

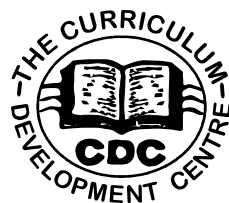


Republic of Zambia

Ministry of Education, Science, Vocational Training and Early Education

DESIGN & TECHNOLOGY SYLLABUS

GRADE 8 - 9



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Vision

Quality, lifelong education for all which is accessible, inclusive and relevant to individual, national and global needs and value systems

Preface

The syllabus was produced as a result of the Curriculum review process carried out by the Ministry of Education, Science, Vocational Training and Early Education under the auspices of the Curriculum Development Centre (CDC). The curriculum reform process started way back in 1999 when the Ministry of Education commissioned five (5) curriculum studies which were conducted by the University of Zambia. These studies were followed by a review of the lower, middle basic and primary teacher education curriculum. In 2005 the upper basic education National survey was conducted and information from learners, parents, teachers, school managers, educational administrators, tertiary institutions, traditional leaders, civic leaders and various stakeholders in education was collected to help design a relevant curriculum.

The recommendations provided by various stakeholders during the Upper Basic Education National survey of 2005 and National symposium on curriculum held in June 2009 guided the review process.

The review was necessitated by the need to provide an education system that would not only incorporate latest social, economic, technological and political developments but also equip learners with vital knowledge, skills and values that are necessary to contribute to the attainment of Vision 2030.

The syllabus has been reviewed in line with the Outcome Based Education principles which seek to link education to real life experiences that give learners skills to access, criticize, analyze and practically apply knowledge that help them gain life skills. Its competences and general outcomes are the expected outcomes to be attained by the learners through the acquisition of knowledge, skills, and values which are very important for the total development of the individual and the nation as a whole.

Effective implementation of Outcome Based Education requires that the following principles be observed: clarity of focus, Reflective designing, setting high expectations for all learners and appropriate opportunities.

It is my sincere hope that this Outcome Based syllabus will greatly improve the quality of education provided at Grade 8 and 9 as defined and recommended in various policy documents including Educating Our Future` 1996 and the `Zambia Education Curriculum Framework `2013.



Chishimba Nkosha

Permanent Secretary

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

Acknowledgements

The syllabus presented here is a result of broad-based consultation involving several stakeholders within and outside the education system.

Many individuals, institutions and organizations were consulted to gather their views on the existing syllabus and to accord them an opportunity to make suggestions for the new syllabus. The Ministry of Education wishes to express heartfelt gratitude to all those who participated for their valuable contributions, which resulted in the development of this syllabus.

The Curriculum Development Centre worked closely with other departments and institutions to create this document. We sincerely thank the Directorate of Teacher Education and Specialized Services, the Directorate of Planning and Information, the Directorate of Human Resource and Administration, the Directorate of Open and Distance Education, the Examinations Council of Zambia, the University of Zambia, schools and other institutions too numerous to mention, for their steadfast support.

We pay special tribute to co-operating partners especially JICA and UNICEF for rendering financial technical support in the production of the syllabus.



C.N.M Sakala (Mrs)

Director-Standards and Curriculum

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

Contents

Preface.....	iv
Acknowledgements.....	v
Introduction.....	viii
GRADE 8	
Workshop Practice	2
Graphic Communication	4
Design and Communication	6
Manufacturing Materials	8
Electrical Engineering	12
Bricklaying and Plastering	14
Entrepreneurship	18
GRADE 9	
Graphic Communication	20
Design and Communication	22
Manufacturing Materials	24
Electrical Engineering.....	28
Bricklaying and Plastering.....	29
Entrepreneurship	30
Project Evaluation Guide	31

Introduction

Technology is defined as a scientific skill that aims at improving the quality of life of mankind and this is mainly achieved either by *improving* the existing item or by *inventing* a completely new one in response to the need.

Therefore, Design and Technology provides an opportunity for the learners to identify needs and opportunities through exploration at home, school or community. In this regard, the role of the teacher is to help the learners identify the needs and produce solutions.

Design and technological capability is enhanced through discussions and recording of ideas by means of drawings. The drawings act as a guide during the making process as learners use tools and appropriate materials and produce artefacts.

The Junior Secondary School syllabus in Design and Technology will be developed in the *four* strands outlined below.

<i>COMPONENT</i>	<i>DESCRIPTION</i>
<i>GRAPHIC COMMUNICATION</i>	This is the communication by drawings or symbols. The main purpose is to help learners develop the ability to convey information about design problems, ideas and solutions by means of sketches and drawings.
<i>MANUFACTURING MATERIALS</i>	<p>This area will expose learners to various materials and their properties. This knowledge will help them choose appropriate materials for any project and base their choice on: <i>availability, cost</i> and <i>characteristics</i> of each material.</p> <p>While working with materials, learners will be using tools. Therefore, they will likewise learn about various types of tools, functions and use.</p>
<i>SYSTEMS TECHNOLOGY</i>	Systems Technology will focus on developing skills used in <i>Structures, Mechanisms</i> and <i>Electronics</i> . Learners will be helped to; <i>identify</i> how these are interrelated, their role in <i>designing</i> and <i>making</i> control systems.
<i>ENTREPRENEURSHIP</i>	Entrepreneurship education is meant to prepare learners for an entrepreneurial career in life. Design and Technology offers learners an opportunity to buy materials, make and sell items.

AIMS OF TEACHING DESIGN AND TECHNOLOGY

The aims of Design and Technology syllabus are to:

1. Foster the learners' awareness of local and national needs so as to contribute towards the attainment the Vision 2030;
2. Equip learners with knowledge and skills so as to play an effective and productive role in the economic life of the nation;
3. Promote positive attitudes towards the challenges of co-operation, work and self-employment.

In this regard, Design and Technology has been integrated with content in Bricklaying and Plastering, Carpentry and Joinery, Metal Fabrication and Welding and Electrical Engineering to accommodate different learner interests and learning outcomes. In this way, learners migrating out of the schooling system will find opportunities for further vocational skills training.

KEY COMPETENCIES

Design and Technology will develop the following competencies:

<i>COMPETENCIES</i>	<i>DESCRIPTION</i>
<i>Investigative skills</i>	<i>Critical thinking</i> : learners will have to come up with possibilities to tackle a particular need and choose the preferred solution; <i>Creative thinking</i> learners will have to produce new ideas that will leading to a conclusion; <i>Inquiring</i> asking questions to obtain suggestions to facilitate solving of problems
<i>Interpretational skills</i>	Learners' ability to classify, convert, identify, explain and interpret evidence. This also involve s the interpretation of patterns, sketches, models, charts and illustrations.
<i>Application skills</i>	Drawing, measuring and cutting. Conducting research and assessing informatio n from various sources. Producing artefacts using materials. Application of knowledge in real life situations.
<i>Communication skills</i>	Explaining, displaying, reporting, reading, listening, drawing and designing.
<i>Valuing skills</i>	Sensitivity to needs, feelings and problems of self and others, cooperative behaviour, weighting individual needs against the needs of others, commitment to the removal prejudices. Appreciating the beauty of the natural environment and preserving it for future generations
<i>Participating skills</i>	Taking part in group work, through classroom discussions and presentations.

SUGGESTED TEACHING METHODOLOGY

The Design and Technology syllabus encourages the learner-centred approach as prescribed in the Zambia Education Curriculum Framework. The emphasis should be on *skills*, *problem solving* and *hands-on activities* which will increase learner participation as individuals or in groups. This approach maximises the quality of learning.

In order to develop learning with understanding, it is important to recognise that learners come to school with a wealth of knowledge and experience gained from the family, community and through interaction with the environment. Therefore, learning in school must build on the learner's prior knowledge and experience.

This is best achieved when learners are actively involved in the learning process through hands on activities. However, each learner has individual needs, pace of learning, experiences and abilities. Hence, the teacher must determine the needs of the learners and shape the learning experiences accordingly. Additionally, teaching methods must be varied and should include among others:

- Working in Pairs
- Group Work
- Individual Work
- Field trip Method
- Project Method
- Discussion Method
- Guest Speaker
- Demonstration Method
- Team Teaching

The teacher should have reasons for choosing a particular teaching method, employ strategies and techniques to make the lesson interesting.

The syllabus outlines the learning outcomes and the teacher must decide, when it is best to let learners *discover* or *explore* information for themselves; when they need *directed learning*, *reinforcement* or when they can be allowed to find own way through a topic. In this way, outcomes can be attained in a spiral manner considering that in any lesson, different outcomes can be covered through knowledge, values and skills. The objective is to ensure that learners are able to apply the knowledge in real life situations.

TIME ALLOCATION

The standard period allocation has been prescribed in the Zambia Education Curriculum Framework (ZECF) 2013. At Junior Secondary School level, Design and Technology will have **twelve (12)** periods per week. However, since the teaching of Design and Technology involves the production of an artefact, time for project work may vary from school to school as much of this will be done outside the prescribed teacher-learner contact time considering that facilities, materials and the level of the learners may also vary.

OUTLINE OF THE SYLLABUS

This syllabus seeks to instil a sense of appreciation for technology and to make sure that learners adapt and cope with the changing situations. It will also provide learners with broader design and technology concepts and principles that will allow them to expand their thinking capacity to tackle real-life situations.

The main topics, sub-topics and outcomes are numbered for easy of reference. It is important to note that, some topics may be similar in both Grades 8 and 9, but the levels of knowledge and skills to be attained are not the same. Hence, when preparing lessons teachers should strive at building on what the learners already know.

While information concerning teaching of different skills, teaching methods and evaluation would be found in the Teacher's Guide, teachers should be mindful of the Specific Outcomes which are preceded by the General Outcomes. Therefore, scheming should be based on the Specific Outcomes and the corresponding knowledge in the content column. In some cases, more lessons will be required before achieving a particular Specific Outcome.

ASSESSMENTS AND CERTIFICATION

All vocational training and learning achievements will be assessed and certified by the Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA). This means that learners taking Design and Technology at Junior Secondary School will acquire a level III Trade Test Certificate in any of the following: Carpentry and Joinery, Metal Fabrication and Welding, Electrical Engineering and Bricklaying and Plastering alongside a Grade 9 academic certificate from the Examinations Council of Zambia, signifying attainment of vocational skills and competencies and academic achievement.

The core theme of Design and Technology is problem solving and is best achieved through **Project Work**. This is because Project work provides a link between *theory* and *practical* embedded in the three key stages: ***Designing, Realising*** and ***Evaluating***.

Designing will involve making of the Portfolio and that learners at this level will be expected to use A4 paper in the folio production.

GRADE 8

GENERAL OUTCOMES AND KEY COMPETENCIES

GENERAL OUTCOMES	KEY COMPETENCIES
<ul style="list-style-type: none">▪ Demonstrate correct use of tools and good workmanship in the work room• Demonstrate application of entrepreneurial skills in business management ▪ Generate design ideas and develop proposals that meet the needs	<ul style="list-style-type: none">• Show knowledge of applying safety precautions at all times.• Demonstrate knowledge and ability to use geometrical concepts in designing articles.• Demonstrate ability and skill of producing small artefact of marketable value using available materials• Demonstrate co-operation and tolerance in managing an entrepreneurial activity.

Workshop Practice

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.1 INTRODUCTION TO DESIGN AND TECHNOLOGY	8.1.1 Design and Technology	8.1.1.1 Explain career prospects in studying Design and Technology	<ul style="list-style-type: none"> • Components of Design and Technology: Graphic Communication, Materials, Bricklaying, Systems Technology and Entrepreneurship • Career prospects in Electrical Engineering, Carpentry, Metal Fabrication, Welding, Building Construction, Architecture, Entrepreneur 	<ul style="list-style-type: none"> • Identification of career prospects in studying Design and Technology • Application of Design and Technology principles in daily life 	<ul style="list-style-type: none"> • Appreciation of career prospects in studying Design and Technology • Appreciation of Design and Technology in daily life
	8.1.2 Safety in the Work room	8.1.2.1 Apply safety precautions in the workroom	<ul style="list-style-type: none"> • Orientation to workrooms: working and marking areas • Safety precautions: safe working habits, protective attire, daily routine, safety signs colours (red, yellow, green, light orange), safety equipment 	<ul style="list-style-type: none"> • Identification of areas for specific activities in the workroom • Applying safety precautions 	<ul style="list-style-type: none"> • Awareness of safety precautions in the workroom • Appreciation of safety rules to prevent accidents
	8.1.3 First Aid	8.1.3.1 Apply basic first aid techniques in the workroom	<ul style="list-style-type: none"> • First Aid Box and techniques applied in First Aid. 	<ul style="list-style-type: none"> • Application of First Aid during injuries 	<ul style="list-style-type: none"> • Participating in emergency cases
	8.1.4 Fire Protection	8.1.4.1 Describe methods of fire fighting	<ul style="list-style-type: none"> • Methods of firefighting: Water, Chemical foam, Carbon dioxide, sand, extinguishing powder 	<ul style="list-style-type: none"> • Identification of methods of fire fighting 	<ul style="list-style-type: none"> • Awareness of firefighting techniques

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.1.5 Ventilation and Lighting	8.1.5.1 Describe the importance of ventilation and lighting	<ul style="list-style-type: none"> • Importance of ventilation: Reduction of suffocation, Extraction of fumes and dust, free flow of air • Types of ventilation: Air conditioners, windows, air extractors • Types of lighting: Natural (sun) and Artificial (Electric) 	<ul style="list-style-type: none"> • Identification of methods of improving ventilation and lighting • Application of types of ventilation and lighting 	<ul style="list-style-type: none"> • Awareness of ways of improving ventilation and lighting to prevent accidents • Appreciation of ventilation and lighting to avoid accidents
	8.1.6 Protection of the Environment	8.1.6.1 Describe ways of managing waste from work rooms	<ul style="list-style-type: none"> • Managing waste: waste disposal (subsoil water, water coarse, solid waste disposal) • Types of waste management: Waste (solid waste, sewer water) • Importance of waste management: Improved sanitation and health environment 	<ul style="list-style-type: none"> • Identification of methods of managing waste in the workroom and the community • Application of methods of managing waste 	<ul style="list-style-type: none"> • Awareness of ways of managing waste • Appreciation of care for the environment

Graphic Communication

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.2 PLANE GEOMETRY	8.2.1 Drawing Lines	8.2.1.1 Construct lines from given data	<ul style="list-style-type: none"> • Prepare Boarder lines (10mm all round) and the Title Block. • Construct: (Perpendiculars, parallel lines; dividing a line into a number of parts and ratio) 	<ul style="list-style-type: none"> • Construction of border lines and title block • Manipulation of instruments to draw parallel lines 	<ul style="list-style-type: none"> • Awareness of the standard way of preparing drawing paper • Awareness of the use of set squares when drawing lines
	8.2.2 Angles	8.2.2.1 Construct angles	<ul style="list-style-type: none"> • Construct angles other than 60°, 90°, 75°, 30°, 105° 	<ul style="list-style-type: none"> • Accurate construction of angles 	<ul style="list-style-type: none"> • Awareness of methods of constructing angles.
	8.2.3 Triangles	8.2.3.1 Construct triangles	<ul style="list-style-type: none"> • Construct (Equilateral, Isosceles, Scalene, Acute, Obtuse and Right Angled) triangles using sides, angles and perimeter. 	<ul style="list-style-type: none"> • Accurate construction of triangles 	<ul style="list-style-type: none"> • Awareness of methods of constructing triangles
	8.2.4 Quadrilaterals	8.2.4.1 Construct quadrilaterals	<ul style="list-style-type: none"> • Construct quadrilaterals given sides, angles and diagonals (Rectangle, Square, Kite, Rhombus, Parallelogram, trapezium) 	<ul style="list-style-type: none"> • Accurate construction of quadrilaterals 	<ul style="list-style-type: none"> • Awareness of methods of constructing quadrilaterals
	8.2.5 Circles	8.2.5.1 Construct circles satisfying given data	<ul style="list-style-type: none"> • Construct circles given the radius or diameter • Circumscribing and Inscribing circles to triangles 	<ul style="list-style-type: none"> • Interpretation of methods of constructing circles 	<ul style="list-style-type: none"> • Appreciation of constructing circles accurately

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.2.6 Polygons	8.2.6.1 Construct regular polygons	<ul style="list-style-type: none"> Construct regular polygons: (Hexagons, Pentagons, Heptagons, Octagons) given: Side, diameter, Across Corners and Across Flats 	<ul style="list-style-type: none"> Application of methods of polygons Accurate construction of regular and irregular polygons 	<ul style="list-style-type: none"> Awareness of methods of constructing polygons Appreciation of polygons in design work
		8.2.6.2 Construct irregular polygons	<ul style="list-style-type: none"> Construct Irregular polygons: (Hexagons, Pentagons) given sides and angles 		
8.3 PICTORIAL DRAWING	8.3.1 Isometric and Oblique Projections	8.3.1.1 Construct drawings in Isometric and Oblique Projections	<ul style="list-style-type: none"> Principles of Isometric and Oblique Projection. Isometric projection of straight edges, slanting edges, circles in isometric 	<ul style="list-style-type: none"> Interpretation of isometric and oblique drawings Application of pictorial drawings 	<ul style="list-style-type: none"> Awareness of principles of Isometric and oblique drawings
	8.3.2 Freehand Drawing	8.3.2.1 Apply freehand drawings to communicate ideas	<ul style="list-style-type: none"> Principles of pictorial drawing in freehand drawing. 	<ul style="list-style-type: none"> Application of freehand sketching of ideas. 	<ul style="list-style-type: none"> Awareness of expressing ideas in freehand drawing
8.4 ORTHOGRAPHIC PROJECTION	8.4.1 Orthographic Projection	8.4.1.1 Transform simple Isometric drawings to Orthographic Projection	<ul style="list-style-type: none"> First and Third Angle Projections (add some hidden details) Title Block data: Name, School, Title, Projection, and Scale 	<ul style="list-style-type: none"> Communication of details of a drawing through elevations Accurate construction of elevations 	<ul style="list-style-type: none"> Awareness of elevations in orthographic Appreciation of orthographic drawing in design work Adhering to the standard way of producing elevations in orthographic
		8.4.1.2 Add the missing view to the given ones	<ul style="list-style-type: none"> Produce missing view: End Elevation or Plan 	<ul style="list-style-type: none"> Interpretation of orthographic views 	
		8.4.1.3 Interpret simple building drawings	<ul style="list-style-type: none"> Simple building drawings: Elevations and Plans, scaling 	<ul style="list-style-type: none"> Interpreting of building drawings 	<ul style="list-style-type: none"> Appreciation of drawings in building

Design and Communication

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.5 DESIGN PROCESS	8.5.1 Design Process Cycle	8.5.1.1 Produce a portfolio from the theme	<ul style="list-style-type: none"> • Studying, defining and interpreting the theme. Adapting the theme to real life situations • Deriving a <i>situation</i> from the theme • Identifying a <i>problem</i> from the situation • Formulate <i>design brief</i> from the problem • Formulate relevant <i>specifications</i> to guide the design activity • Conduct <i>research</i> • Generate <i>possible solutions</i> • Development of <i>chosen solution</i> • Development <i>Working drawings</i> and Time Plan • Produce a detailed and sequential <i>production plan</i> of the intended artefact 	<ul style="list-style-type: none"> • Communication of design ideas in artefact production • Application of the design process in artefact making • Interpretation of design details in artefact making • Application of critical thinking to come up with possibilities to tackle a need and choose the preferred solution 	<ul style="list-style-type: none"> • Awareness of the design process. • Appreciation of the role of systematic planning in solving problems • Appreciation of team work in artefact making.

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.5.2 Realisation	8.5.2.1 Produce an artefact	<ul style="list-style-type: none"> Gathering materials Marking, cutting and shaping. Application of appropriate finishes Produce an aesthetically appealing artefact 	<ul style="list-style-type: none"> Application of correct tools and methods in artefact making Preparation of materials in artefact making 	<ul style="list-style-type: none"> Awareness methods of making an artefact Appreciation of beauty in artefact making
8.6 DESIGNING	8.6.1 Rendering	8.6.1.1 Apply enhancements on drawings and various materials	<ul style="list-style-type: none"> Enhancement of drawings through: Colours, texturing, shading Enhancement of materials: timber, glass, metal, plastic 	<ul style="list-style-type: none"> Communication of information through enhancements Application of enhancements on materials. 	<ul style="list-style-type: none"> Appreciation of enhancements in artefact making Awareness of methods of enhances of various materials.
	8.6.2 Symbols	8.6.2.1 Design symbols	<ul style="list-style-type: none"> Designing symbols of: buildings, danger signs, directions Symbols used in electrical, building construction 	<ul style="list-style-type: none"> Communication of information through symbols Interpretation the meaning of symbols 	<ul style="list-style-type: none"> Awareness of communication through symbols Appreciation of symbols in communication
	8.6.3 Logos	8.6.3.1 Design logos from specified information	<ul style="list-style-type: none"> Designing logos of: companies, clubs, organisations, schools from given information 	<ul style="list-style-type: none"> Communication of information through logos Interpretation the meaning of logos 	<ul style="list-style-type: none"> Awareness of communication through symbols Appreciation of symbols in communication

Manufacturing Materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.7 MATERIALS	8.7.1 Classification of materials	8.7.1.1 Classify materials	<ul style="list-style-type: none"> • Wood: Classify indigenous and exotic trees suitable for timber. Properties of Softwood, hardwood Cross section of a log. Stages in timber processing: Felling, conversion, seasoning Manufactured boards and uses: Particle boards, plywood • Metals: Properties of metals Ferrous metals : Carbon and alloy steels, cast irons Non-ferrous metals: Zinc, tin, copper, lead, aluminium Alloys: Brass, bronze, solder, steel, duralumin General uses of metals • Plastics: Thermoplastics, Thermosets and their properties • General uses: eyeglass frames, toothbrushes, insulations, bottles, furniture 	<ul style="list-style-type: none"> • Identification of materials used in construction • Classification of materials used in artefact making • Application of the use of different types of materials 	<ul style="list-style-type: none"> • Appreciating different types of materials used in construction • Awareness of qualities and behaviour of different materials
		8.7.1.2 Describe the effects of heat on plastics	<ul style="list-style-type: none"> • Plastic memory, bending, Vacuum forming, Press forming, cold casting and embedding. 	<ul style="list-style-type: none"> • Investigating effects of heat on plastics. 	

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		8.7.1.3 Explain the effects of plastics on the environment	<ul style="list-style-type: none"> • Effects of plastics on the environment: Pollution • Safe ways of disposing: Recycling 	<ul style="list-style-type: none"> • Communication of the effects of plastics on the environment 	<ul style="list-style-type: none"> • Awareness of the effects of plastics on the environment
	8.7.2 Preparation of Materials	8.7.2.1 Prepare material to the required sizes	<ul style="list-style-type: none"> • Material on the cutting lists • Contents of the cutting list: Quantity, length, width, thickness, types of material • Preparation procedure: measuring, marking, cutting, testing • Steel rule, try square, marking knife/gauge <i>Units of measure: mm</i> 	<ul style="list-style-type: none"> • Application of the stages of preparing material before use • Preparation of material before use • Measuring, marking and cutting materials 	<ul style="list-style-type: none"> • Awareness of the stages of preparing material before use • Precision in material preparation before use
	8.7.3 Wasting of Materials.	8.7.3.1 Apply correct methods of cutting materials	<ul style="list-style-type: none"> • Wood: Saws, chisels, planes, spokeshaves • Metal: Hacksaws, Files, Drill bits, chisels • Plastic: Coping saws, tenon saw and dovetail (including methods of cutting curves) • Types and main parts of the above tools 	<ul style="list-style-type: none"> • Application of techniques of wasting material • Application of correct tools when wasting material 	<ul style="list-style-type: none"> • Appreciation of accurate cutting of materials using wasting tools.
		8.7.3.2 Apply holding tools when cutting materials	<ul style="list-style-type: none"> • Holding tools: Vices and sawing board • Uses and safety precautions when using holding tools 	<ul style="list-style-type: none"> • Application of correct holding tools when wasting material 	<ul style="list-style-type: none"> • Appreciation of holding tools when working with materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.7.4 Joining Materials	8.7.4.1 Apply different methods of joining materials	<ul style="list-style-type: none"> • Permanent and temporary joints • Wood: Stopped Housing, Stub mortice and tenon, Single dovetail, nailing, screwing • Metal: Tinplate joints, riveting soldering, screwing threads • Welding: Materials and equipment: Arc welding (Connecting –ve and +ve terminals), electric welding (50 – 200 Amps), marking out , surface cleaning, edge finishing • Tacking, laying a bead, welding bead, quality finish • Plastic: Laminating 	<ul style="list-style-type: none"> • Application of different methods of joining materials • Application of safety precautions when joining materials 	<ul style="list-style-type: none"> • Appreciating various joints used in projects. • Awareness of the safety precautions required when joining materials
	8.7.5 Adhesives	8.7.5.1 Apply adhesives when bonding materials	<ul style="list-style-type: none"> • Use of: Casein, Animal, PVA, Contact, glue, PVC weld, Tensol cement • Characteristics of the above adhesives. • Procedure of applying adhesives and application of holding tools. • Observe safety when working with glues 	<ul style="list-style-type: none"> • Application of different types of adhesives when joining materials 	<ul style="list-style-type: none"> • Awareness of safety precautions when applying adhesives

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.7.6 Fixings	8.7.6.1 Fix iron mongers	<ul style="list-style-type: none"> • Iron mongery for security: <i>Locks:</i> Mortice locks, Rim locks, Night latch, Straight barrel bolt • For penetration - Nails: French nail, panel pin, oval, roofing and upholstery nails <i>Screws:</i> Countersunk, raised head, round head, self-tapping, Bolts and Nuts, rivets <i>Main parts of screws and nails including methods of nailing and screwing</i> • For movement <i>Hinges:</i> Butt, Rising butt hinge, Scotch Tee hinge 	<ul style="list-style-type: none"> • Identification of different types of fixings • Classification of different types of fixings • Application of different types on different materials and in different situations • Application of safety precautions when fixing iron mongery 	<ul style="list-style-type: none"> • Awareness of different types of fixings • Appreciating different types of fixings • Awareness of the safety precautions required when working on fixings

Electrical Engineering

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.8 BASIC TECHNOLOGY	8.8.1 Energy	8.8.1.1 Identify forms and common sources of energy	<ul style="list-style-type: none"> • Electrical, mechanical, (heat) Kinetic, potential Sources; fossils, bio, solar, tidal, wind, hydro, thermal. 	<ul style="list-style-type: none"> • Identification of different sources of energy. 	<ul style="list-style-type: none"> • Awareness of sources of energy
8.9 ELECTRICAL EQUIPMENT	8.9.1 Operating Electrical Equipment	8.9.1.1 Operate electrical instruments	<ul style="list-style-type: none"> • Multi-meter - Electrical tests • Voltmeter - Voltage • Ammeter - Current Tester - Line phase/conductor Measuring resistance in electrical circuits Testing Voltage in power circuits and lighting Measuring current in a circuit 	<ul style="list-style-type: none"> • Identification of different types of electrical instruments • Application of electrical instruments in a required situation 	<ul style="list-style-type: none"> • Awareness of safety precautions when operating electrical instruments
8.10 DOMESTIC INSTALLATIONS	8.10.1 Electrical Components and Equipment	8.10.1.1 Identify cable sizes used in installation	<ul style="list-style-type: none"> • Cable Sizes used in installations: 1.5mm lighting, 2.5mm socket outlets, $\frac{4}{6}$ mm cooker control and geyser, 16mm service mains 	<ul style="list-style-type: none"> • Identification of cable sizes used in domestic installations • Application of cables sizes when carrying out installations 	<ul style="list-style-type: none"> • Awareness of colour coding standards

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		8.10.1.2 Install electrical components	<ul style="list-style-type: none"> • Installing: Sockets power point, switches, lamp holders, Lightning arrestor • Meter and distribution box installing breakers Wiring of earthing to the meter box • Electrical tools required: Pliers, hammer, chisel, Measuring tape, Fist wire, Screw driver, drilling machine 	<ul style="list-style-type: none"> • Identification of electrical components and required tools • Installation of electrical components to walls 	<ul style="list-style-type: none"> • Awareness of safety regulations when installing electrical components
	8.10.2 Domestic Installations	8.10.2.1 Install Conduit Pipes	<ul style="list-style-type: none"> • Preparing wall for installation of conduits chiselling • Install conduit Pipes • Preparation of elbows, offsets, male and female bushes 	<ul style="list-style-type: none"> • identification • Installation of conduit pipes 	<ul style="list-style-type: none"> • Awareness of safety precautions when installing conduits
		8.10.2.2 Wire metre box and distribution box	<ul style="list-style-type: none"> • Installing Meter Box Circuit breakers MCB tray • Installing distribution box: Circuit breakers, Neutral blocks • Installing breakers for: Lighting - 5A Socket outlet - 15A Cooker - 30A Main - 60A • Installing the earth electrode Earthing conductor Lightning arrestor 	<ul style="list-style-type: none"> • Identification of the circuit breakers • Wiring of the metre box and distribution box • Installation of the metre box and the distribution box 	<ul style="list-style-type: none"> • Awareness of the recommended circuit breakers • Adherence to the required standards in domestic installation

Bricklaying and Plastering

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.11 TRADE TOOLS	8.11.1 Hand Tools	8.11.1.1 Classify hand tools	<ul style="list-style-type: none"> Classification of bricklaying hand tools: <i>Laying Tools</i>: Building or brick trowel, steel square) <i>Wall Straightening tools</i>: Spirit level, boat level, straight edge <i>Cutting and Trimming tools</i>: Bolster, cold chisel, club/lump hammer, brick hammer <i>Finishing tools</i>: pointing trowel, hand hawk, wooden float, angle tools, wire brush, jointer, joint duster 	<ul style="list-style-type: none"> Identification of types of hand tools used in bricklaying Classification and correct storage of hand tools according to use Cleaning of hand tools 	<ul style="list-style-type: none"> Awareness of types of hand tools used in bricklaying Appreciation of precautions in handling and caring for the hand tools Appreciation of caring for tools
8.12 BUILDING MATERIALS	8.12.1 Building Materials	8.12.1.1 Classify building materials	<ul style="list-style-type: none"> Classification of building Materials: <i>Binders (matrix)</i>: Types of Binders Cement and lime <i>Aggregates</i> (Pit sand, river sand, quarry dust, stones) <i>Building units</i> (Clay bricks, (making bricks) concrete blocks, (moulding bricks) <i>Types of clay bricks</i>: Wire cut, Machine processed <i>Classification of clay bricks</i> Colour, variety 	<ul style="list-style-type: none"> Identification of types of building materials Classification of building materials 	<ul style="list-style-type: none"> Awareness of types of building materials Appreciation of building materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		8.12.1.2 Knead the clay	<ul style="list-style-type: none"> • Kneading the clay for bricks: (Clay preparation process) Add water, mix to plastic state • Purpose of kneading clay for brick making, Workability 	<ul style="list-style-type: none"> • Preparation of clay to the required standard 	<ul style="list-style-type: none"> • Awareness of the standard clay mixture to produce quality bricks
		8.12.1.3 Make clay bricks	<ul style="list-style-type: none"> • Methods of making clay bricks Soft processes dry processes • Moulding procedure: Place mix or clot in mould Compact, cut excess releasing brick from mould • Methods of drying clay bricks Artificial drying (hot floor, chamber, tunnel) Natural drying (Sun dried) Dry clay bricks 	<ul style="list-style-type: none"> • Identification of methods of making clay bricks • Application of the methods and procedure of moulding and drying clay bricks 	<ul style="list-style-type: none"> • Awareness of methods of making clay bricks • Appreciation of moulding quality bricks to earn a living • Appreciation of safety precautions when drying bricks
		8.12.1.4 Construct brick kilns	<ul style="list-style-type: none"> • Types of kilns : Clamp kilns Down drought kiln, Hoffman kilns, Continuous kilns Setting out of a kiln Make stacks, create a shade Mark the area, establish the gauge • Construction of brick kilns 	<ul style="list-style-type: none"> • Application of the stages of making a brick kiln 	<ul style="list-style-type: none"> • Awareness of types of kilns • Appreciation of making good kilns to avoid wastage of bricks

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
	8.12.2 Concrete Blocks making	8.12.2.1 Mix materials for block making	<ul style="list-style-type: none"> Materials: cement, sand water Mixing of materials: Dry mixing, Wet mixing Reasons for mixing: Uniformity in material proportioning , Common strength achieved Water control: Improve strength, Avoiding shrinkage, Strength measure 	<ul style="list-style-type: none"> Identification of materials used in block making Application of standard proportions of mixing materials in block making 	<ul style="list-style-type: none"> Awareness of the standard proportions of mixing materials when making blocks Appreciation of water control to produce quality blocks
		8.12.2.2 Mould blocks	<ul style="list-style-type: none"> Types of moulding processes By hand, By machine Categories of various types of Moulding processes: Commercial and domestic Moulding procedure Batching, Mixing, Moulding 	<ul style="list-style-type: none"> Application of the methods of moulding blocks 	<ul style="list-style-type: none"> Awareness of methods of moulding blocks Appreciation of moulding to produce quality blocks
		8.12.2.3 Cure cement sand blocks	<ul style="list-style-type: none"> Methods of curing Sand spray, Wet soa king Chemical spray, Ponding Importance Achieve strength Become durable Density of block is improved 	<ul style="list-style-type: none"> Application of the methods of curing blocks that are strong and durable 	<ul style="list-style-type: none"> Awareness of methods of curing blocks Appreciation of curing blocks to avoid wastage

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		8.12.2.4 Stack blocks	<ul style="list-style-type: none"> • Reasons for stacking: Save costs, breakage minimised, reduce accidents, improves workmanship • Methods of stacking: Stack rows, Bonded rows • Method of storing blocks in warehouses, under cover of hay, tents • Importance: Keep away from weather elements 	<ul style="list-style-type: none"> • Identification of methods of stacking blocks • Application of methods of stacking and storing blocks • Classification of methods of stacking blocks 	<ul style="list-style-type: none"> • Awareness of methods of stacking and storing blocks • Appreciation of stacking and storing blocks to avoid wastage
	8.12.3 Mortar	8.12.3.1 Prepare Mortar	<ul style="list-style-type: none"> • Types of mortar • Characteristics, Composition • Ratios, Mixing procedures • batching of materials 	<ul style="list-style-type: none"> • Mixing of materials to make mortar 	<ul style="list-style-type: none"> • Honesty when mixing materials to recommended proportions
8.13 BONDING OF BRICKWORK	8.13.1 Introduction to wall Construction	8.13.1.1 Build brick walls	<ul style="list-style-type: none"> • Parts of a brick • Importance of bonding brickwork, methods of laying bricks, • Build brick walls : • 10mm brick thick using stretched bond with stopped ends • 100 mm brick thick return corner in stretcher bond • 100 mm brick on thick double return corner in stretcher bond • T-junction with tooth and stopped ends • 100 mm brick on thick cross junction in stretcher bond 	<ul style="list-style-type: none"> • Application of bonding rules • Application of lapping of bricks • Avoidance of straight joints 	<ul style="list-style-type: none"> • Awareness of methods of bonding walls • Appreciation of good workmanship when laying bricks

Entrepreneurship

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.14 ENTREPRENEURSHIP	8.14.1 Entrepreneurial Activities in Design and Technology	8.14.1.1 Explain the benefits of engaging in entrepreneurial activities	<ul style="list-style-type: none"> Why people engage in entrepreneurial activities: <i>Use of local raw materials, alternative career, development of self-reliance, development of rural communities, reduction in incidences of crime</i> 	<ul style="list-style-type: none"> Identification of entrepreneurial activities in Design and Technology 	<ul style="list-style-type: none"> Awareness of entrepreneurial activities in Design and Technology
		8.14.1.2 Identify entrepreneurial activities in Design and Technology	<ul style="list-style-type: none"> Entrepreneurial activities: Design and Technology: Carpentry, Welding, Electrical, building products and services. 	<ul style="list-style-type: none"> Application of various entrepreneurial activities in Design and Technology 	<ul style="list-style-type: none"> Appreciation of entrepreneurial activities in Design and Technology
		8.14.1.2 Make business plans for an entrepreneurial activity	<ul style="list-style-type: none"> Identification of entrepreneurial activities, Start-up costs, fixed costs, marketing, advertising 	<ul style="list-style-type: none"> Identification of the components of the business plan Application of the business plans for an entrepreneurial activity 	<ul style="list-style-type: none"> Appreciation of the importance of in making business plans Appreciation of teamwork when making a business plan
		8.14.1.3 Implement business plans	<ul style="list-style-type: none"> Analysing activities for projects Start-up capital: contributions, loans, borrowing from friends or school 	<ul style="list-style-type: none"> Identification of ways of raising funds for the entrepreneurial activity Implementation of the business plan 	<ul style="list-style-type: none"> Awareness of ways of raising funds for the business plan Appreciation of the reasons for making a business plan

GRADE 9

GENERAL OUTCOMES AND KEY COMPETENCIES

GENERAL OUTCOMES	KEY COMPETENCIES
<ul style="list-style-type: none">• Apply geometrical constructions in designing• Demonstrate ability to manage a small business	<ul style="list-style-type: none">▪ Demonstrate ability to produce an artefact based on the details in the portfolio▪ Display basic skills to construct structures from available materials▪ Demonstrate ability to manage an entrepreneurial activity.▪ Display basic skills to conduct domestic installations.

Graphic Communication

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.1 PLANE FIGURES	9.1.1 Tangents	9.1.1.1 Construct tangents	<ul style="list-style-type: none"> • Types of tangents • Construct tangents to a point, on and away from the circumference, radius corners 	<ul style="list-style-type: none"> • Accuracy when constructing tangents to circles • Application of tangents in design work 	<ul style="list-style-type: none"> • Awareness of methods of constructing tangents
	9.1.2 Circles in Contact	9.1.2.1 Construct circles in contact	<ul style="list-style-type: none"> • Construct circles in contact: (Internal and external to two equal and unequal circles) 	<ul style="list-style-type: none"> • Accuracy in blending of curves • Accuracy when joining curves of an ellipse • Neatness when blending curves. 	<ul style="list-style-type: none"> • Awareness of methods of constructing circles in contact
	9.1.3 Ellipse	9.1.3.1 Construct an ellipse	<ul style="list-style-type: none"> • Construct ellipses using Concentric Circle and Rectangle Methods Minor axis, Major axes, focal points 	<ul style="list-style-type: none"> • Application of ellipses in design work • Accuracy when joining ellipses. • Neatness when blending ellipses. 	<ul style="list-style-type: none"> • Appreciation of methods of obtaining elliptical shapes
9.2 SURFACE DEVELOPMENT	9.2.1 Surface Development of Solids	9.2.1.1 Develop surfaces of solids	<ul style="list-style-type: none"> • Surface development of: plain and truncated prisms (<i>triangular, rectangular, hexagonal, pentagonal</i>), plain and truncated cylinders. 	<ul style="list-style-type: none"> • Application of surface development in designing and making artefacts 	<ul style="list-style-type: none"> • Appreciation of surface development in design work

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.3 ORTHOGRAPHIC PROJECTION	9.3.1 Projection of Solids	9.3.1.1 Project prisms and cylinders	<ul style="list-style-type: none"> • Projections of plain and truncated prisms (hexagonal and pentagonal) • Plain and truncated cylinders 	<ul style="list-style-type: none"> • Drafting of solids in orthographic • Accuracy in projecting elevations of solids 	<ul style="list-style-type: none"> • Awareness of projecting solids in orthographic • Appreciation of different orthographic views
	9.3.2 Orthographic Projection	9.3.2.1 Produce sectional elevations from the given views	<ul style="list-style-type: none"> • Projection of sectional elevations and plans • Cutting plane, sectioning, section subtitle, hatching lines, sectioning of webs and curved surfaces. 	<ul style="list-style-type: none"> • Interpreting of sectional elevations • Accuracy in projecting elevations 	<ul style="list-style-type: none"> • Concentration in producing elevations • Projection of neat and well-spaced elevations • Appreciation of planning in orthographic drawing
	9.3.3 Working Drawings	9.3.3.1 Produce working drawings for an artefact	<ul style="list-style-type: none"> • Pictorial isometric, detail drawings, assembly drawings, parts list, cutting list 	<ul style="list-style-type: none"> • Sketching freehand working drawings 	
9.4 GRAPHICS	9.4.1 Introduction to Computer Drawing.	9.4.1.1 Draw basic 2-dimensional shapes using a computer	<ul style="list-style-type: none"> • By Layer: Line type, line weight, colour, scale (Use of AutoCAD, Corel draw, Sketch up) 	<ul style="list-style-type: none"> • Application of computers in drawing 	<ul style="list-style-type: none"> • Awareness of computer drawing • Appreciation of computers in drawing and designing

Design and Communication

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.5 DESIGN PROCESS	9.5.1 Evaluation	9.5.1.1 Appraise the artefact in line with the brief and specifications	<ul style="list-style-type: none"> • Test the artefact whether it meets the brief and specifications • Analysis of artefact providing strengths and weaknesses • Suggest possible modifications • Outline limitations in designing and making the artefact 	<ul style="list-style-type: none"> • Testing the product. • Analysing aspects of evaluation to ascertain its suitability • Communicating aspects of evaluation 	<ul style="list-style-type: none"> • Awareness of the need to suggest modifications to the artefact • Honesty in stating whether the artefact meets the brief and specifications
9.6 PORTFOLIO	9.6.1 Portfolio Presentation	9.6.1.1 Produce portfolios	<ul style="list-style-type: none"> • Portfolio presentation: content (drawings, data), sequencing (arranging all components of the portfolio sequentially), binding (stapling, spiral binding) • Draw design ideas using a variety of graphical techniques, enhance ideas using a variety of presentation techniques 	<ul style="list-style-type: none"> • Communicating information graphically and in writing • Organising material and other requirements 	<ul style="list-style-type: none"> • Keeping portfolio records orderly • Participating in group work in problem solving

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.7 SYSTEMS TECHNOLOGY	9.7.1 Structures	9.7.1.1 Apply the concept of forces in structures	<ul style="list-style-type: none"> Types of structures: Natural and artificial (Shell and Frame) Types of forces in structures : Static and dynamic 	<ul style="list-style-type: none"> Identification of structures Observing the behaviour of forces in structures 	<ul style="list-style-type: none"> Appreciating harmonious structures. Awareness of working with forces
		9.7.1.2 Apply methods of strengthening and stabilising structures.	<ul style="list-style-type: none"> Methods: Strength, Stability, Rigidity, ties and struts 	<ul style="list-style-type: none"> Application of methods of stabilizing structures 	<ul style="list-style-type: none"> Appreciation of the importance of strong structures.
	9.7.2 Mechanisms	9.7.2.1 Identify different types of mechanisms	<ul style="list-style-type: none"> Forms of motions, types of mechanisms: (levers, linkages, input and output movements) 	<ul style="list-style-type: none"> Identifications of types of mechanisms 	<ul style="list-style-type: none"> Awareness of types of mechanisms Appreciation of mechanisms in artefact making
		9.7.2.2 Apply mechanisms in artefact making	<ul style="list-style-type: none"> Application of mechanisms in artefact making 	<ul style="list-style-type: none"> Application of mechanisms in artefact making 	
	9.7.3 Electronics	9.7.3.1 Construct simple electronic circuits	<ul style="list-style-type: none"> Design electronic circuits: Construction of electronic circuits: Application of resistors, capacitors, transistors, diodes, (semi-conductors) bread board (circuit board) 	<ul style="list-style-type: none"> Drawing electronic circuit diagrams Construction of electronic circuits from diagrams 	<ul style="list-style-type: none"> Awareness of health hazards when constructing electronic circuits

Manufacturing Materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.8 MATERIALS	9.8.1 Heat Treatment	9.8.1.1 Apply methods of heat treatment on metals	<ul style="list-style-type: none"> • Methods of heat treatment: Hardening, annealing, normalising, tempering, casehardening 	<ul style="list-style-type: none"> • Application of methods of treating metals 	<ul style="list-style-type: none"> • Appreciation of the effects of heat on metals
	9.8.2 Impelling Tools	9.8.2.1 Apply impelling tools in joining materials	<ul style="list-style-type: none"> • Types and uses of hammers (Claw, cross pane, ball pane), mallets (carpenter's mallet, rubber mallet), and screwdrivers (London Pattern, cabinet pattern) 	<ul style="list-style-type: none"> • Identification of impelling tools • Correct handling of impelling tools when working with materials. 	<ul style="list-style-type: none"> • Awareness of the uses of impelling tools • Appreciation of safety rules when using impelling tools
	9.8.3 Finishing Materials	9.8.3.1 Apply finishes to the product	<ul style="list-style-type: none"> • Pre-finishing processes: glass paper, emery cloth sanding techniques • Types and methods of finishing: Varnish, paint, oil, polish, wax, stain, plastic coating, blueing, banishing • Tools for applying finishes: brushes, spray guns • Safety precautions when applying finishes 	<ul style="list-style-type: none"> • Application of appropriate finishes on artefacts • Correct use of equipment used in applying finishes 	<ul style="list-style-type: none"> • Awareness of various types of finishes • Observe safety precautions when applying finishes

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.9 HOUSE FITTINGS	9.9.1 In-built Fittings	9.9.1.1 Construct in-built house fittings	<ul style="list-style-type: none"> Types of house fitting : In-built wardrobes and in-built kitchen pantries Parts: Shelves, runners/cleats, hanging rods in wardrobes Procedure of constructing in-built house fittings: Mark position for runners/cleats Fix shelves on the runners/cleats 	<ul style="list-style-type: none"> Identification of parts and types of in-built fittings Fixing in-built house fittings 	<ul style="list-style-type: none"> Awareness of in-built house fittings Producing neat in-built house fittings
	9.9.2 Fitting Doors	9.9.2.1 Fix doors to in-built house fittings	<ul style="list-style-type: none"> Procedure of fixing doors: Mark position for door linings Fix door linings, mark out for doors, Fix door iron mongery, Fix doors 	<ul style="list-style-type: none"> Fixing doors to in-built house fittings 	<ul style="list-style-type: none"> Fixing doors to in-built house fittings neatly and accurately
9.10 ROOF CONSTRUCTION	9.10.1 Simple Roofs	9.10.1.1 Erect flat roofs	<ul style="list-style-type: none"> Flat roofs: These are the roofs which have a slope of less than 10 degrees Throws rain water on one end The for span should not be more than 5m Slope formed by furring pieces Procedure of erecting a flat Measure the span of the room Prepare and fix: joists according to span, wall plate, furring pieces, purlins, paint the frame with the appropriate wood preservative, secure the roofing sheets 	<ul style="list-style-type: none"> Identification the required material for constructing a flat roof Constructing a flat roof Applying the appropriate finish and preservative to a flat roof 	<ul style="list-style-type: none"> Observing safety precautions when constructing a flat roof Appreciation of an accurate and neatly constructed flat roof

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		9.10.1.2 Erect lean-to roofs	<ul style="list-style-type: none"> • Lean-to- roofs: Type of roof supported by an already existing wall, Single pitched roof • Procedure of erecting a lean-to roof Measure the span of the room Prepare and fix: abutment piece, wall plate, joists (beams), purlins, paint the frame with the appropriate wood preservative, secure the roofing sheets <i>Abutment piece: This is the timber that is secured to the wall where the joists rest</i> 	<ul style="list-style-type: none"> • Identification of the required material for a lean-to-roof • Constructing a lean-to-roof • Application of the appropriate finish and preservative to a lean-to-roof 	<ul style="list-style-type: none"> • Observing safety precautions when constructing a lean-to-roof • Appreciation of an accurate and neatly constructed lean-to-roof
	9.10.2 Roof Materials	9.10.2.1 Describe materials used in roof construction	<ul style="list-style-type: none"> • <i>Materials used in roof construction:</i> timber, iron sheets, tiles, slates, asbestos sheets, roofing nails, wire nails, J-hooks • <i>Sizes of materials used in roof construction:</i> Timber: - Joists – 150 x 50mm, Wall plate 100 x 50mm, Fascia board 150 x 25mm, 25mm x 200mm Purlins 75mm x 50mm Furring Pieces 100 mm x 50 mm 150 mm x 50 mm Nails: 3”, 4”, 5”wire nails 	<ul style="list-style-type: none"> • Identifying materials used in roof construction • Cutting materials for roof construction accurately 	<ul style="list-style-type: none"> • Adherence to the required standards used in construction • Appreciation of following the required measurements when using prescribed materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
		9.10.2.2 Describe materials used in roof covering	<ul style="list-style-type: none"> • Roof coverings: <i>Asbestos sheets</i> and sizes 1.2m, 1.5m, 1.8m, 2.1m, 2.4m, 2.7m, 3.0m, 3.3m., 3.6m <i>Iron sheets</i> and sizes 1.5m, 2m, 2.5m,3m, 3.5 m <i>Tiles</i> and sizes Approx. 250 x250 & 350 x 350 Note <i>measurement in mm</i> 	<ul style="list-style-type: none"> • Identifying types of roof covering materials 	<ul style="list-style-type: none"> • Awareness of types of roof covering materials
		9.10.2.3 Fix roof coverings on simple roofs	<ul style="list-style-type: none"> • Procedure of fixing of roof coverings on simple roofs: Measure the length of building Select correct number of roof coverings Select correct fixing devices Lay the first line of roofing sheets and secure them to purlins by nailing Lay the remaining securing them by overlapping 1 ½ corrugations in case of iron sheet and 1(one) corrugation in asbestos sheets Prepare and fix fascia board <i>Fascia board – The timber that is fixed at the end of joists in order to:</i> <ul style="list-style-type: none"> ▪ <i>Hide the end grains</i> ▪ <i>Beautify the building</i> ▪ <i>Provide for the fixing of the gutter</i> 	<ul style="list-style-type: none"> • Fixing roof covering materials on simple roofs • Applying correct methods of securing roof coverings 	<ul style="list-style-type: none"> • Fixing roof coverings neatly and accurately • Observing safety precautions when fixing roof coverings

Electrical Engineering

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.11 INSTALLATIONS AND APPLIANCES	9.11.1 Domestic Installations	9.11.1.1 Install equipment and materials	<ul style="list-style-type: none"> • Installing Socket Outlets Ring connection Radial connection • Installing lighting circuits Parallel connection Series connection • Installing Cooker Control Unit and Geyser 	<ul style="list-style-type: none"> • Installing equipment and materials for domestic installation • Application of series and parallel connections 	<ul style="list-style-type: none"> • Awareness of equipment and materials for domestic installation • Observing safety precautions when making installations
		9.11.1.2 Test installed equipment	<ul style="list-style-type: none"> • Testing Polarity: Ensure that all conductors are connected in a live phase • Testing insulation resistance • Testing Continuity of circuit (Voltage drops in series and parallel circuit) 	<ul style="list-style-type: none"> • Identifying equipment for testing installations • Testing the installations 	<ul style="list-style-type: none"> • Observing safety precautions when making installations • Awareness of testing installed equipment
	9.11.2 Repair of Domestic Appliances	9.11.2.1 Repair domestic appliances	<ul style="list-style-type: none"> • Principle of operation of pressing iron, stove, electric kettle • Fault diagnostic procedures • Repairing Pressing Irons, kettles and stoves (Checking elements and fuse on plugs, replacing elements Asbestor cables, Neutral blocks, Oven elements, Knobs) 	<ul style="list-style-type: none"> • Conducting a fault diagnostic procedure • Repairing of domestic appliances • Application of fault diagnostic procedures 	<ul style="list-style-type: none"> • Observing safety precautions when repairing domestic appliances • Appreciation of safety precautions

Bricklaying and Plastering

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.12 BONDING OF BRICKWORK	9.12.1 Wall Construction	9.12.1.1 Build walls	<ul style="list-style-type: none"> • Setting out the first course: Marking out, Dry bond • Build the wall: lay the bricks, square the first course, gauge the brick, plumb the corners, level the courses • 200 mm wall in English bond: <i>with stopped ends; return corner wall with stopped ends; cross junction wall</i> and apply bonding rules; <i>toothed ends in English Garden wall bond</i> • Lay out 200 mm wall using Flemish bond with <i>stopped ends; return corner and stopped ends; return corner wall with raked ends; toothed ends in Flemish Garden wall bond</i> 	<ul style="list-style-type: none"> • Accuracy in setting out and building the brick or block wall • Application of bonding rules in wall construction • Identification of English and Flemish bonds 	<ul style="list-style-type: none"> • Awareness in setting out and building the brick or block wall • Awareness of bonding rules in wall construction
9.13 JOINTING AND POINTING	9.13.1 Jointing and Pointing the Walls	9.13.1.1 Joint and point different types of walls	<ul style="list-style-type: none"> • Types of joints (tooled, weathered, stuck, flush joints) • Application of joints i.e. tooled point, tuck pointing, and weather pointing • Factors to consider when jointing: Wall to be fresh • Types of tools to use, process of jointing as work proceeds • Jointing procedures: apply fresh or plastic mortar 	<ul style="list-style-type: none"> • Identification of joints • Application of factors when jointing walls • Application of tools in the jointing process 	<ul style="list-style-type: none"> • Distinguishing the different processes of jointing and pointing • Awareness of jointing and pointing of walls

Entrepreneurship

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.14 ENTREPRENEURSHIP	9.14.1 Business Management	9.14.1.1 Manage small business	<ul style="list-style-type: none"> • Business management: Organising, supervising, service provision. • Becoming a critical consumer: calculate cost price, selling price, profit/loss 	<ul style="list-style-type: none"> • Identification of various records in business management • Record keeping and monitoring of activities. 	<ul style="list-style-type: none"> • Appreciation of budgeting in business management • Appreciation of record keeping in business management • Teamwork in managing a small business • Tolerance of different personalities in the business venture
		9.14.1.2 Manage credit	<ul style="list-style-type: none"> • Choose an appropriate payment method: Instalments, Banks stop order, Cash • Managing risk and emotion: distinguish between credit, debit, borrowing and saving 	<ul style="list-style-type: none"> • Budgeting when managing business • Application of problem solving skills • Management of emotions in entrepreneurial activities 	
		9.14.1.3 Present final accounts for the Business	<ul style="list-style-type: none"> • Prepare final accounts for the business • Income and expenditure sheet • Present the final business accounts • Liquidation of the entrepreneurial activity 	<ul style="list-style-type: none"> • Preparation of income and expenditure sheet • Application of initial agreed business guidelines 	

APPENDIX 1

PROJECT EVALUATION GUIDE

		TICK YOUR SELECTION BELOW				
I made a						I DID NOT DO THIS PART
Did you work with somebody else? YES <input type="checkbox"/> NO <input type="checkbox"/>		VERY PLEASED	PLEASED	FAIRLY HAPPY	UNHAPPY	
Investigation	I carried out an investigation and feel					
Research	I carried out research and feel					
Ideas	I sketched various ideas and feel					
Models	I made a model and feel					
Development	I developed my design and feel					
Planning	I planned my work step-by-step and feel					
Making	I made my design and feel					
If it was made again, how could it be improved? Explain using notes or/and sketches						
I liked <input type="checkbox"/> disliked <input type="checkbox"/> this project? Tick a box, then given a reason for your answer:						
What was the most difficult part to make? Explain your answer.						
How did you improve or alter your design as it was made?						
How did you test work, to make sure it did what it was supposed to do?						
What did other people say about your work? (e.g. parents, teachers, industrial advisers etc.)						
Who did you ask and what comments did the make?						

