Republic of Zambia

MINISTRY OF EDUCATION, SCIENCE, VOCATIONAL TRAINING AND EARLY EDUCATION

DESIGN & TECHNOLOGY JUNIOR SECONDARY SCHOOL SYLLABUS

[GRADE 8- 9]

TRIALING VERSION

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PREFACE

This syllabus is a product of the recommendations made during the National Symposium held in June 2009 and the Baseline survey that was conducted by the Curriculum Development Centre in 2005 where stakeholders suggested that Industrial Arts subjects i.e. Technical Drawing, Woodwork and Metalwork be integrated into one subject; hence the change to Design and Technology.

The teaching of Design and Technology at the Junior Secondary School is designed to build on knowledge and skills acquired in Technology Studies at Primary School level so as to provide an opportunity to the learner to pursue a Technical Career path in life. In this regard, Design and Technology will equip learners with a variety of knowledge, skills and values that can prepare them for further education, entrepreneurship and ultimately, for life in general.

Thus, the review was necessitated by the need to improve the quality of education at Junior Secondary School level as outlined and recommended in the policy document Educating Our Future (1996) and the Zambia Education Curriculum Framework (ZECF) 2012.

It is my sincere hope that this syllabus will improve learning and teaching of Design and Technology in schools and have a positive impact on the national economy.

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PERMANENT SECRETARY
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We also wish to thank government departments and institutions of learning that were involved in the development and production of this syllabus in many varied ways.

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Finally, we wish to acknowledge our indebtedness to the former Director Standards and Curriculum Mrs Florence C. Mfula, the former Chief Curriculum Specialist Ms Georgina Hamaimbo and the late Principal Curriculum Specialist of Natural Science Ms Mary M. Lungufor their valuable contributions in guiding the review exercise before they retired from the service.

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AIMS OF TEACHING DESIGN AND TECHNOLOGY

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.

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 to identify the needs and opportunities for design and technological activities.

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

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

COMPONENT		***DESCRIPTION***
1	***GRAPHIC COMMUNICATION***	Communication by drawings or symbols.The purpose of *Graphic Communication* in Design and Technology is to help learners develop the ability to convey or transmit information about design problems, ideas and solutions graphically.
2	***MATERIALS***	This area will help the learners investigate various materials and their properties. This will help them to develop skills of how to choose materials for any project and base their choice on: *availability, cost* and *characteristics* of each material. When working with materials, learners will have to use tools. Therefore, they will have to learn about various types of tools, function and use.
3	***TECHNOLOGY***	Technology will focus on developing skills used in *Structures, Mechanisms* and *Electronics*. Learners will be helped to; *identify* how these are interrelated, their role in *designing* and *making* control systems.
4	***ENTREPRENUERSHIP***	The purpose ofteaching entrepreneurship education is to prepare learners for an entrepreneurial career in life. Design and Technology offers learners an opportunity to buy, make and sell items.

Thus, the aims of Design and Technology syllabus are to:

1. Foster the learners' awareness of local, regional and national needs so as to contribute towards development and fully attain the Vision 2030;
2. Equip learners 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, entrepreneurship and self-employment.

KEY COMPETENCIES

Learners taking Design and Technology are expected to develop the following competencies:

COMPETENCIES		***DESCRIPTION***
1	***Investigative skills***	*Critical thinking*: learners are expected to come up with possibilities to tackle a particular need and choose the preferred solution; *Creative thinking* learners will be expected to produce new ideas that will leading to a conclusion; *Inquiring* asking questions to obtain suggestions to facilitate solving of problems
2	***Interpretational skills***	Learners' ability to classify, convert, identify, explain and interpret evidence. This also involves the interpretation of patterns, sketches, models, charts and illustrations.
3	***Application skills***	Drawing, measuring and cutting. Conducting research and assessing information from various sources. Producing artefacts using materials. Application of knowledge in real life situations.
4	***Communication skills***	Explaining, displaying, reporting, reading, listening, drawing and designing.
5	***Valuing and attitudinal skills***	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
6	***Participating skills***	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 leaner participation as individuals or in groups.This approach maximises the quality of learning when the following principles are put into practice.

In order to develop learning with understanding, skills and attitudes to contribute to the development of society, the starting point for teaching and learning is to recognise that learners come to the school 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. To accommodate this, the teacher must determine the needs of the learners and shape the learning experiences accordingly. Therefore, teaching methods must be varied but flexible within well-structured sequences of lessons 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, in relation to the learning outcomes to be achieved, when it is best to let learners *discover* or *explore* information for themselves; when they need *directed learning, reinforcement* or when the learners 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.

SUGGESTED TIME ALLOCATION FOR EACH COMPONENT

The standard period allocation has been prescribed in the Zambia Education Curriculum Framework (ZECF) 2012. At Junior Secondary School level, Design and Technology will have **six (6)** periods of **forty (40)** minutes 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 time considering that facilities, tools, materials and the level of the learners may also vary.

While information concerning teaching of different skills, resources, scheming, 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 which are found in this syllabus. Therefore, scheming should be based on the Specific Outcome. In some cases, more lessons will be required before achieving a certain Specific Outcome.

OUTLINE OF THE SYLLABUS

This syllabus seeks to instil a sense of appreciation of technology to make sure that learners can adapt and cope with 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 arranged in this order for easy of reference. Some topics may be similar in both Grades 8 and 9, but the levels of knowledge, skills, concepts and attitudes to be attained are not the same. Hence, when preparing lessons teachers should strive at building on what the learners already know.

It is suggested that Graphic Communication and Materials feature prominently in Grade 8 Term 1 whereas the Design Process should run through from Term 1 to Term 3 because these components will lay a strong cornerstone for the content: knowledge, skills and values needed for realisation, analyse, interpret and solve problems in everyday life.

GRADE 8 DESIGNS AND TECHNOLOGY *Introduction to Design and Technology*

GENERAL OUTCOMES:

- **Apply good personal working habits**
- **Care for the workroom and equipment**

KEY COMPETENCIES AT GRADE 8 LEVEL
▪ Identify materials used to make items found in the environment. ▪ Identify main parts of the computer, open and close a computer ▪ Describe activities that take place at the markets

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 the importance of Design andTechnology.	• Career path: Architecture, engineering, Entrepreneurship	• Identification • Interpretation • Communication	• Awareness, • Application • Appreciation
	8.1.2 SAFETY	8.1.2.1 Apply safety rules in the workroom. 8.1.2.2 Practice safe ways of avoiding HIV/AIDS infections.	• Safety rules, causes of accidents /injuries • First Aid andtechniques	• Interpretation • Orderliness • Emergency care	• Awareness, • Team work • safety consciousness • Assertiveness
	8.1.3 WORK ROOM MANAGEMENT	8.1.3.1 Explain the features of the workroom. 8.1.3.2Explain the daily routine in the workroom	• Working and Marking areas, Work bench: parts -use /care • Workroom routine -Storage of tools	• Orderliness, • Identification • Communication	• Awareness, • Responsibility • Accountability

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES: *Graphic Communication*

- **Demonstrate correct use of drawing instruments**
- **Demonstrate correct application of graphical communication techniques**

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.2.0 GRAPHIC COMMUNICATION	**8.2.1 INSTRUMENTS**	8.2.1.1 Identify the basic drawing instruments. 8.2.1.2 Demonstrate the correct use of drawing instruments.	• Set squares, Rule, Compass, Dividers, Drawing board, T-square, Pencils. • Correct use	• Identification • Drawing • Printing • Lettering • Communication	• Awareness • Appreciation • Quality work
	8.2.2PAPER LAYOUT	8.2.2.1 Apply correct method of preparing paper.	• Paper sizes, • Border line (10mm all round) Title block	• Printing • Manipulation • Accuracy	• Awareness • Application • Demonstration
	8.2.3 COLOURS	8.2.3.1 Identify colours 8.2.3.2 Use of colours for communication purposes	• Primary, Secondary colours, • use of colour	• Identification • Interpretation	• Curiosity • Appreciation • Creativity • Awareness
	8.2.4 SYMBOLS	8.2.4.1 Design symbols from specified information	• Symbols, explanatory diagrams.	• Communication • Drawing • Analysis	• Curiosity • Quality work • Creativity
	8.2.5 LINES	8.2.5.1 Construct lines from given measurements	• Parallel lines; divide into a number of parts and ratio.	• Manipulation • Accuracy • Demonstration	• Awareness • Appreciation • Quality work

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Apply correct geometrical construction methods to satisfy given conditions** *Graphic Communication*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.3.0 PLANE GEOMETRY	**8.3.1 ANGLES**	8.3.1.1 Construct angles. 8.3.1.2 Bisect angles.	• Types of angles, other than 60˚, 90˚, 75˚, 30˚, 105˚ • Bisect	• Bisecting, • Drawing • Accuracy • Manipulation	• Accuracy, • Quality work • Demonstration • Team work
	8.3.2 TRIANGLES	8.3.2.1 Describe various triangles. 8.3.2.2 Construct various triangles.	• Equilateral, Isosceles, Scalene, Acute, Obtuse and Right Angled. • Construct triangles using sides, angles and perimeter.	• Identification, • Manipulation	• Accuracy, • Quality work • Team work
	8.3.3 QUADRILATERALS	8.3.3.1 Describe various quadrilaterals. 8.3.3.2 Construct various quadrilaterals.	• Rectangle, Square, Kite, Rhombus, Parallelogram. • Construct using, Sides, angles and diagonals.	• Bisecting, • Drawing • Accuracy • Manipulation	• Accuracy, • Quality work • Demonstration • Team work
	8.4.1 CIRCLES	8.4.1.1Construct circles. 8.4.1.2 Circumscribe and inscribe circles to triangles	• Parts of a circle • Construct circles given radius/diameter • Concentric circles • Circumscribe • Inscribe	• Manipulation • Accuracy • Bisecting • Drawing •Communication	• Awareness • Appreciation • Quality work • Accuracy

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Apply correct geometrical constructions and drawing techniques to solve problems***Graphic Communication*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.4.0 PLANE GEOMETRY ***(Continued)***	**8.4.2 POLYGONS**	8.4.2.1 Describe polygons 8.4.2.2 Construct regular polygons. 8.4.2.3 Construct the irregular polygons using sides and angles	• Regular and irregular: Hexagons, Pentagons, Heptagons, Octagons • Construct **regular** polygons given: Side, diameter, Across Corners (A/C) Across Flats (A/F) • Construct **irregular** polygons	• Manipulation • Accuracy • Drawing • Demonstration	• Awareness • Appreciation • Quality work
8.5.0 SOLID GEOMETRY	**8.5.1 PICTORIAL DRAWING**	8.5.1.1 Construct blocks in Pictorial Drawing	• Freehand sketching, Principles of pictorial drawing. • **Isometric:**(straight edges, slanting, circles)	• Demonstration • Accuracy • Identification	• Awareness • Appreciation • Quality work • Team work

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Produce drawings in Orthographic Projection***Graphic Communication*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	**SKILL**	**VALUES**
8.6.0 ORTHOGRAPHIC PROJECTION	**8.6.1 ORTHOGRAPHIC PROJECTION**	8.6.1.1 Describe the Principle Planes in Orthographic Projection 8.6.1.2 Construct simple objects from Isometricto Orthographic Projection without hidden details 8.6.1.3 Construct simple objects from isometric to Orthographic Projection withsomehidden details 8.6.1.4 Produce the *End Elevation* First Angle Projection given the *Plan*and the*Front Elevation*. 8.6.1.5 Produce the *End Elevation* Third Angle Projection given the *Plan*and the *Front Elevation*.	• Principle planes: *(Vertical, Horizontal and Side Vertical Planes),* Front, Plan, End elevations • Hidden details, Dimensioning, First and Third Angle Projections, Data in the Title Block: *(Name, School, Title, Projection, Scale)*	• Identification • Demonstration • Accuracy • Drawing • Communication	• Curiosity • Problem solving • Critical thinking • Application • Accuracy • Team work

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Generate design ideas and develop proposals that meet the specific users**
- **Evaluate how the product meets the needs.**
- **Demonstrate ability to recommend modifications on the artefact***Design Process*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.7.0 DESIGNING	**8.7.1 DESIGN PROCESS**	8.7.1.1 Explain the design process 8.7.2.2 Generate design ideas from a theme 8.7.1.3 Communicate design ideas 8.7.1.4 Produce portfolios on any theme 8.7.1.5 Produce artefacts based on the portfolio	• Design Process: - Problem identification from situation - Design brief - Investigation - Solution (Portfolio) - Realisation - Evaluation	• Identification • Designing • Communication • Interviewing • Drawing • Sketching • Researching • Interpretation • Analysis • Labelling • Colouring • Accuracy • Management • Costing	• Problem solving • Ingenuity • Resourcefulness • Creative thinking • Appreciation • Curiosity • Team work • Quality work • Inquisitive • Entrepreneurship

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Explain the basic properties and characteristics of materials**

Materials

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.8.0 MATERIALS	**8.8.1 WOOD**	8.8.1.1 Identify and classify local and exotic trees suitable for wood workinZambia 8.8.1.2 Describe the cross section of a tree. 8.8.1.3 Outline the timber processes. 8.8.1.4 Explain the sustainable use of local Trees.	• Softwood, hard wood • Cross section of a log • Felling, conversion, seasoning. • Uses of wood. (timber)	• Identification • Classification • Analysis • Sketching • Labelling	• Appreciation • Resourcefulness • Application • Inquisitive • Awareness • Entrepreneurship
	8.8.2 METAL	8.8.2.1 Identify and classify metals 8.8.2.2 Explain uses of metal in everyday life.	• Metal properties/ uses. - **Ferrous:**(carbon and alloy steels, cast irons) - **Non-ferrous: (**zinc, tin, copper, lead, aluminium) - **Alloys:** (brass, bronze, solder, steel, duralumin)	• Identification • Classification • Communication • Analysis	• Appreciation • Resourcefulness • Application • Inquisitiveness • Critical thinking
	8.8.3 PLASTICS	8.8.3.1 Identify and classify plastics 8.8.3.2 Explain the general uses of plastics in everyday life. 8.8.3.3 Explain the effects of plastics on the environment and the safe ways ofdisposing them off.	• **Thermoplastics** • **Thermosets** properties, uses, storage of plastics • Recycling	• Identification • Classification • Communication • Analysis	• Appreciation • Application, • Awareness

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Select appropriate tools to use when preparing material in artefact production** *Materials*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.8.0 MATERIALS	**8.8.4 PREPARATION OF MATERIALS**	8.8.4.1 Describe measuring, marking out and testing tools. 8.8.4.2 Demonstrate correct methods of using measuring, marking out and testingtools. 8.8.4.3 Demonstrate the correct care for measuring, marking out and testing tools.	• Notation, Measuring tools, Marking tools, Testing tools • Correct Method of using • Care	• Measuring • Marking • Testing	• Appreciation • Application, • Inquisitive • Quality work, • Accuracy
	8.8.5 WASTING OF MATERIALS	8.8.5.1 Identify and illustrate wasting tools 8.8.5.2 Demonstrate the correct method of using wasting tools. 8.8.5.3 Identify and illustrate holding tools 8.8.5.4 Demonstrate the correct method of using holding tools when wasting materials.	• **Wood:** saws, chisels, planes **Metal:** Hacksaws, Files,Drill bits, chisels **Plastic:** Coping saws, tenon saw. • Correct method of using • **Holding tools**: (Vices, sawing boards) • Correct method of using	• Ripping, • Planing • Sketching • Filling, • Chiselling, • Drilling, • Sawing, • Shearing • Shaping	• Appreciation • Resourcefulness • Application • Inquisitive • Safety consciousness • Assertiveness • Team work • Quality work

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Demonstrate correct use of equipment used when joining materials.** *Materials*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.8.0 MATERIALS	**8.8.6 JOINING MATERIALS**	8.8.6.1 Identify different methods of joining wood 8.8.6.2 Describe different methods of joining wood 8.8.6.3 Apply different methods of joining wood 8.8.6.4 Identify different methods of joining metal 8.8.6.5 Describe different methods of joining metal 8.8.6.6 Apply different methods of joining metal 8.8.6.7 Identify different methods of joining plastics 8.8.6.8 Describe methods of joining plastics 8.8.6.9 Apply different methods of joining plastics	• **Wood Joints**: Housing, Mortice and tenon, Dovetail, Halving, Bridle • **Metal:** - Riveting, Soldering - Seaming - Threading • **Plastic:** - Laminating - Screwing	• Identification • Demonstration Cutting, Riveting, Soldering, Seaming, Threading, Laminating Drilling. • Accuracy	• Appreciation • Quality work • Application • Problem solving • Safety consciousness
	8.8.7 ADHESIVES AND FIXINGS	8.8.7.1 Describe the characteristics of adhesives 8.8.7.2 Use adhesives appropriately 8.8.7.3 Demonstrate safety precautions when applying adhesives 8.8.7.4 Identify and illustrate parts of the prescribed fixings 8.8.7.5 Use fixings appropriately	• Casein, Animal, PVA, Contact, glue, PVC, tensile cement • **Fixings:** screws, nails, rivets, self tapping)	• Identification • Manipulation • Joining	• Appreciation • Resourcefulness • Application, • Inquisitive • Reasoning • Critical thinking • Craftsmanship

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Apply principles of mechanisms to solve real life situations**
- **Apply concepts and principles of electricity and electronics in problem solving situations***Technology*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.9 TECHNOLOGY	**8.9.1 MECHANISMS**	8.9.1.1 Illustrate different forms of motions 8.9.1.2 Identify different types of mechanism 8.9.1.3 Explain the functions of mechanisms 8.9.1.4 Select and make appropriate mechanismsin response to a given	• Types of mechanisms, • levers, linkages, input and output movements, functions of mechanisms	• Identification • Designing, • Drawing, • Interpretation, • communication • Research	• Appreciation • Creativity, • Safety consciousness • Problem solving, • Team work
	8.9.2 BASIC ELETRICITY AND ELECTRONICS	8.9.2.1 Identify basic components of a circuit 8.9.2.2 Interpret and draw circuit diagrams usingconventional symbols 8.9.2.3 Describe the tree of electricity and electronics 8.9.2.4 Design a simple electrical circuit 8.9.2.5 Construct a simple electrical circuit 8.9.2.6 Design a simple electronic circuit 8.9.2.7 Construct a simple electronic circuit 8.9.2.8 Demonstrate awareness of potential hazards when working with electricalequipment.	• Circuit, bread board (circuit board) cells in series & parallel • Conventional symbols for (Switches, Resistors, Transistors, Capacitors, Conductors) • Magnets and electromagnetism	• Identification • Interpretation • Designing , • Labelling, • Circuit assembling, • Soldering, Communication, • Drawing, • Analysis	• Appreciation • Creativity, • Safety consciousness • Problem solving, • Logical thinking, • Application, • Quality work

GRADE 8 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Demonstrate knowledge and values of entrepreneurship**
- **Develop entrepreneurial skills***Entrepreneurship*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.10 ENTREPRENEURSHIP	**8.10.1 CAREERS**	8.10.1.1 Identify and select entrepreneurial activity in Design and Technology 8.10.1.2 Form entrepreneurial working teams 8.10.1.3 Make business plans for the selected entrepreneurial activity 8.10.1.4 Mobilise resources 8.10.1.5 Design marketing strategies 8.10.1.6Design pricing strategies 8.10.1.7Manage small business 8.10.1.8Prepare final accounts for the Business	• Wood products • Metal products • Plastic products • Toy making • Tool making • Sign writing	• Identification • Communication • Marketing • Pricing • Interpretation • Analysis • Packaging • Labelling • Record keeping • Evaluation • Monitoring • Organisational	• Creativity • Awareness • Honesty • Integrity • Team work • Quality work • Determination • Responsibility • Thriftiness • Entrepreneurship • Innovation • Application

GRADE 9 DESIGNSAND TECHNOLOGY

GENERAL OUTCOME:

- **Apply tangential constructions in designing**

Graphic Communication

KEY COMPETENCIES AT GRADE 1 LEVEL
▪ Identify materials used to make items found in the environment. ▪ Match primary colours ▪ Identify main parts of the computer, open and close a computer ▪ Describe activities that take place at the markets

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.0 CIRCLES	**9.1.1 TANGENTS AND CIRCLES IN CONTACT**	9.1.1.1 Construct tangents. 9.1.1.2 Construct tangential arcs 9.1.1.3 Construct circles in contact 9.1.1.4 Applytangents and circles in contact in artefact making.	• **Tangents** to a point **on** and **away** from the circumference, internal /external tangents to equal/unequal circles. • Radius corners • **Circles in contact** (Internal / external to two equal and unequal circles)	• Manipulation • Accuracy • Drawing • Demonstration	• Appreciation • Curiosity • Application • Logical thinking • Problem solving • Quality work
	9.1.2 ELLIPSE	9.1.2.1 Construct an ellipse. 9.1.2.2 Apply elliptical constructions in design work	• Parts of an ellipse, construction (Concentric circle, rectangle Methods)	• Identification • Accuracy • Interpretation • Demonstration	• Appreciation • Curiosity • Application • Problem solving
9.2.0 SURFACE DEVELOPMENT	**9.2.1CYLINDERSANDPRISMS**	9.2.1.1 Construct surface development of solids. 9.2.1.2 Apply surface development in artefact making.	• Development of: plane and truncated prisms plane and truncated cylinders	• Manipulation • Accuracy	• Appreciation, • Application, • Problem solving • Quality work

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Produce and read working drawings.**
- **Interpret graph and present data graphically**

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.3.0 ORTHOGRAPHIC PROJECTION	**9.3.1 PROJECTION OF SOLIDS**	9.3.1.1 Draw the projections of andcylinders. 9.3.1.2 Draw the projections of prisms	• Projections of plane and truncated solids	• Drafting • Identification	• Appreciation, • Application, • Problem solving • Quality work
	9.3.2 ORTHOGRAPHIC PROJECTION	9.3.2.1 Produce a missing *elevation* in First/Third Angle when theother *two*are given 9.3.2.2 Produce a sectional *elevation* in either First or Third angle given the cutting plane.	• Projection of elevations, plans cutting plane, sectioning, section subtitle, • Hatching lines, • Sectioning of webs and curved surfaces	• Identification • Manipulation • Accuracy • Communication • Sketching	• Appreciation, • Application, • Problem solving • Quality work
	9.3.3 WORKING DRAWINGS	9.3.3.1 Produce working drawings of an artefact.	Designing, sketching		
9.4.0 GRAPHICS	**9.4.1 GRAPHS**	9.4.1.1 Interpret and communicatestatistical data graphically	• Line graphs, bar and column diagrams, circle or pie diagrams	• Designing • Communication • Interpreting	• Appreciation, • Application, • Problem solving • Quality work

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Apply treatment to material in a variety of ways**
- **Use of impelling tools when joining materials.**

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.5 MATERIALS	**9.5.1 MATERIAL TREATMENT**	9.5.1.1 Explain different methods of material treatment. 9.5.1.2Demonstrate different methods of material treatment.	• Metal:(hardening, annealing, normalising, tempering, casehardening, bending, forming andcasting) • **Plastic:** - Plastic memory bending - Vacuum forming - Press forming, cold casting and embedding.	• Identification • Communication • Demonstration • Sketching • Analysis	• Appreciation • Reasoning • Application • Problem solving
	9.5.2 JOINING MATERIALS	9.5.2.1 Identify different types of impellingtools. 9.5.2.2 Apply different methods of using impelling tools when joining materials. 9.5.2.3 Use impelling tools correctly.	• Types and uses: hammers, mallets, screwdrivers	• Identification • Demonstration	• Appreciation • Application, • Problem solving

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Select and apply appropriate finishes on materials**

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.5 MATERIALS	**9.5.3 FINISHING MATERIALS**	9.5.3.1 Identify finishes used on materials 9.5.3.2 Explain the importance of finishing artefacts and the various methods used 9.5.3.3 Observe and apply safety precautions duringfinishing processes.	• Pre-finishing/ finishing processes • **Wood:** Varnishing, painting, abrasives • **Metal:** Draw filing, (polishing), emery cloth, blueing, galvanising, tinplating, terneplate, painting, oiling, applying lacquer, Plastic coat • **Plastic:** Filing, polishing, scrapping	• Identification • Analysis • Varnishing • Painting • Polishing • Filing • Bluing • Scrapping • Sanding • Oiling • Coating	• Appreciation • Application • Problem solving • Aesthetic • Team work • Quality work • Safety consciousness

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOME:

- **Apply reinforcing techniques on structures***Technology*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
9.6 TECHNOLOGY	**9.6.1 STRUCTURES**	9.6.1.1 Identify and classify structures. 9.6.1.2 Identify forces in structures. 9.6.1.3 Design methods to strengthen and stabiliseStructures 9.6.1.4 Construct simple structure to meet the demands of design situations. 9.6.1.5 Apply safety factors in adapting structures to solve design problems.	• Natural and artificial structures • Forces (static and dynamic), strength, stability, Rigidity • Construction	• Identification • Application, • Designing, • Communication • Interpretation • Drawing • Analysis	• Appreciation • Responsibility • Craftsmanship • Innovation • Application • Logical thinking • Team work • Safety consciousness
	9.6.2 ENERGY	9.6.2.1 Identify forms and common sources ofenergy. 9.6.2.2 Select and use appropriate energy sources in response to a given design problem.	• Energy, forms (electrical, mechanical, heat) • kinetic, potential, conserving and storing energy, converting of energy, positive and negative effects of energy	• Identification • Application, • Designing • Interpretation • Analysis	• Appreciation, • Responsibility • Innovation, • Application, • Critical thinking • Team work, • Safety consciousness

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Generate design ideas and develop proposals that meet the specific users**
- **Evaluate how the product meets the needs.**
- **Demonstrate ability to recommend modifications on the artefact***Design Process*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.7.0 DESIGNING	**8.7.1 DESIGN PROCESS**	8.7.1.1 Explain the design process 8.7.2.2 Generate design ideas from a theme 8.7.1.3 Communicate design ideas 8.7.1.4 Produce portfolios on any theme 8.7.1.5 Produce artefacts based on the portfolio	• Design Process: - Problem identification from situation - Design brief - Investigation - Solution (Portfolio) - Realisation - Evaluation	• Identification • Designing • Communication • Interviewing • Drawing • Sketching • Researching • Interpretation • Analysis • Labelling • Colouring • Accuracy • Management • Costing	• Problem solving • Ingenuity • Resourcefulness • Creative thinking • Appreciation • Curiosity • Team work • Quality work • Inquisitive • Entrepreneurship

GRADE 9 DESIGNS AND TECHNOLOGY

GENERAL OUTCOMES:

- **Demonstrate knowledge and values of entrepreneurship**
- **Develop entrepreneurial skills***Entrepreneurship*

TOPIC	SUB TOPIC	SPECIFIC OUTCOMES	CONTENT		
			KNOWLEDGE	SKILL	VALUES
8.10 ENTREPRENEURSHIP	**8.10.1 CAREERS**	8.10.1.1 Identify and select entrepreneurial activity in Design and Technology 8.10.1.2 Form entrepreneurial working teams 8.10.1.3 Make business plans for the selected entrepreneurial activity 8.10.1.4 Mobilise resources 8.10.1.5 Design marketing strategies 8.10.1.6Design pricing strategies 8.10.1.7Manage small business 8.10.1.8Prepare final accounts for the Business	• Wood products • Metal products • Plastic products • Toy making • Tool making • Sign writing	• Identification • Communication • Marketing • Pricing • Interpretation • Analysis • Packaging • Labelling • Record keeping • Evaluation • Monitoring • Organisational	• Creativity • Awareness • Honesty • Integrity • Team work • Quality work • Determination • Responsibility • Thriftiness • Entrepreneurship • Innovation • Application

DESIGN & TECHNOLOGY PROJECT ASSESMENT SHEET

THEME:	***Centre Name/centre:***

Candidate Number:	***LEARNER'S SURNAME***	***LEARNER'S FIRST NAME***

	PART	***TOPIC***	***TOTAL MARKS***	***MARKS SCORED***	***TEACHER'S COMMENTS***
1. PORTFOLIO	*1.1*	*Theme*			
	1.2	*Situation*			
	1.3	*Design Brief*			
	1.4	*Research/Analysis*			
	1.5	*Specification*			
	1.6	*Initial ideas*			
	1.7	*Development*			
	1.8	*Working drawings*			
	1.9	*Production planning*			
	1.10	*Presentation*			
2. PRODUCT	*2.1*	*Suitability*			
	2.2	*Workmanship*			
	2.3	*Use of materials*			
	2.4	*Evaluation*			
			TOTAL MARKS		

APPENDIX 1
LIST OF EQUIPMENT REQUIRED FOR DESIGN AND TECHNOLOGY

Equipment, Tools and Machinery		
A Graphic Communications Equipment		
2H Pencils	300 mm Rule	Compass and Dividers
Coloured Pencils	A3 Tee Squares	Set Squares
A3 Drawing Boards	Drawing Boards Clips/Cello tape	French Curve
B Materials		
Measuring and Marking Out Tools		
Measuring Tape	**Callipers:** Internal and External, Old leg, Veneer	Marking Knife
Steel Rules		Surface and Angle Plate
Try Squares	**Gauges:** Marking, Mortice and Cutting	Pencil/Wet Chalk
Sliding Bevel		Wing Compass
Micrometer	**Punches:** Centre and dot	
Wasting Tools		
Saws:	**Planes:**	**Files:** Flat, Half round, Triangular, Square,
Bench: Rip, Cross cut, Panel	Jack, smoothing, spoke shaves	Needle file, rasp
Back: Tenon, Dovetail, Gents	**Chisels *(Wood):*** firmer, Mortice, Paring,	
Frame: Coping, Bow, Compass, hacksaw,	Bevel edged	
Junior hacksaw	**Chisels *(Metal):*** Flat cold, Half round,	
Special: Key hole, Abra	Cross cut	
Driving/Impelling/Percussion Tools		
Hammers:	**Mallets:**	**Screwdrivers:**
Claw, Ball pein, Cross pein, planishing,	Carpenter's, Bossing, Rubber	Flat, Phillips, Electrical
Warrington pattern, pin		
Holding Tools		
Vices: Wood bench vice, Metal bench vice,	G Cramp, Sash Cramp, Mitre Cramp	Vee Block, Vice Grip, Tool clamp
Machine vice, Hand vice		
		Other Equipment (Plastic)
Boring: Ratchet brace, Twist bits, Brad awl,		Hot Air guns, Strip benders
Centre bit, Countersunk, Jennings auger bit		
Drills: Hand drill, Breast drill, Pillar drill		
Glass bits		

PROJECT EVALUATION

		TICK YOUR SELECTION BELOW				
I made a …… Did you work with somebody else? **YES** ☐ ☐		**VERY PLEASED**	**PLEASED**	**FAIRLY HAPPY**	**UNHAPPY**	**I DID NOT DO THIS PART**
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 ☐ did not mind ☐ disliked ☐ 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?