Republic of Namibia

MINISTRY OF EDUCATION

JUNIOR SECONDARY PHASE

DESIGN AND TECHNOLOGY

SYLLABUS

GRADES 8 - 10

2011

Ministry of Education
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Design and Technology Syllabus Grades 8 - 10

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Table of Contents

1. INTRODUCTION

This syllabus describes the intended learning and assessment for Design and Technology in the Junior Secondary phase. As a subject, Design and Technology is within the technological area of learning in the curriculum, but has thematic links to other subjects across the curriculum. Learning about technology includes applying knowledge of how to work more efficiently using tools, materials and processes. Technology is a specific way of solving problems through planning, design, realisation and evaluation. Learners develop the necessary knowledge, skills and attitudes to perform tasks using appropriate technology.

The aims, learning objectives and competencies which overlap between subjects are amongst the essential learning within the curriculum as a whole.

2. RATIONALE

Every learner lives in a world where decisions concerning Design and Technology have a significant impact on their careers, well-being and overall quality of life. Thus, the prime goal of Design and Technology is to increase the design abilities and technological literacy of learners.

Design abilities refer to the use of a wide range of experience, knowledge and skills to find the best solution to a problem within certain technological constraints. Technological literacy refers to the understanding of and capability of using the technology necessary to live and work in a technological society.

The Design and Technology Programme for the Junior Secondary Phase is designed to build on knowledge and skills acquired in the Senior Primary Education in order to prepare young male and female Namibians for the demands in the rapidly changing technological world of the present and the future. It will therefore equip them with a variety of knowledge, skills and attitudes to prepare them for further training, employment and, ultimately, for life in general.

Learners engaged in Design and Technology activities will:

- develop a better understanding of the advantages and disadvantages of technology in society;
- nurture an appreciation for the importance between and among technological systems;
- solve technological problems through applying appropriate design principles and to use tools, materials and processes accordingly;
- investigate and study the technological world of the past and present with the intent of improvement in the technology of the future;
- analyse technological systems and the impact of these systems on the environment and society to enhance a positive outcome;
- learn safe and environmentally sound procedures relative to the materials and equipment used in a given occupational field, the importance of safe working conditions, and the health aspects relative to the occupation as a whole, including emergency and first-aid training.

AIMS

This syllabus promotes the following aims:

- foster the learner's awareness of local, regional and national needs of Namibia and contribute towards development;
- equip learners to play an effective and productive role in the economic life of the nation; and
- promote positive attitudes towards the challenges of co-operation, work, entrepreneurship and self-employment.

3. COMPETENCIES AND LEARNING OUTCOMES

3.1 COMPETENCIES

On entry to the Junior Secondary Phase, all learners are expected to develop the following skills/competencies:

Investigating skills:

- critical thinking (coming up with possibilities, making rational choices); creative thinking (producing new ideas); decision making (the process of coming to a conclusion); inquiring (investigating; asking questions to solve problems) and problem solving;
- recalling (remembering); collecting; analysing (thinking through); comparing and contrasting; classifying (putting into groups); generalising (stating broadly) and evaluating (finding out the value of something).

Interpretation skills:

- classifying, converting, identifying, explaining and interpretation of evidence, time management, chronology (sequence of time), cause and effect, change and continuity, recognition of similarities and differences;
- comprehension and interpretation of patterns, sketches, models, cartoons, charts, instructions and illustrations

Applying knowledge and skills:

- drawing, measuring and cutting.
- doing research, assessing information from community members, printed material, libraries and/or computers;
- producing various original usable items from scrap materials (recycling);
- developing initiative and creative design of project work;
- demonstrate application of knowledge in one's community

Communication skills:

- telling, acting out, showing, explaining, displaying, reporting, reading, listening, speaking, drawing and designing

Valuing and attitudinal skills:

- sensitivity to needs, feelings and problems of self and others, cooperative and constructive behaviours, weighting individual needs against the needs of others in a wider society, commitment to the removal of stereotypes and prejudices, competence for responsible social action.
- appreciating the beauty of the natural environment and preserving it for future generations

Participating skills:

- taking part, in group work, through classroom discussions and presentations

A few learners will just be able to manage the minimum, and must receive compensatory teaching through adapted teaching approaches, adapted materials, and assistance from peers. A small number of learners have special needs to a degree which requires greater individual attention or resources. Others will have handicaps which do not necessarily limit cognitive and affective learning and development, e.g. the visually impaired, hearing impaired and physically challenged.

3.2 LEARNING OUTCOMES:

On completion of the Junior Secondary phase, learners demonstrate their creativity through competence in more advanced technological processes of investigating and exploring product ideas, making choices about a range of designs and/or materials, using appropriate tools and electrical equipment, in order to make and evaluate a product.

4. PARTICULAR FEATURES OF THE SUBJECT AT THIS PHASE

Design and Technology is used as a term referring to those aspects of the educational process involving, in addition to general education, the studies of technologies and related sciences, and the acquisition of a broad base of general practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of the economic and social life. Design and Technological education is further understood to be:

- an integral part of general education;
- a means to prepare for technological fields and for effective participation in the world of work;
- an aspect of lifelong learning and preparation for responsible citizenship;
- an instrument for promoting environmentally sound sustainable development.

5. GENDER ISSUES

Gender equity is an essential step in the path to a better future. Design and Technology empowers the individual to make life choices based on interest and aptitudes, rather than tradition or gender.

6. LOCAL CONTEXT AND CONTENT

The learning content in this syllabus is relevant to the Namibian context, though themes and topics are on a variety of scales. Teachers are therefore urged to use local examples to illustrate concepts, issues and processes. Issues and strategies can be adapted to the appropriate level of learners. Design projects can serve as illustrative examples or as a basis for more extended classroom discussion of local issues.

Learners should be encouraged to consider and evaluate different points of views and thus encourage critical thinking.

The local environment can be used when planning for and carrying out simple projects, which promote the development of Design and Technological skills. On a basic level, learners (as individuals and groups) could identify a local problem and find solutions to service facilities in their local area, through the use of resources such as electricity, wood and water at schools or household. Other relative topics can be on materials, health and HIV and AIDS. Learners could also practice how to apply methods of designing to change or better their environment. Simple design proposals could also be used to facilitate the understanding and action taking/problem solving of environmental risks and issues, for example.

Though not directly examined, these practical activities could facilitate the development of key skills as contained in the Pilot Curriculum Guide for Senior Secondary Education and Design and Technological Skills. It also supplements efforts of the Whole School Approach to address local social and environmental problems through school clubs and committees.

7. LINKS TO OTHER SUBJECTS AND CROSS-CURRICULAR ISSUES

The cross-curricular issues including Environmental Education, HIV and AIDS, Population Education, Education for Human Rights and Democracy (EHRD), and Information and Communication Technology (ICT) have been introduced to the formal curriculum to be dealt with in each subject and across all phases because each of the issues deals with particular risks and challenges in our Namibian society. All of our learners need to:

- understand the nature of these risks and challenges
- know how they will impact on our society and on the quality of life of our people now and in the future
- understand how these risks and challenges can be addressed on a national and global level
- understand how each learner can play a part in addressing these risks and challenges in their own school and local community.

The main risks and challenges have been identified as:

- the challenges and risks we face if we do not care for and manage our natural resources
- the challenges and risks caused by HIV and AIDS
- the challenges and risks to health caused by pollution, poor sanitation and waste
- the challenges and risks to democracy and social stability caused by inequity and governance that ignores rights and responsibilities
- the challenges and risks we face from globalisation.

Since some subjects are more suitable to address specific cross-curricular issues, those issues will receive more emphasis in this syllabus.

7.1 INFORMATION AND COMMUNICATION TECHNOLOGY

One of the features of a rapidly changing world is the accumulation of a vast amount of information and data. Technology has an impact on all aspects of modern life. Learners need to be equipped with the knowledge and skills to be competent and confident in assessing and working with various forms of information and data.

The approach to information and communication technology focuses on the use of support materials and equipment to access, process and use information in the most appropriate ways.

Where resources are available, schools should interpret the use of information and communication technology to include the following skills:

- word processing
- graphics
- CD-ROM referencing

7.2 LINKS TO OTHER CROSS-CURRICULAR ISSUES

Grade	HIV and AIDS	Environment Education	Human Rights and Democracy
8	2. Safety Precautions	1.Design and Technology 5.1 Structures 5.3 Materials 6. Energy	2. Safety Precautions 5.1 Structures
9	2. Safety Precautions	1. Design and Technology 5.1 Structures 5.3 Materials 6. Energy	2. Safety Precautions 3. Graphical Communication
10	2. Safety Precautions	1. Design and Technology 4.1 Structures 4.3 Materials 5. Energy	2. Safety Precautions

8. APPROACHES TO TEACHING AND LEARNING

The approach to teaching and learning is based on a paradigm of learner-centred education described in ministerial policy documents, curriculum guides, and the conceptual framework. This approach ensures optimal quality of learning when the following principles are put into practice.

The aim is to develop learning with understanding, and the skills and attitudes to contribute to the development of society. The starting point for teaching and learning is the fact that the learner brings to the school a wealth of knowledge and social experience gained continually from the family, the community, and through interaction with the environment. Learning in school must involve, build on, extend and challenge the learner's prior knowledge and experience.

Learners learn best when they are actively involved in the learning process through a high degree of participation, contribution and production. At the same time, each learner is an individual with his/her own needs, pace of learning, experiences and abilities. The teacher must be able to sense the needs of the learners, the nature of the learning to be done, and how to shape learning experiences accordingly. Teaching strategies must therefore be varied but flexible within well-structured sequences of lessons.

The teacher must decide, in relation to the learning objectives and competencies to be achieved, when it is best to convey content directly; when it is best to let learners discover or explore information for themselves; when they need directed learning; when they need reinforcement or enrichment learning; when there is a particular progression of skills or information that needs to be followed; or when the learners can be allowed to find their own way through a topic or area of content.

Work in groups, in pairs, individually, or as a whole class must therefore be organised as appropriate to the task in hand. Co-operative and collaborative learning should be encouraged wherever possible. In such cases, tasks must be designed so that pair or group work is needed to complete it, otherwise the learners will not see any relevance in carrying out tasks together. As

the learners develop personal, social and communication skills, they can gradually be given increasing responsibility to participate in planning and evaluating their work, under the teacher's guidance.

The teacher must decide, in relation to the learning objectives and competencies to be achieved, when it is best to convey content directly, when it is best to let the learners discover or explore information for themselves, when they need directed learning; when they need reinforcement or enrichment, when there is a particular progression of skills or information that needs to be followed, or when the learners can be allowed to find their own way through a topic or area of content.

9 SUMMARY OF LEARNING CONTENT

Theme/Topic	Grade 8	Grade 9	Grade 10
1. Design and Technology		1. Design and Technology	1. Design and Technology
2. Safety Precautions		2. Safety Precautions	2. Safety Precautions
3. Design		3. Design	3. Design
4. Design Communication		4. Design Communication	4. Design Communication
5. Resistant Materials		5. Resistant Materials	5. Resistant Materials
6. Technology	6.1 Structures 6.2 Mechanisms 6.2.1 Lever and linkages 6.2.2 Rotary Systems 6.3 Energy 6.4 Electricity 6.4.1 Concepts	6.1 Structures 6.2.Rotary Systems 6.3 Energy 6.4 Electricity 6.4.1 Concepts 6.4.2 Electromechanical devices	6.1 Structures 6.2 Mechanisms: Pneumatics and Hydraulics 6.2.1 Rotary Systems 6.3 Energy 6.4 Electricity 6.4.1 Concepts 6.4.2 Electromechanical devices and transducers 6.4.3 Electronics 6.4.4 Digital logic

10. LEARNING CONTENT

It is recommended that the approach to the following general objectives should be a practical one wherever possible. The basic competencies of the syllabus are seen as a single and integrated area of study.

10.1 GRADE 8

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
1. Design and Technology	• understand the concepts of Design and Technology	• describe the concepts: – Design – Technology • describe the link between Design and Technology • explain and describe the negative and positive environmental and social impacts of Design and Technology
2. Safety Precautions	• be introduced to safety issues with regard to hand tools and equipment • understand the basic National Occupational Safety Authority (NOSA) safety regulations in the classroom environment	• identify the safety rule relevant to: – punches – bench vice/hand vice – hammers (ball, claw, etc.) and mallets – pincer – screwdrivers – saws (back-, hack-, coping-, etc.) – files and rasps – planes and chisels – pliers (combination-, engineers-, etc.) and side cutters • apply and use of tools and equipment safely • discuss First Aid rules done in Grade 7

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
2. Safety Precautions (continued)	• know the basic NOSA safety regulations in the classroom environment (continued) • demonstrate skills with regard to HIV and AIDS	• illustrate and demonstrate the safety aspects concerning: – storage and use of tools and equipment – protective wear including eye protection, clothing – machine guards – disposal of waste – accident procedure • identify ways to reduce the common use of chemicals dangerous to the environment, e.g. bleaches, chlorofluorocarbons (CFC's), toxic materials • apply appropriate safety rule with regard to: – open wounds – bleeding with prevention of HIV and AIDS in mind
3. Design (to be presented continuously throughout the phase and closely linked to listed technological concepts, principles, processes and procedures)	• acquire knowledge and understanding of factors influencing design • acquire a working knowledge of stages in the design process	• discuss and apply the concepts: – functionality – aesthetics – ergonomics • discuss and research the design process: – analysis – design brief – research – specifications – possible solutions – selecting a solution
(NB: Design stages are to be refined and finalised into a design folder during the first part of the final year of Junior Secondary Phase.)		

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
4. Design Communication (To be presented continuously throughout the phase and closely linked to listed Design concepts, principles, processes and procedures)	• know the drawing equipment and instruments	• identify and use drawing equipment and instruments (drawing board; T-square; rule; compasses; pencil; rubber; $30^o/60^o$ and 45^o set squares) • discuss and apply the factors influencing the neatness and quality of drawings • plan and apply a proper layout on drawing paper with efficient use of working space
	• demonstrate graphical communication techniques	• use appropriate shading and colouring techniques on presented freehand sketches • apply freehand sketching techniques to present two and three dimensional views of simple objects • identify and apply appropriately and according to prescribed standards: – different line types – print writing techniques for notes, titles and relevant information – dimensioning methods for horizontal, vertical and isometric measurements • apply appropriate methods to construct and draw: – regular plane linear shapes (circles, triangles, quadrilaterals, pentagons, hexagons and octagons) – regular geometrical solids with bases as above – simple geometrical solids and shaped blocks in orthographic projection (first and third angle orthographic projection with appropriate titles and dimensioning); – simple geometrical solids and shaped blocks in isometric projection (excluding curved shapes) and insert appropriate titles and dimensioning

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
5. Resistant Materials: timber plastics metal	• be introduced to and gain awareness of the basic properties and uses of timber, plastic and metal	• identify and collect examples of household containers made of selected materials • carry out simple experiments to determine approximate properties of collected materials (appearance, hardness, strength) • list possible reasons why a material has been used for particular purpose
	• acquire a working knowledge of timber	• collect and discuss a selection of locally used timbers regarding: – types – origin – structure – properties – uses • identify and describe storage procedures for timbers and timber products
	• acquire practical skills in working with and accurately manipulating timber	• describe and apply the principles and procedures in: – measuring and marking out – sawing – planning to accurate size – shaping to flat, concave and convex profiles – drilling – abrading and finishing timber – joining using fasteners and adhesives • identify and use appropriately the required tools, equipment and sundries for listed procedures • apply appropriately the relevant safety principles and procedures for listed processes, tools and equipment

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
5. Resistant Materials: (continued)	• acquire a working knowledge of plastic	• collect and compare various plastics regarding: – type (thermo and thermo hardened) – production/manufacturing – properties – uses • identify and describe storage procedures for plastic and plastic products
	• acquire practical skills in working with and accurately manipulating plastic	• describe and apply the principles and procedures in: – measuring and marking out – sawing and cutting – drilling – filing, abrading and finishing – joining using fasteners and adhesives • identify and use appropriately required tools and equipment for listed procedures • apply appropriately the relevant safety principles and procedures for listed processes, tools and equipment
	• acquire working knowledge of metals	• collect, discuss and evaluate various ferrous and non-ferrous metals regarding: – types (steels, copper, aluminium, zinc, tin, silver, gold and lead and their main alloys) – production/manufacturing – properties of metal (colour, texture and corrosion resistance) – uses • identify and describe safe storage procedures for metals

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
5. Resistant Materials: (continued)	• acquire practical skills in working with and accurately manipulating metal	• describe and demonstrate the principles and procedures in: – measuring and marking out – sawing and cutting – applying appropriate chiselling techniques – filing to accurate size – drilling – abrading and finishing – joining using fasteners • identify and appropriately using required tools, equipment and sundries for listed procedures • apply appropriately the relevant safety principles and procedures for listed processes, tools and equipment
6. Technology: 6.1. Structures	• know various natural structures	• identify and collect examples of natural structures • determine, through experimentation, the composition and properties of identified structures • form an opinion on why an identified structure is suitable for purpose
	• gain an awareness of how natural structures have been adapted to form a basis for human-made structures.	• make comparisons between identified natural structures and human-made structures with similar composition and purpose • suggest ways of how particular natural structures could be adapted to solve a selected design problem

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.2 Mechanisms	• be aware of the types of movement and how movement can be transmitted	• identify and describe different types of movement • research and discuss mechanisms used to transmit motion • describe and evaluate/compare the concepts: – lever – mechanical advantage (MA) – velocity ratio (VR) – efficiency • identify and classify levers into its three classes • carry out experiments to determine the relation between MA, VR and Efficiency in lever systems • do simple calculations to determine the value of: – $\text{MA} = \frac{\text{Load}}{\text{Effort}}$ – $\text{VR} = \frac{\text{Distance moved by Effort}}{\text{Distance moved by Load}}$ – $\text{Efficiency} = \frac{\text{MA}}{\text{VR}}$
6.2.1 Levers and Linkages	• acquire a working knowledge of: – levers and linkages	• research and discuss that a linkage is a combination of a set of lever systems • identify applications of simple linkages in household appliances and simple mechanisms • carry out experiments on selected linkage systems to determine the: – relation between the input and output loads – the influences on MA; VR and efficiency of the system • apply lever and linkage systems in simple design solutions

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.2.2 Rotary systems	• acquire a working knowledge of: - pulley systems and belt drives	• describe and evaluate the concepts: – pulley and pulley systems – belts and belt drives – mechanical advantage (MA) – velocity ratio (VR) – efficiency • identify applications of simple pulley systems in household • appliances and simple mechanisms • carry out experiments to determine the VR relation in pulley systems • do simple calculations to determine VR from: – $VR = \frac{\text{Distance moved by Effort}}{\text{Distance moved by Load}}$ – $VR = \frac{\text{Distance moved by Driver Pulley}}{\text{Distance moved by Driven Pulley}}$ – $VR = \frac{\text{Diameter of Driven Pulley}}{\text{Diameter of Driver Pulley}}$ • apply pulley and belt systems in simple design solutions
	- chain and sprocket systems	• describe and evaluate chain and sprocket systems • make a comparison between pulley and belt drive systems and chain and sprocket systems regarding their properties and applications • carry out simple experiments to determine the rotational speed between the driver and driven sprockets • apply chain and sprocket systems in simple design solutions

Themes/Topics	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.3 Energy	• know the forms of energy • be aware that energy can be converted from one form into another form	• discuss that energy is the capacity for doing work • identify and describe different forms of energy • carry out simple experiments to find out how one form of energy could be converted into another form of energy • research and illustrate that energy conversions result in energy "losses" • carry out simple experiments to show methods of converting solar energy into a usable energy form (heat for cooking, electricity to power a motor, etc.)
6.4 Electricity	• know, as appropriate, first aid and safety precautions • acquire a basic working knowledge of electricity and electronics	• apply appropriate first aid and safe working procedures when working with electrical and electronic equipment • illustrate and compare that electricity is one form of energy • discuss and describe the concepts: – electricity – current flow – conventional current • identify and describe methods of generating electricity • compare and illustrate forms of electricity (static electricity and alternating and direct currents) • identify and describe the properties and uses of: – conductors – semiconductors – insulators • carry out simple experiments to determine the relationship between current, voltage and resistance (Ohm's Law) • interpret and draw a selection of simple electric and electronic circuit diagrams using standard symbols • identify and describe the purpose of components used in the selected circuits • construct elementary circuits from a circuit diagram

10.2 GRADE 9

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
1. Design and Technology	• show awareness and appreciation of the issues regarding conservation of resources	• research and compare the concepts: – renewable resources – non-renewable resources • identify and describe ways to conserve resources • do an elementary case study (from information provided or information that can easily be gathered) on an identified product to: – determine positive and negative impacts of the product on society and the environment regarding its design, manufacturing processes, intended uses and possible ways to dismantle and/or discard after service life – propose possible improvements on the design of the product to eliminate or minimise the negative impacts on environment and society
2. Safety Precautions	• know the safety rules with regard to basic hand tools and minor electrical tools	• compare and discuss safety rules with regard to: – electrical soldering iron – drilling machine – angle grinder • apply safety precautions when doing minor adjustments to electrical power tools (change of plug, adjustment of saw blade, etc.) • organise their workplace to maximise their safety and output • report: – hazards – breakages – accidental spillages • explains the necessity of wearing protective clothing

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
2. Safety Precautions (continued)	• demonstrate more advanced safety precautions according to the NOSA regulations	• handle safety regulations including: – correct selection of materials and finishes – safety in terms of function and project maintenance – dust and fume extraction – the disposal of chemicals to manufactured projects – make use of colour association, i.e. red for danger
3. Design (to be presented continuously throughout the phase and closely linked to listed technological concepts, principles, processes and procedures)	• acquire a working knowledge of stages in the design process	• draw and compile a detailed working drawing for selected product designs • identify factors that contribute to the production costs of the selected design • do elementary costing on the proposed design • draw up a formal production plan supported by a possible time frame for the identified product design
	• understand the concepts and principles of design stages	• apply processes to produce an actual design proposal
(NB: Design stages to be refined and finalised into a design folder during the first part of the final year of Junior Secondary Phase.)		
4. Design Communication (to be presented continuously throughout the phase and closely linked to listed design concepts, principles, processes and procedures)	• know how to incorporate appropriate media and graphic techniques to make graphical presentations of design ideas	• present a graphical view (freehand drawing) of a selection of natural and human-made objects demonstrating the application of: – thin and thick lines – light and shade to show form and mass – textural representation to represent material type – colour rendering to show space and depth

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
4. Design Communication (continued)	• know how to apply appropriate geometrical constructions, drawing techniques and calculations to solve given problems	• identify and apply suitable construction methods to: – construct and draw parallel, perpendicular and bisecting lines – divide lines into a selected number of equal parts – bisect angles – reduce and enlarge plane figures – construct and draw tangents (linear and curved) to lines and circles/curved sections – draw inscribed and circumscribed plane figures (circles, triangles, quadrilaterals, pentagons, hexagons and octagons)
	• know how to apply appropriate geometrical constructions, drawing techniques and calculations to solve given problems • know differences between various diagrammatic presentations • develop flow charts and graphs to present data graphically	• identify and apply suitable drawing techniques to construct, project and draw in first angle orthographic projection: – regular and oblique geometrical solids (cylinders, cones, prisms and pyramids) – parts of simple mechanical devices to specified scale and fully dimensioned • identify and apply suitable drawing techniques to construct and draw in isometric projection: – parts of simple mechanical devices to specified scale and fully dimensioned • read and interpret: – elementary site and building plans – road maps – graphs • read and interpret data of quantity and distribution presented on a variety of flow charts and graphs

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
5. Resistant Materials: timber plastics metal	• acquire working knowledge of timber	• collect and discuss a selection of locally used timbers regarding: – conversion of logs into marketable timber – conversion methods and its influences on quality and appearances of timber – seasoning of timber • collect and compare a selection of locally used manufactured boards regarding: – types – structure – production/manufacturing – properties; and – uses
	• acquire practical skills in working with, and accurately manipulating timber	• describe and apply the principles and procedures in: – measuring, marking out and making a selection of elementary wood joints – fitting joints appropriately to form designed framework or artefacts – joining manufactured boards using fittings, fixtures and adhesives • select and apply suitable wood finishes from sanding sealant, stains, oils, waxes, varnish, paints, plastic coating and creosote • identify and use appropriately the required hand tools, equipment and sundries for listed procedures • apply appropriately the relevant safety principles and procedures for the relevant procedures, tools and equipment

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
5. Resistant Materials: (continued)	• acquire a working knowledge about processes and procedures to shape plastics • acquire practical skills in working with and accurately manipulating plastic • acquire a working knowledge of metal • acquire practical skills in working with and accurately manipulating metal	• illustrate and evaluate the following shaping processes: – casting – moulding – deforming • design and construct simple moulds to carry out elementary shaping on plastics • identify and use appropriately the required hand tools, equipment and sundries for listed procedures • apply appropriately the relevant safety principles and procedures for the relevant procedures, tools and equipment • collect, discuss and evaluate various ferrous and non-ferrous metals regarding: – influences of cold working on structure of metal – heat treatment processes and its influences on the structure of metal – properties of metal (hardness, toughness, brittleness, elasticity, plasticity, tenacity and malleability) • identify and prepare elementary joints for: – soft soldering – brazing – oxy-acetylene welding – arc welding • identify and use the appropriate tools, equipment and sundries to apply the joining methods in a practical project(s) • apply appropriately the relevant safety principles and procedures for applicable processes, tools and equipment
6. Technology 6.1 Structures	• acquire a working knowledge of structures	• identify and classify structures into main groups • illustrate and discuss static and dynamic forces acting on a structure

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.1 Structures (continued)	• acquire a working knowledge of structures (continued)	• determine and identify, through experimentation: – the type of forces acting on a structure – the influences of a particular type of force on a structure – the influence of triangulation on stability and strength of structures – methods to strengthen and stabilise structures • suggest and construct a solution for selected structural design problems
6.2 Rotary Systems	• acquire a working knowledge of gears and gear systems	• compare and discuss various methods of converting: – rotary motion into reciprocating motion – reciprocating motion into rotary motion • identify and be aware of possible uses for: – spur gear systems – idler gears – bevelled gears systems – worm gear systems – rack and pinion gear systems • compare between pulley and belt drive systems, chain and sprockets systems and gear systems regarding: – main features – advantages and disadvantages – main uses
	• acquire a working knowledge of gears and gear systems	• carry out simple experiments to determine the relationship between: – input and output rotary speed (VR) – effort and the load (MA)

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.2 Rotary Systems (continued)	• acquire a working knowledge of crank sliders (followers) and cam systems and crankshaft and connecting rod systems • know concepts and principles of mechanisms to solve identified design problems	• describe and evaluate the concepts: – cam and cam follower (crank sliders) systems – crankshaft and connecting rod systems • carry out simple experiments to form an understanding of how the profile of a cam influences the movement transmitted to a cam follower • apply concepts and principles regarding crank sliders (followers), cam systems and crankshaft and connecting rod systems to solve simple identified design problems
6.3 Energy	• understand sources of energy • know how to research the local energy consumption patterns • know ways to reduce local energy consumption	• identify and list energy sources • illustrate and discuss that the Sun is the primary source of energy • carry out an elementary research to determine the sources used to generate energy for local consumption • determine from the research the positive and negative effects of energy consumption on the local society and environment • suggest ways of how the energy consumed from particular sources could be reduced/consumed more efficiently
6.4 Electricity	• know, as appropriate, first aid and safety precautions • acquire a basic working knowledge of electricity and electronics regarding: – maintenance and repairing procedures – cells	• apply first aid and safety precautions and procedures applicable to the working and testing tasks • describe and carry out minor inspection, maintenance and repairing procedures for portable electrical powered tools/equipment on inventory • list and describe differences between primary and secondary cells regarding its basic construction and properties • describe and apply basic maintenance procedures for primary and secondary cells • identify uses for primary and secondary cells

Theme/Topic	**Learning Objectives** *Learners will:*	**Basic Competencies** *Learners should be able to:*
6.4 Electricity (continued)	• acquire a basic working knowledge of electricity and electronics regarding: – series, parallel and series-parallel connections	• illustrate and compare the terms: – series – parallel – series-parallel connections • set up and connect simple series, parallel and series-parallel circuits • carry out simple experiments to determine the influences of series, parallel and series-parallel connections on circuits regarding current and resistance
	– magnets and electromagnetism	• discuss magnets and their properties • compare the relationship between magnets and electricity • carry out simple experiments to determine the electromagnetic effect of current carrying conductors: – on one another – in a magnetic field • discuss and compare the effects of electromagnetism as applied in simple circuits such as electric bells, indicators and relay switches
	– simple domestic power supply systems	• apply the effects of electromagnetism in solving simple identified design problems such as in simple alarm circuits • design and draw wiring diagrams for simple domestic lighting and power circuits • illustrate and apply the standard wiring regulations applicable to consumer circuits • discuss the importance of earthing • apply basic wiring procedures in practice • identify and carry out basic tests on domestic circuits • identify and be able to use the testing equipment necessary for basic tests on domestic circuits (AVO-, Multi-, Megger-, Volt-, Ohm- and Ammeter)

10.3 GRADE 10

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
NB. Learners are encouraged to know and understand work done in Grades 8 and 9, because they will also be examined at the end of Grade 10 about it all!		
1. Design and Technology	• develop conservation methods for natural resources • understand conservation methods for natural resources	• list and describe conservation methods for natural resources • draw up a comparison of advantages and disadvantages of listed conservation methods • illustrate and apply recycling as a method of conserving natural resources • suggest and describe ways of using recycling to conserve natural resources • carry out an elementary study to identify a locally applied conservation method/a conservation method that could be applied locally • determine from the study the positive/possible positive results of the identified conservation method
2. Safety Precautions	• know a broad understanding of safety regulations according to NOSA safety standards	• compare, discuss and evaluate safety regulations which include: – workers within the projected environment – flammable and toxic substances – use of barrier creams – the need to dispose of redundant projects in a safe and environmentally friendly way
3. Design (to be presented continuously throughout the phase and closely linked to listed technological concepts, principles, processes and procedures)	• demonstrate knowledge of appropriate tools and materials to make designed product with precision and control according to working drawings and production plan	• construct and produce a prototype of a design product with precision and control according to working drawings and the production plan in design folder • discuss and compare quality and practical difficulties encountered during construction process to make appropriate adjustments to working drawings and production plan as required • illustrate, compare and apply working practices and efficient use of materials and tools

Theme/Topic	**Learning Objectives** **Learners will:**	**Basic Competencies** **Learners should be able to:**
3 Design (continued)	• know objective criteria and apply appropriate procedures to evaluate/test prototype of designed artefact	• generate objective criteria linked directly to the design brief and specifications • use surveys, questionnaires and testing procedures to evaluate/test prototype • apply the criteria-selected evaluation/testing procedure and carry out the evaluation/testing procedure • compile, interpret and present the evaluation/test results
	• make relevant modifications to designed prototype as/if required	• make/suggest appropriate modifications/changes as/if required
4. Design Communication (to be presented continuously throughout the phase and closely linked to listed design concepts, principles, processes and procedures)	• understand appropriate media and graphic techniques to make graphical presentations of design ideas	• present ideas using formal drawing techniques in two and three dimensional sketches, first and third angle orthographic projections, circuit diagrams or systems that include: – scales and scaling, outlines, dimensioning – notes that clarify design reasoning and key choices – enhancements of sketches, e. g. colour, texture, shade, thick and thin lines and shadow
	• know appropriate geometrical constructions, drawing techniques and calculations to solve given problems	• identify and apply appropriate geometrical constructions, drawing techniques and calculations to determine: o inclinations of oblique lines and triangular laminas with two principle planes o true lengths of oblique lines o true shape and sizes of oblique triangular laminas; and o shortest distance between: – point and line – line and line (one line parallel to one principle plane); and – point and triangular lamina

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
4. Design Communication (continued)	• know appropriate geometrical constructions, drawing techniques and calculations to solve given problems (continued)	• apply appropriate geometrical constructions, drawing techniques and calculations to draw: – vectors – frame stress diagrams – electrical circuit diagrams – electronic circuit diagrams • identify and apply appropriate construction methods and drawing techniques to project and draw in first and third angle orthographic projection: – sectional views of regular geometrical solids (cylinders, cones, prisms and pyramids) with cutting plane oblique to one principle plane – true shape of sectional views of regular geometrical solids (cylinders, cones, prisms and pyramids) with cutting plane oblique to both the principle planes • apply appropriate geometrical constructions, drawing techniques and calculations to construct surface developments of: – rectangular prisms (including truncated prisms) – truncated triangular, rectangular and hexagonal pyramids; and – cylinders (including truncated cylinders)
	• understand scale drawings and diagrammatic layout drawings	• identify and apply appropriate constructions and drawing techniques to project and draw in first angle orthographic projection to specified scale and fully dimensioned: – out side and sectional views of mechanical devices – simple assembled drawings from exploded isometric views – assembled drawings from a part drawing consisting of not more than five parts; and – part drawings from assembled views of simple mechanical components

Theme/Topic	**Learning Objectives** **Learners will:**	**Basic Competencies** **Learners should be able to:**
4. Design Communication (continued)	• understand scale drawings or diagrammatic layout drawings (continued) • know how to develop diagrammatic presentations • know flow charts and graphs to present data graphically	• identify and apply appropriate constructions and drawing techniques to project and draw to a prescribed scale: – fully dimensioned isometric views of shaped geometrical solids (including curved sections) and simple mechanical components – exploded isometric views of simple mechanical devices • design and draw: – elementary site and building plans – road maps – graphs • identify, select and apply a suitable flow chart and graph types to present processes/systems and statistical data of quantity and distribution
5. Resistant Materials: timber plastics metal	• acquire a working knowledge of timber • acquire practical skills in working with and accurately manipulating timber	• identify and describe the principle factors responsible for: – defects in timber – decay/deterioration in timber • identify and describe methods/procedures to prevent/minimise listed: – defects in timber – decay/deterioration in timber • research, discuss and compare different methods of producing required shapes and forms: – cutting and removal of materials (wastage) – joining and adding materials (addition) • apply elementary design and construction of joints (butt, tongued, rebate, dowelled, housed and shouldered, combed, dovetailed) from the joint groups: – widening joints – corner joints – framing joints • apply a combination of fixings, fastenings, adhesives and joints for basic framed constructions

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
5. Resistant Materials: (continued)	• acquire practical skills in working with and accurately manipulating timber (continued)	• select and apply suitable wood finishes from sanding sealant, stains, oils, waxes, varnishes, paints, plastic coating and creosote • show skilful manipulation of basic hand tools and equipment and electrically powered hand tools and equipment in carrying out relevant practical tasks • apply appropriately the relevant safety principles and procedures for applicable processes, tools and equipment
	• acquire a working knowledge of plastic	• identify and describe the basic shaping procedures regarding: – line bending – vacuum forming – turning – laminating
	• acquire practical skills in working with and accurately manipulating plastic	• identify and use the appropriate tools, equipment and sundries to apply a selection of the shaping process in a practical project • apply appropriately the relevant safety principles and procedures for applicable processes, tools and equipment
	• acquire a working knowledge of metal	• illustrate and compare different methods of producing required shapes and forms: – cutting and removal of materials (wastage): shears, guillotine, oxy-acetylene cutting, drilling, punching, grinding, turning and milling – bending and rolling (folding iron, pan-brake, slip rolls) – joining (fastenings, fixings, welding) • discuss and apply elementary design and preparation of joints for: – bolted joints – welding joints
	• acquire practical skills in working with and accurately manipulating metal	• apply a combination of fixings, fastenings and fusion joints for basic framed constructions • describe and apply suitable metal surface protection and finishes from polishing, lacquering, blueing, painting, anodising, electroplating, and enamelling • show skilful manipulation of basic hand tools and equipment and electrically powered hand tools and equipment in carrying out relevant practical tasks

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
5. Resistant Materials: (continued)	• acquire practical skills in working with and accurately manipulating metal (continued)	• apply appropriately the relevant safety principles and procedures for applicable processes, tools and equipment
6. Technology: 6.1. Structures	• show an understanding of frame structures regarding applicable terminology, reinforcing techniques and the effects of forces on structures • acquire graphically the type and magnitude of forces in frame structures • know appropriate concepts and principles to solve selected structural design problems	• discuss and compare frame structures regarding: – basic structural components (columns, beams, arches, buttress, struts, stays, guys and ties – reinforcing techniques (triangulation, webs and fillets, orientation and cross-sectional areas of members) – forces acting on structures (static forces and dynamic forces) • identify and describe the effects of external forces on structures • do basic calculations for uniformed beams and triangulated structures (not more than three pointed loads) to determine: – left- and right-hand reactions – moments around a point • determine graphically the magnitude and the type of forces in the members of elementary triangulated framed structures • select/adapt/design simple structures to meet the demands of a particular design situation
6.2. Mechanisms: Pneumatics and Hydraulics	• understand pneumatic and hydraulic systems	• research and describe the basic operation principles and cycles of: – pneumatic systems – hydraulic systems • identify and know the purposes of components and symbols used in basic pneumatic and hydraulic circuits • make a comparison between pneumatic systems and hydraulic systems regarding their: – basic circuit layout – properties – applications

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
6.2. Mechanisms: Pneumatics and Hydraulics (continued)	• demonstrate an understanding of pneumatic and hydraulic systems (continued)	• identify from local environment and examples where: – pneumatic systems are used – hydraulic systems are used • list the advantages and disadvantages associated with the particular use of the identified: – pneumatic system – hydraulic system
	• demonstrate elementary experiments on a simple hydraulic system to determine the relationship between input forces and output forces	• carry out elementary experiments on a simple hydraulic system to determine the relation between: – input and output forces – distance over which force has been applied compared to distance load is displaced • do elementary calculations regarding: – relations between input and output forces – distance over which force has been applied compared to distance over which load is displaced (MA)
	• know appropriate concepts and principles to solve selected structural design problems	• apply concepts and principles regarding pneumatic and hydraulic systems to solve simple identified design problems

Theme/Topic	**Learning Objectives** **Learners will:**	**Basic Competencies** **Learners should be able to:**
6.3. Energy	• understand different forms of energy storage • know practical ways of converting and transmitting energy	• identify and describe different forms of energy storage in use to including: – kinetic energy – potential energy – thermal energy – electrical energy – chemical energy • identify and describe practical and efficient methods of the conversion and transmission of energy through simple mechanisms, machines, engines, turbines and electric motors • apply concepts and principles regarding energy storing, conversion and transmission to solve simple identified design problems

Theme/Topic	Learning Objectives Learners will:	Basic Competencies Learners should be able to:
6.4. Electricity; Concepts, Electromechanical devices and transducers, Electronic systems and Digital logic	• acquire a basic working knowledge of electricity and electronics regarding: – concepts	• discuss and apply the concepts and the ability to do elementary calculations of: – energy, force, work, power, electrical current and specific heat capacity
	– electromechanical devices and transducers	• identify and list the applications of a selection of: – electromechanical devices – transducers
	– electronic systems	• identify and list the applications of selected electronic systems from elementary: – power supply circuits – transistor amplifiers – audio power amplifiers
	– digital logic	• discuss and compare the concepts: – logic systems – logic gates – truth tables • identify and list the characteristics of logic gates • draw circuit diagrams of elementary logic gate systems and draw up a truth table for the logic gate system • apply concepts and principles regarding logic systems to solve simple identified design problems

11 ASSESSMENT

A learner-centred curriculum and learner-centred teaching use a broad range of knowledge and skills that are relevant to the knowledge-based society. The basic competencies in the syllabuses state what understanding and skills a learner must demonstrate as a result of a teaching-learning process, and which will be assessed. However, it is intended that the curriculum be learning-driven, not assessment and examination driven. Assessment and examination are to support learning.

11.1 Continuous assessment

In order to capture the full range and levels of competence, a variety of formal and informal continuous assessment situations is needed to give a complete picture of the learner's progress and achievements in all subjects. Continuous assessment must be clear, simple and manageable, and explicitly anchored in learner-centred principles and practice. Teachers must elicit reliable and valid information of the learner's performance in the basic competencies. The information gathered about the learners' progress and achievements should be used to give feedback to the learners about their strong and weak points, where they are doing well, and why, and where they need to try more, how, and why. The parents should be regularly informed about the progress of their child in all subjects, be encouraged to reward achievements, and given suggestions as to how they can support their learning activities.

The learner's progress and achievements in all subjects must be reported to parents on the school report.

11.2 Formative and summative assessment

The two modes of assessment used are formative continuous assessment and summative assessment. Formative continuous assessment is any assessment made during the school year in order to improve learning and to help shape and direct the teaching-learning process. Assessment has a formative role for learners if and when:

- it is used to motivate them to extend their knowledge and skills, establish sound values, and to promote healthy habits of study
- assessment tasks help learners to solve problems intelligently by using what they have learned
- the teacher uses the information to improve teaching methods and learning materials

Summative assessment is an assessment made at the end of the school year based on the accumulation of the progress and achievements of the learner throughout the year in a given subject, together with any end-of-year tests or examinations. The result of summative assessment is a single end-of-year promotion grade.

11.3 Informal and formal methods

The teacher must assess how well each learner masters the basic competencies described in the subject syllabuses and from this gain a picture of the all-round progress of the learner. To a large extent, this can be done in an informal way through structured observation of each learner's progress in learning and practice situations while they are investigating things, interpreting phenomena and data, applying knowledge, communicating, making value judgements, and in their participation in general.

When it is necessary to structure assessment more formally, the teacher should as far as possible use the same sort of situation as ordinary learning and practice situations to assess the competency of the learner. The use of formal written and oral tests can only assess a limited range of competencies and therefore should not take up a great deal of time. Short tests in any subject should be limited to part of a lesson and only exceptionally use up a whole lesson. End-of-term tests should only be written in the first lesson of the day, so that teaching and learning can continue normally for the rest of the time.

In Grade 10 a mock examination may be held to learn examination skills and to identify areas of the syllabus which may need extra attention. Mock examinations only serve a useful purpose if they are used as a learning experience in how to organise oneself, how to read the paper, how to interpret and answer examination-type questions, and how to allocate time in an examination. This involves the

teacher going through the paper systematically with the class when their answers are returned.

11.4 Evaluation

Information from informal and formal continuous assessment is to be used by the teacher to know where it is necessary to adapt methods and materials to the individual progress and needs of each learner. At the end of each main unit of teaching, and at the end of each term, the teacher together with the learners should evaluate the process in terms of tasks completed, participation, what the learners have learnt, and what can be done to improve the working atmosphere and achievements of the class.

11.5 Criterion-referenced grades

When grades are awarded in continuous assessment, it is essential that they reflect the learner's actual level of achievement in the Basic Competencies, and are not related to how well other learners are achieving or to the idea that a fixed percentage of the learners must always be awarded a Grade A, B, C, and so on (norm-referencing). In criterion-referenced assessment, each letter grade must have a descriptor for what the learner must demonstrate in order to be awarded the grade. Grade descriptors must be developed for each subject for each year. It is important that teachers in each department/section work together to have a shared understanding of what the grade descriptors mean, and how to apply them in continuous assessment, so that grades are awarded correctly and consistently across subjects. Only then will the assessment results be reliable.

11.6. Grade descriptors in the Junior Secondary Phase

In the Junior Secondary phase, grades A-G and U (ungraded) apply as follows:

Grades	Mark range	Grade descriptor
A	80%+	**Achieved Basic Competencies exceptionally well**. The learner is outstanding in all areas of competency.
B	70-79%	**Achieved Basic Competencies very well**. The learner is highly proficient in most areas of competency.
C	60-69%	**Achieved Basic Competencies well**.
D	50-59%	**Achieved Basic Competencies satisfactorily**.
E	40-49%	**Achieved a sufficient number of Basic Competencies** to exceed the minimum competency level.
F	30-39%	**Achieved the Basic Competencies needed to be considered competent**. The learner needs learning support.
G	20-29%	**Achieved the minimum number of Basic Competencies worthy of a grade**. The learner needs learning support
U	0-19%	**Did not achieve the minimum level of competence**. The learner needs learning support

11.7 Conducting and recording assessment

Continuous assessment should be planned and programmed at the beginning of the year, and kept as simple as possible. Marks given for class activities, practical activities, project work, assignments, homework, and short tests on completion of a topic may be recorded for continuous assessment. Non-promotional subjects in the Upper Primary and Secondary grades should be assessed through informal continuous assessment methods and letter grades awarded directly. These grades must be reported to the parents on the termly school report, but will not count for promotion purposes.

11.8 Assessment Objectives

The assessment objectives for Design and Technology are:

A Knowledge with understanding

Learners should be able to:

A1 demonstrate the ability to state facts, recall and name items, recall and describe

processes;

A2 demonstrate the ability to apply and relate knowledge to basic design and manufacturing;

A3 make reasoned arguments and anticipate consequences about outcomes of the design and realisation process;

A4 demonstrate a crucial awareness of the interrelationship between design and the needs of society.

B Design problem solving

Learners should be able to:

B1 identify clearly, from a situation, a specific need for which a solution is required and compose a design brief;

B2 analyse a problem by considering any relevant functional, aesthetic, human, economic and environmental design issues and draw up a design specification;

B3 generate a range of outline solutions to a design problem, giving consideration to the constraints of time, skills and resources;

B4 test and refine the functional and aesthetic effectiveness of design solutions.

C Design Communication

Learners should be able to:

C1 recognise information in one form and where necessary change it into a more applicable form;

C2 propose and communicate ideas graphically;

C3 develop ideas and represent details of form, shape, constructive movement, size and structure through graphical presentation.

D Realisation

Learners should be able to:

D1 plan and organise the work procedure involved in the realisation of a solution;

D2 select, from a range of resources, those appropriate for the realisation of the product;

D3 demonstrate appropriate manipulative skills by showing an understanding of materials and their characteristics in relation to their use;

D4 demonstrate appropriate manipulative skills by showing the ability to correctly and efficiently use instruments and tools used in the realisation of a product.

11.9 Continuous Assessment: Detailed guidelines

Continuous assessment at Junior Secondary level consists of informal and more formal assessment. The table in 11.9.2 specifies how formal assessments are required for assignments, projects and shorter tests, in order to give an overall picture of the learner's knowledge and skills.

11.9.1 Types of assessment

Practical Investigations: These are assessments of practical skills assessed during a practical activity where learners are required to plan and to carry out investigations and to collect, report and analyse information. Except for one major investigation or project towards the end of the second term/beginning of third term, activities should be aimed to assess not more than two practical skills.

Projects: All the relevant stages in the design folder should be taken into account. Each learner will undertake an individually identified project from the chosen option. The project, which will be internally marked and externally moderated in Grade 10, is expected to be completed over the final two terms of the course.

The work presented for assessment will be in the form of an A3 size folder and the product. The folder should include photographic evidence of the final product.

Grade 8: Learners should be introduced to the framework and stages of a design folder. Results achieved on tasks set on the application regarding the investigation and developing of the different stages within the proper framework.

Grade 9: Learners are expected to identify, develop and plan a suitable design for a proposed product and to compile this information into a design folder according to the framework and stages introduced in Grade 8. The folder should be completed by the end of Grade 9 and results recorded on the Assessment Record Sheet.

Grade 10: Learners should revise and refine the folder completed in Grade 9. They should manufacture the product according to their revised and refined proposed design and production plan set out in their folder.

A learner may opt for a product other than proposed and designed during his/her Grade 9 year. However, he/she should then first complete a new design and compile an appropriate design folder for that specific product before realising the design into a completed product. The finished product must be tested and an evaluation report written on the outcome of these tests to be included in their design folder. The design folder, together with photographic evidence of the final product, would be externally moderated in Grade 10.

Topic tasks: These are activities that include competencies such as locating information, conducting surveys, analysing information or presenting information and form part of the day-to-day teaching strategies. These are assessed and recorded and could be used to introduce a topic, during teaching of a topic and/or revision of a topic. Not all assessment objectives need to be present in every topic task. The greatest emphasis should be placed on assessment objectives B, C and D to meet the weighting shown in the Specification Grid.

Topic tests: After completing certain topics in the syllabus, it may be necessary to conduct a test indicating the achievement of learners in these topics.

End of Term Test: This is a comprehensive test of the whole term's work.

11.9.2 Summary of Continuous Assessment Tasks

CONTINUOUS ASSESSMENT GRADE 8						
COMPONENTS	**TERM 1**		**TERM 2**		**TERM 3**	
	Number & Marks	**Total**	**Number & Marks**	**Total**	**Number & Marks**	**Total**
Practical Investigations	2 × 20	40	2 × 20	40	1 × 20	20
Topic Tasks	2 × 10	20	2 × 10	20		
Topic Tests	2 × 20	40	2 × 20	40		
End of Term Tests	1 × 50	50	1 × 50	50		
Term Marks		150		150		20
Weighted Term Marks	(150÷15× 10)	100	(150÷15× 10)	100		
Total Term Mark						320
Converted Term Mark	(320 ÷ 8)					40
Design folder						60
CA Mark	(40 + 60)					100

CONTINUOUS ASSESSMENT GRADE 9						
COMPONENTS	**TERM 1**		**TERM 2**		**TERM 3**	
	Number & Marks	**Total**	**Number & Marks**	**Total**	**Number & Marks**	**Total**
Practical Investigations	2 x 20	40	2 x 20	40	1 x 20	20
Topic Tasks	2 x 10	20	2 x 10	20		
Topic Tests	2 x 20	40	2 x 20	40		
End of Term Tests	1 × 50	50	1 × 50	50		
Term Marks		150		150		20
Weighted Term Marks	(150÷15× 10)	100	(150÷15× 10)	100		
Total Term Mark				320		
Converted Term Mark	(320 ÷ 8)			40		
Design Folder	(80 X 0.75)			60		
CA Mark	(40 + 60)			100		

CONTINUOUS ASSESSMENT GRADE 10				
COMPONENTS	**TERM 1**		**TERM 2**	
	Number & Marks	**Total**	**Number & Marks**	**Total**
Practical Investigations	2 x 25	50	2 x 25	50
Topic Tasks	2 x 25	50	2 x 25	50
Topic Tests	2 x 25	50	2 x 25	50
End of Term Tests	1 × (75 × 2)	150	1 × 150	150
Term Marks		300		300
Weighted Term Marks	(300 ÷ 3)	100	(300 ÷ 3)	100
Total Term Mark	(300 + 300)			600
Converted Term Mark	(600 ÷ 30)			20
Design Folder				80
Product				50
CA Mark	(20 + 80 + 50)			150

11.10 End of year examinations: Detailed guidelines

In Grades 8 and 9 there will be internal end-of-year examinations. As before, the purpose of these examinations is to focus on how well learners can demonstrate their thinking, communication, and problem-solving skills related to the areas of the syllabus, which are most essential for continuing in the next grade. Preparing for, and conducting these examinations should not take up more than two weeks altogether right at the end of the year.

There will be an external examination at the end of Grade 10. The purpose of the examination is to assess how far each learner can demonstrate their achievement in reaching the competencies as a preparation for everyday life and for further studies or training, and to what extent the system as a whole is enabling learners to achieve optimally.

Grades 8 and 9:

Component	Description	Marks	Duration
Written Examination	**Section A**: will consist of 10 short answer, compulsory questions intended to assess knowledge	20	2h 15 min
	Section B: will consist of **three** compulsory, structured questions intended to assess the learners' abilities of analysis and synthesis and will be set on: • graphics and graphic products • resistant materials • technology	20 20 20	
	Section C: will consist of **one** compulsory open-ended question intended to assess the learners' basic design and problem solving skills and abilities regarding graphics and graphic product, resistant materials and technology.	20	45 min

Grade 10:

Component	Description	Marks	Duration
Written Examination	**Paper 1** This Paper will consist of **two** sections: **Section A**: Section A will consist of 10 short answer, compulsory questions intended to assess knowledge	30	2h 15min
	Section B: Section B will consist of **three** compulsory, structured questions intended to assess the learners' abilities of analysis and synthesis and will be set on: • graphics and graphic products • resistant materials • technology	30 30 30	
	Paper 2: This paper will consist of **three** optional open-ended questions of 30 marks each of which learners are required to answer **only one**. It is attended, with each of these questions, to assess the learners' basic design and problem solving skills and abilities within the context of: • graphics and graphic products • resistant materials • technology.	30	45min

11.11 Promotion marks

In Grades 8-10, continuous assessment contributes 50% of the summative mark. The weighting of each assessment component is as follows:

Grades 8 and 9:

Component	Description	Marks	Weighting
End-of-year Examination	Paper 1: Section A:	20	10%
	Section B:	60	30%
	Section C:	20	10%
Continuous Assessment	Practical Investigations, Design Folder, Topic Tasks, Topic Tests and End of Term Tests	100	50%

Grade 10:

Component	Description	Marks	Weighting
End-of-year Examination	Paper 1: Section A:	30	10%
	Section B:	90	30%
	Paper 2:	30	10%
Continuous Assessment	Practical Investigations, Design Folder, Product, Topic Tasks, Topic Tests and End of Term Tests	150	50%

The promotion marks are calculated as follows:

PROMOTION MARK FOR GRADE 8				
	Term 1	Term 2	Term 3	Total
Term Mark	150	150	20	320
Converted Term Mark	(320 ÷ 8)			40
Design folder				60
CA Mark	(40+60)			100
End-of-year examination				100
Promotion Mark	200 ÷ 2			100

PROMOTION MARK FOR GRADE 9				
	Term 1	Term 2	Term 3	Total
Term Mark	150	150	20	320
Converted Term Mark	(320 ÷ 8)			40
Design Folder	(80 X 0.75)			60
CA Mark	(40 + 60)			100
End-of-year examination				100
Promotion Mark	200 ÷ 2			100

PROMOTION MARK FOR GRADE 10			
	Term 1	Term 2	Total
Term Mark	300	300	600
Converted Term Mark	(600 ÷ 30)		20
Design Folder			80
Product			50
CA Mark	(20 + 80 + 50)		150
End-of-year examination			150
Promotion Mark	300 ÷ 3		100

11.12 Specification Grid

The specification grid below indicates the weighting allocated to each objective for both Continuous Assessment and for the Written Examination.

Components	Weighting
Assessment Objectives for Written Examination	
Objective A Knowledge with Understanding	20%
Objective B Design Problem Solving	8%
Objective C Design Communication	11%
Objective D Realisation	11%
Assessment Objectives for Continuous Assessment	
Objective A Knowledge with Understanding	8%
Objective B Design Problem Solving	21%
Objective C Design Communication	8%
Objective D Realisation	13%

11.13 Assessment Criteria

The descriptors of three levels of work are given with a mark band for each [High (H); Medium (M) and Low (L)]. The highest mark in a band is for work that fully satisfies the descriptor.

The Design Folder

(For Grade 8 criteria 1-4 are used and for Grade 9 and 10 criteria 1-5 are used**)**

Criterion	Level		Part Mark	Max Mark
1. General Analysis of the problem and formulation of Design brief:	H	A wide-ranging analysis with many of the aspects of the problem considered and a clearly expressed brief.	7 –10	**10**
	M	A relatively sound analysis with a range of aspects of the problem considered and a full brief.	4 – 6	
	L	An analysis with aspects of the problem considered and a skeleton brief only	1 - 3	
2. Preparation and precision of Specification:	H	A concise and comprehensive specification.	7 –10	**10**
	M	A statement of some of the specific requirements.	4 – 6	
	L	An unclear specification	1 - 3	
3. Exploration of Ideas:	H	A wide range of ideas combined with imaginative interpretation.	14-20	**20**
	M	A fair range of ideas with some ideas examined.	8 - 13	
	L	Little variety of ideas with a tendency to concentrate on a single concept.	1 - 7	
4. Development of Proposed Solution:	H	Thorough and thoughtful development with attention to fine detail.	14-20	**20**
	M	A developed idea with sufficient attention to detail only.	8 - 13	
	L	An undeveloped idea lacking in attention to detail.	1 - 7	
5. Planning for Production:	H	Good insight into processes involved, clear and detailed planning.	14-20	**20**
	M	Some awareness of main processes involved a simple plan.	8– 13	
	L	Consideration of processes, lacking in detail, no overall plan.	1 - 7	

The Product

(Only for Grade 10)

Criterion	Level		Part Mark	Max. Mark
1. Quality of Production:	H	Overall judgement required how range of skills contained has been applied. Typically:	21-30	
	M	Precise, accurate, well finished. Mastery of most aspects, refinement of detail.	11-20	**30**
	L	Competent, some minor inaccuracies, blemishes, some degree of mastery. Product marred by limited skills.	1-10	
2. Evaluation:	H	Detailed appraisal related to specification, objective tests applied where possible, and modifications proposals.	11-15	**15**
	M	Main aspects of specification critically appraised some objectivity.	6-10	
	L	General overall appraisal with little reverence to specification.	1 - 5	
3. Fitness for Purpose:	H	Completed solution fulfilling the brief.	4 – 5	**5**
	M	Completed solution fulfilling the brief in part only.	2 – 3	
	L	An incomplete solution failing to satisfy the brief.	0 - 1	

ANNEXE 1: Assessment Record Sheet for Grade 8

ASSESSMENT RECORD SHEET DESIGN AND TECHNOLOGY										Grade: 8					Year:		
School:										**Teacher:**							
Name of Learner	**Term**	**Practical Investigation**		**Topic Task**		**Topic Test**		**End of Term Test**	**Term Mark**		**Weighted Term Mark (150 ÷15)×10**	**Total Term Mark (150+150+20)**	**Converted Term Mark (320÷8)**	**Design Folder**	**CA Mark (40 + 60)**	**End-of-year Examination**	**Promotion Mark (200÷2)**
		20	**20**	**10**	**10**	**20**	**20**	**50**	**150**	**20**	**100**	**320**	**40**	**60**	**100**	**100**	**100**
	1																
	2																
	3																
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ANNEXE 2: Assessment Record Sheet for Grade 9

ASSESSMENT RECORD SHEET DESIGN AND TECHNOLOGY **Grade: 9** **Year:**

School: **Teacher:**

Name of Learner	Term	Practical Investigation		Topic Task		Topic Test		End of Term Test	Term Mark		Weighted Term Mark	Total Term Mark (150+150+20)	Converted Term Mark (320÷8)	Design Folder (80 X 0.75)	CA Mark (40 + 60)	End-of-year Examination	Promotion Mark (200÷2)
		20	20	10	10	20	20	50	150	20	100	320	40	60	100	100	100
	1																
	2																
	3																
	1																
	2																
	3																
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	3																
	1																
	2																
	3																
	1																
	2																
	3																

ANNEXE 3: Assessment Record Sheet for Grades 10

ASSESSMENT RECORD SHEET DESIGN AND TECHNOLOGY **Grade: 10** **Year:**

School: **Teacher:**

Name of Learner	Term	Practical Investigation		Topic Task		Topic Test		End of Term Test	Term Mark	Weighted Term Mark (300 ÷ 3)	Total Term Mark	Converted Term Mark (600 ÷ 30)	Design Folder	Product	CA Mark (20 + 80 + 50)
		25	25	25	25	25	25	150	300	100	600	20	80	50	150
	1														
	2														
	1														
	2														
	1														
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