



Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

JUNIOR SECONDARY PHASE

TECHNICAL STUDIES B SYLLABUS

Module 1: Electricity and Electronics
Module 2: Metalwork and Welding
Module 3: Motor Mechanics

GRADE 8 & 9

For implementation:
Grade 8 in 2025
and
Grade 9 in 2026

Ministry of Education, Arts and Culture
National Institute for Educational Development (NIED)
Private Bag 2034
Okahandja
Namibia

© Copyright NIED, Ministry of Education, Arts and Culture, 2024
Technical Studies B Syllabus Grades 8 & 9

ISBN: 978-99945-2-495-2

Printed by NIED

Website: <http://www.nied.edu.na>

Publication date: December 2024

Table of contents

1.	Introduction	1
2.	Rationale	1
3.	Aims	2
4.	Inclusive education	2
5.	Links to other subjects and cross-curricular issues	2
6.	Approach to teaching and learning	3
7.	End-of-phase competencies	4
8.	Summary of the learning content	5
9.	Learning content	7
9.1	Grade 8 learning content	8
9.2	Grade 9 learning content	22
10.	Assessment	40
10.1	Types and methods of assessment	40
10.2	Grade descriptors	40
10.3	Assessment objectives	41
10.4	Continuous assessment: detailed guidelines	41
10.5	End-of-year examinations: detailed guidelines	43
10.6	Specification grid	44
	Annexe 1: Glossary of terms	45
	Annexe 2: List of tools, equipment and materials	48
	Annexe 3: Assessment record sheet for grade 8	49
	Annexe 4: Assessment record sheet for grade 9	50

1. INTRODUCTION

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

2. RATIONALE

The presentation of Technical Studies B at school is first and foremost an educational matter, with the overall goal being that learners attain proper adulthood in the society. As a result of the increasing industrialisation and mechanisation of modern times, technological knowledge and skills have become indispensable in everyday life.

The inclusion of Technical Studies B in the learners' curriculum does not aim at vocational training in the narrow sense of the word. It simply provides the learner with a broad educational foundation for further specialised training. It also provides the learners with a clear understanding of technology and assists them in becoming better adapted and prepared for life. Technical Studies B has its main focus on the motor industry.

The integration of entrepreneurial concepts and activities lays the foundation for the development of human resources as a basis for studies, occupations or self-employment. Technical Studies B, together with entrepreneurial concepts and activities, empowers the individual to be creative and gain problem-solving skills.

The particular features of Technical Studies B at this phase are to enable the learners to achieve technological literacy through the development of:

- technological knowledge and understanding
- technological capacity and
- an awareness of the significance of Technical Studies B (Electricity and Electronics, Metalwork and Welding as well as Motor Mechanics) upon society.

Learners should develop a thorough knowledge of basic concepts which they can apply in a wide range of situations. They must also develop the broad-based skills that are so important for effective functioning in the world of work. They must learn to identify and analyse problems and to explore and test solutions in a wide variety of contexts. This firm conceptual base is at the heart of the Technical Studies B curriculum and must be the focus on teaching and learning in the classroom.

3. AIMS

Technical Studies B promotes the following aims in the curriculum:

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

4. INCLUSIVE EDUCATION

Inclusive education is the right of every learner and promotes participation in, or access to, the full range of educational programmes and services offered by the education system in mainstream schools. It is based on the principle of supporting and celebrating the diversity found among all learners and removing all barriers to learning. The Technical Studies B teacher in the Junior Secondary phase should therefore accommodate learners with special educational needs by adapting this syllabus to the needs of the learner through differentiation of teaching methods and material as indicated in the *Inclusive Education Curriculum Framework (2023)*. The adaptation for assessment of learners with special educational needs must be done as prescribed in the *Handbook for Centres (2022)* by the Directorate of National Examinations and Assessment (DNEA). The accommodations prescribed in this handbook are not only for external examinations, but apply to learners from Grades 1 to 12.

Basic education prepares the society, as envisaged in Namibia's Vision 2030, by promoting inclusivity. Learners experiencing barriers to learning and other individual needs will be included in a mainstream school and their needs will be attended to through differentiation of teaching methods and materials as required. Learners, who are so severely impaired that they cannot benefit from attending inclusive schools, will be provided for according to their needs in learning support units, resource units or resource schools until such time that they can join the inclusive school where applicable. The curriculum, teaching methods and materials are adapted for learners in these institutions.

Technical Studies B promotes equal opportunity for males and females, enabling both to participate equally. Teachers should know and understand how to treat learners equally, and all materials should support gender fairness. Including gender perspectives is important in all social themes in order to raise awareness of gender stereotyping, how limitations are set on gender equity, and how to promote gender equity in all spheres of life. All teaching/learning materials should be analysed to ensure that they promote gender equity.

5. LINKS TO OTHER SUBJECTS AND CROSS-CURRICULAR ISSUES

The cross-curricular issues include Environmental Learning, HIV and AIDS, Population Education, Education for Human rights and democracy, Information and Communication Technology (ICT) and Road Safety. These issues have been introduced to the formal curriculum, because each of the issues deals with particular risks and challenges in our Namibian society. They should be dealt with across all phases and in every subject where the topics overlap with the content of that subject.

All of our learners need to:

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

The main risks and challenges have been identified as:

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

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

In this syllabus the following cross-curricular issues can be dealt with as indicated:

Grade	HIV and AIDS	Environmental Learning	EHRD	Entrepreneurship Education	ICT
8	Health and safety	Materials Cell/batteries Metals welding Lubrication Energy	Career prospects	Job shadowing	Design and realisation Communication
9	Safety precautions and first aid measures	Materials Cell/batteries Metals welding Lubrication Energy	Human resource	Job observation	Design and realisation Communication

6. APPROACH TO TEACHING AND LEARNING

The approach to teaching and learning is based on a paradigm of Learner-Centred Education (LCE) described in ministerial policy documents and the LCE conceptual framework. This approach ensures optimal quality of learning when the principles are put into practice.

The aim is to develop learning with understanding, and the knowledge, skills and attitudes to contribute to the development of society. The starting point for teaching and learning is the fact that the learner brings to the school a wealth of knowledge and social experience gained continually from the family, the community, and through interaction with the environment.

Learning in school should involve, build on, extend and challenge the learner's prior knowledge and experience.

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

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

Work in groups, in pairs, individually, or as a whole class must therefore be organised as appropriate to the task in hand. Co-operative and collaborative learning should be encouraged wherever possible. In such cases, tasks must be designed so that pair or group work is needed to complete it, otherwise the learners will not see any relevance in carrying out tasks together. As the learners develop personal, social and communication skills, they can gradually be given increasing responsibility to participate in planning and evaluating their work, under the teacher's guidance. Practical work is essential for learning skills in Technical Studies B.

Technical Studies B emphasises the re-use of locally available resources (recyclable materials) to conserve the environment and the content has been adapted to suit the local context.

7. END-OF-PHASE COMPETENCIES

On entry to the Junior Secondary phase, all learners are expected to have a basic awareness of and some practical skills in pre-vocational subjects within the Namibian school curriculum. They should consider the social and environmental impact of these subjects and also have basic entrepreneurial awareness.

A few learners might not be able to achieve all the specific objectives satisfactorily and must receive learning support through adapted teaching approaches, adapted materials, and assistance from peers. A small number of learners have special educational needs to a degree which requires greater individual attention, resources or assessment. Others will have impairments which do not necessarily limit cognitive and affective learning and development, e.g. the visually impaired, hearing impaired and physically challenged.

On completion of the Junior Secondary phase, learners are expected to be able to demonstrate their competence in simple technological processes and have basic skills in electricity and electronics, metalwork and welding as well as motor mechanics. They should be able to make informed choices about design and/or materials and evaluate a finished product in these areas. They should also be able to use basic equipment and know the safety precautions in doing so.

8. SUMMARY OF THE LEARNING CONTENT

Grade 8	Grade 9
Module 1: Electricity and Electronics	
1.1 Safety	1.1 Safety
1.2 Tools and equipment	1.2 Tools and equipment • Measuring and marking tools • Cutting tools • Holding tools • Driving tools • Wiring tools and equipment
1.3 Atomic theory	1.3 Electrical terminology
1.4 Cells and batteries	1.4 Cells and batteries
1.5 Electrical terminology	1.5 Electrical circuits
1.6 Electric circuits	1.6 Conductors and insulating materials
1.7 Conductors, insulators and semi-conductors	1.7 Joining electrical components and materials
1.8 Magnetism	1.8 Magnetism
1.9 Earthing	1.9 Earthing and the consumer's circuit
1.10 Testing	1.10 Testing
	1.11 Types of current
Module 2: Metalwork and Welding	
2.1 Safety and first aid	2.1 Health and safety
2.2 Measuring and marking out tools	2.2 Measuring and marking out tools
2.3 Hand tools	2.3 Hand tools
2.4 Power tools	2.4 Power tools
2.5 Metals	2.5 Metals

Grade 8	Grade 9
Module 2: Metalwork and Welding (continued)	
2.6 Joining methods	2.6 Joining methods
2.7 Oxy-acetylene welding	2.7 Oxy-acetylene
2.8 Arc welding	2.8 Arc welding
2.9 Sheet metalwork	2.9 Sheet metalwork
2.10 Metal finishing	2.10 Finishing of metals
Module 3: Motor Mechanics	
3.1 Safety	3.1 Safety
3.2 Vehicle care	3.2 Vehicle care
3.3 Car body designs	3.3 Car body designs
3.4 Vehicle layout	3.4 Vehicle layout
3.5 Tools	3.5 Tools
3.6 Materials	3.6 Materials
3.7 Fasteners	3.7 Fasteners
3.8 Lubrication	3.8 Lubrication
3.9 Tyres and wheels	3.9 Tyres and wheels
3.10 Suspension, brakes and steering	3.10 Suspension, brakes and steering
3.11 Engine parts	3.11 Engine parts
3.12 Engine operation	3.12 Engine operation
3.13 Electricity and magnetism	3.13 Electricity and magnetism

9. LEARNING CONTENT

Introduction to learning content

The learning content outlined below is designed to provide guidance to teachers as to what will be assessed in the overall evaluation of learners. It is not meant to limit, in any way, the teaching programme of any particular school.

Modules and topics refer to those components of the subject which learners are required to study/master.

The **general objectives** are derived from the topic/skill and are the general knowledge, understanding and demonstration of skills on which learners will be assessed.

The **specific objectives** are the detailed and specified content of the syllabus, which learners need to master to achieve the general objectives, and on which they will be assessed. For skills-based subjects, specific objectives indicate what learners should be able to do at the end of the year.

9.1 Grade 8 learning content

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS		
1.1 Safety	understand safety measures in the workplace regarding electricity	- identify and apply appropriate basic safety measures relating to: - personal safety - workshop safety - tools and equipment - electrical 3-pin plug top and wiring - list the dangers of electricity - identify general safety symbols and colour codes
1.1 Safety (continued)	explore first aid emergency situations.	- identify and explain the uses of the basic content of the first aid kit - explain the appropriate first aid procedures with HIV and AIDS in mind regarding: - minor cuts and injuries - open wounds - electrical shock - burns

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.2 Tools and equipment	• know the uses of basic tools and equipment	• identify and use the following hand tools and equipment: - screwdrivers/insolated screwdrivers - pliers - soldering wire /soft solder - soldering irons - solder sucker - pipe bender - reamer - pipe vice - draw vice - stock and dies - wire stripper - fish tape - hack saw - multiplier - twist drills - hand drills - breast drills - drilling machines - insulated gloves - insulation tape

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.3 Atomic theory	understand the basic atomic theory	- explain and illustrate the composition of atoms - describe the movement of electrons that produces electricity
1.4 Cells and batteries	understand cells and batteries as a source of electrical energy	- explain how cells and batteries are a source of electrical energy - differentiate between primary and secondary cells - describe the difference between the types of cells by identifying the components of cells and batteries - list the advantages and disadvantages of cells and batteries
1.5 Electrical terminology	understand a simple Direct Current (DC) circuit	- describe the following terms in a simple DC circuit: - voltage - current and - resistance - list the symbols and units for: - voltage - current and - resistance - describe Ohm's law - perform simple calculations by applying Ohm's Law - carry out simple experiments to determine the relationship in a simple DC circuit between: - voltage - current - resistance

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.6 Electric circuits	be familiar with simple circuit diagrams	- distinguish between the different components in an electrical circuit - draw simple electric circuit diagrams using different components /symbols - build appropriate electric circuits for specific functions by making use of appropriate components.
1.7 Conductors, insulators and semiconductors	- understand conductors, insulators and semiconductors - know the materials for conductors, insulators and semiconductors	- differentiate between the following terms: - conductors - insulators - semiconductors - identify the types of materials for: - conductors - insulators and - semiconductors
1.8 Magnetism	- understand the properties of magnets - be familiar with magnetic fields	- state the properties of magnetism - draw/sketch a magnetic field
1.9 Earthing	know concepts related to earthing	- differentiate between the following terms: - earthed - earth conductor - earth continuity conductor - earth electrode
1.10 Testing	understand various testing instruments when wiring simple circuits	- demonstrate different testing instruments regarding: - voltage - current - resistance

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING		
2.1 Health and safety	- understand National Occupational Safety Association (NOSA) safety measures - know basic first aid	- explain and apply appropriate safety measures of NOSA with reference to: - obstruction - loose clothing and jewelry - personal safety or Personal Protective Equipment (PPE) - workshop and environmental safety - hand tools and machinery - portable electrical equipment - list the content of a basic first aid kit (box) - identify and demonstrate basic first aid procedures including: - treatment of bleeding wounds with HIV and AIDS in mind - ABC (Airway, Breathing, Circulation) of first aid application <i>(possible practical activities: role plays, posters)</i>
2.2 Measuring and marking out tools	- know the different measuring and marking tools and their uses - familiarise themselves with accurate measuring and marking by means of different tools	- identify and state the uses of the following measuring tools: - measuring tape - steel rule - folding rule - engineers square - marking out tools: - scriber - punches - dividers - calipers - apply the correct use of the mentioned measuring and marking tools <i>(possible practical activities: any measuring and marking related activities)</i>

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.3 Hand tools	know basic hand tools and their uses	- identify and discuss uses of the various hand tools: - driving tools (hammer, screwdriver, hand drill) - cutting tools (hack saw, tin snip, side cutter, drill bit) - holding devices (bench vice, hand vice, clamp, plier) - shaping tools (file, hammer) <i>(possible practical activities: use the listed tools to demonstrate filing, planing, hammering, sawing)</i>
2.4 Power tools	understand power tools and their uses	- identify different power tools and state their uses: - electric hand drill - bench grinder - angle grinder - jig saw - soldering iron
2.5 Metals	know the three classes of metals	- identify the three classes of metal - discuss the uses of the following types of metals: - ferrous metals (containing iron): mild steel (used for general welding work), tool steel (used for tools e.g. hammer head.) - non-ferrous metals: lead, zinc, copper, tin - alloys: brass, bronze <i>(possible practical activity: collect, identify and exhibit different types of metals)</i>
2.6 Joining methods	understand basic joining methods	- identify the following temporary joining methods: - screws - bolts - nuts - identify the following permanent joining methods: - riveting - welding (arc, oxy-acetylene, soldering) <i>(possible practical activities: riveting, bolting, screwing, soldering related activities)</i>

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.7 Oxy-acetylene equipment	- understand safety rules and precautionary measures of the oxy-acetylene equipment - know components of the oxy-acetylene equipment	- list the precautionary measures and safety rules to be taken in joining metals: - storage - handling - maintenance - identify the difference in screw threads and colour coding (cylinders) - explain the dangers and causes of back flashing and backfiring - discuss the process of testing gas leaks - identify and name the components of oxy-acetylene equipment: - cylinders - regulators - hoses - flashback arrestors - valve spanner - blowpipe - nozzle - lighter - safety equipment (personal) <i>(possible practical activity: dismantle and assemble components)</i>

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.8 Arc welding	• know precautionary measures in storing, handling, assembling and maintenance of equipment • know components of the arc welding equipment • understand the correct usage of welding equipment • know basic welding joints	• list the precautionary measures and safety rules to be taken in joining the metals with the arc-welding equipment: - personal - machines and equipment - firefighting equipment • identify the components of arc-welding equipment, including: - electrodes - chipping hammer - helmet - safety clothing • use welding equipment correctly • identify and draw basic welded joints: - square butt joint - T-joint - lap joint <i>(possible practical activity: dismantle and assemble components)</i>
2.9 Sheet metalwork	• know metalwork tools and equipment	• identify, name and state the uses of the following tools: - tin snips - folding bars - mallets - anvil • use sheet metalwork tools and equipment correctly

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.9 Sheet metalwork (continued)	• know different edges and joints	• identify and draw the following edges and joints: - safe edge - wire edge - lap joint <i>(possible practical activity: cut shapes with tin snips)</i>
2.10 Metal finishing	• know suitable finishes and their purpose	• identify, describe and apply the following finishing procedures: - filing - use of abrasives - painting • discuss the purpose of finishing <i>(possible practical activity: use the shapes cut in the previous activity and apply finishing)</i>

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS		
3.1 Safety	• know safety rules in the workshop • understand safety rules for machines and equipment • realise the importance of safety measures during practical work • understand emergency situations and basic first aid	• list safety rules • discuss workshop safety • discuss workshop layouts with evacuation routes • use personal protective equipment • discuss the safe storage of fluids and waste materials • list safety rules for machines and equipment: - compressors - compressed air - electrical equipment - engine (2-post/4-post) hoists - jacks, trolley jacks - trestles - slinging equipment • apply safety measures during practical work • role play an emergency situation • identify and explain the uses of the basic contents of the first aid kit • list and explain the appropriate basic first aid procedures to be followed with HIV and AIDS in mind

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.2 Vehicle care	• know how to care for and clean the interior and exterior of a vehicle • understand the use of owner's manuals and workshop manuals	• clean a vehicle interior and exterior • find information using: - owners' manuals - workshop manuals
3.3 Car body designs	• know car body types and characteristics	• identify car body types and characteristics
3.4 Vehicle layout	• know the components of a drive train	• identify the components of a drive train: - engine - clutch - gearbox - drive shaft - final drive
3.5 Tools	• know measuring and marking out tools and their functions • know how to care for and maintain measuring and marking out tools	• identify measuring and marking out tools and list their functions: - squares - ruler - calipers - micro meters - straight edge - scribes - dividers - dial gauge - telescopic gauge - feeler gauge • care for and maintain measuring and marking out tools during and after use

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.5 Tools (continued)	know hand tools and special tools and list their uses	- identify hand tools and special tools and list their functions: - punches - tinsnips - screwdrivers - spanners - sockets - files - saws - torque wrench - pliers - chisels - drills - ring squeezer - strap wrench
3.6 Materials	know about fluids and lubricant	- identify fluids and lubricants: - acid - anti-freeze - automatic transmission fluid - brake fluid - mineral oil - paraffin - petrol - diesel
3.7 Fasteners	know fasteners and their uses	- identify fasteners: - bolts, studs, nuts and screws - washers - rivets - split pins and keys - state the uses of the listed fasteners

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.8 Lubrication	- understand the importance of lubrication - know types of lubrication, parts that need lubrication and how to check oil levels	- explain friction and the purpose of oil and grease - name types of lubricants: - oil - grease - identify parts that needs lubrication - check oil levels
3.9 Tyres and wheels	know wheels and tyres	- explain the function of wheels and tyres - distinguish between types of rims and tyres
3.10 Suspension, brakes and steering	- know suspension components - understand chassis configurations - know different brake systems - understand different steering systems	- identify and name suspension components: - leaf and coil springs - shock absorbers - shackles - torsion bars - distinguish between passenger and light delivery vehicles, chassis constructions and suspension mounting points - identify and name brake systems: - drum brakes - disc brakes - parking brake - identify the following steering systems: - manual steering - power steering - rack and pinion

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 8 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.11 Engine parts	• know the main engine parts	• identify the main engine parts: - cylinder block - cylinder head, pistons and rings - con rods - crankshaft - bearings - flywheel - carburetor - starter motor
3.12 Engine operation	• understand the functions of the main engine parts • know about spark ignition engines • understand the operation of the spark ignition engines	• explain the functions of the main engine parts • identify spark ignition engines (4-stroke) • explain the operating principles of (4-stroke) spark ignition engines
3.13 Electricity and magnetism	• know basic electrical circuits • know SI units and symbols	• describe basic electrical circuits • distinguish between series and parallel circuits • name SI units and symbols

9.2. Grade 9 learning content

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS		
1.1 Safety	• know safety measures in the workplace regarding electricity	• identify and apply appropriate basic safety measures relating to: - personal safety - workshop safety - tools and equipment - electrical socket outlets and wiring • identify general safety symbols and colour codes • role play an emergency situation
1.2 Tools and equipment	• understand first aid procedures • know the uses, care and maintenance of measuring and marking tools regarding electricity • know the uses, care and maintenance of cutting tools regarding electricity	• describe and apply the uses, care and maintenance of the following measuring and marking tools: - ruler - measuring tape - T-chalk - pencil - tester (multimeter) - insulator tester • describe and apply the uses, care and maintenance of the following cutting tools: - wire stripper - hack saw - pliers - reamer - multiplier - stock and dies - hand drills - twist drills - breast drill - chisel - drilling machines

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.2 Tools and equipment (continued)	• know the uses, care and maintenance of holding tools regarding electricity • know the uses, care and maintenance of driving tools, regarding electricity • know the uses, care and maintenance of wiring tools	• describe and apply the uses, care and maintenance of the following holding tools: - draw vice - hand vice - pipe vice - engineer's vice (bench vice) • describe and apply the uses, care and maintenance of the following driving tools: - screwdrivers/insolated screw drivers - rubber mallets - chasing hammer • identify and apply the uses, care and maintenance of the following wiring tools: - soldering wire /soft solder - soldering iron - solder sucker - pipe bender - fish tape - insulated gloves - insulation tape
1.3 Electrical terminology	• know basic electric concepts • understand the atomic theory	• identify the following from given circuits and write down their symbols: - voltage - current - resistance in a simple direct current (DC) circuit • apply the following electrical concept: - voltage - current - resistance in a simple DC circuit • explain the composition of an atom

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.4 Cell/batteries	understand cells, their functions and maintenance	- illustrate different types of cells - identify and describe the parts of cells - draw and explain a diagrammatic presentation of cell compositions - describe the working principles of: - lead–acid - alkaline - explain the various types and working principles of cells - explain the care and maintenance - explain the safe disposal of cells
1.5 Electrical circuits	- know concepts relating to Ohm's law - understand calculations in series and parallel circuits - know how to remove, repair and replace electrical or electronic components/units	- describe Ohm's law relating to: - potential difference - current - resistance - electromotive force - power - apply calculations regarding Ohm's law - perform basic calculations related to series and parallel circuits - perform the following basic operations on electrical components: - repair/replace/remove defective parts and components

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.6 Conductors and insulating materials	• know the concepts of conductors and insulating materials • know different adapter cords and cables	• explain the various types of materials used for: - conductors - insulators and - semiconductors • describe the requirements, properties, uses and colour codes for conductors • construct adapter cords for electrical portable appliances • explain the uses of the following cables: - polyvinyl chloride (PVC) cables - paper insulated cables - surfix - cross linked polythene • list the advantages and disadvantages of the cables listed above
1.7 Joining electrical components and materials	• know various types of joints	• apply and illustrate the different types of joints: - T-joints - Y-joints - corner joints - cross joints • apply and demonstrate different joining methods: - soldering - screws - brackets - adhesives

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.8 Magnetism	- understand the molecular theory - know the construction of the single stroke bell circuit - understand the Right Hand Rule - understand Fleming's Left Hand Rule	- describe the molecular theory of magnets - explain why the magnets are classified as natural, permanent and electromagnetism - sketch the following: - poles - lines of force - flux density - field strength - sketch how a magnetic field is established when an electrical current flows through a conductor - describe the effect on the magnetic field around a current carrying conductor when placed in a uniform magnetic field
1.9 Earthing and consumers' circuits	- understand the necessity of earthing - know how to install power supplies	- define and describe the meaning of the following terms: - earthed - earth conductor - earth continuity conductor - earth electrode - demonstrate installations of power supplies to: - outer buildings - main buildings

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 1: ELECTRICITY AND ELECTRONICS (CONTINUED)		
1.10 Testing	understand the electric test	- explain the use of the insulation tester for testing installations and electrical apparatus for insulation and earth faults - name and explain the following concepts: - continuity conductors - insulation resistance between conductor - polarity - earth continuity - earth leakage protection
1.11 Types of currents	know the difference between direct and alternating currents	explain the difference between alternate and direct current circuits

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING		
2.1 Health and safety	• understand NOSA (National Occupational Safety Association) safety measures • know basic first aid procedures	• identify and apply safety measures regarding NOSA with reference to: - personal safety or personal protective equipment (PPE) - sharp corners or edges - protection of eyes and body against radiation when welding - inadequate guards over machinery - misuse of compressed air and electricity - sharp tools - gas cylinders and leakages - rule regarding electricity - earthing of electrical equipment - working in confined spaces (for example arc and gas welding) • demonstrate basic first aid procedures in case of: - treatment of bleeding wounds with HIV and AIDS in mind - electrical shock - burns • demonstrate the ABC (Airway, Breathing, Circulation) of first aid application

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.2 Measuring and marking out tools	• know different measuring and marking out tools • understand accurate measuring and marking by means of using different tools	• describe and draw the basic measuring tools: - measuring tape - steel rule - folding rule - engineer's square • describe and draw basic marking out tools: - scribe - punches - dividers - calipers • apply the listed measuring and marking out tools correctly
2.3 Hand tools	• know different basic hand tools and their uses • understand how to store and maintain the hand tools concerned	• describe, draw and identify parts of various hand tools and name their uses: - driving tools (hammers, screwdrivers, hand drills) - cutting tools (hack saw, tin snips, side cutters, shears, drill bits, chisels) - holding devices (bench vice, clamps) - shaping tools (files, hammer, mallets: rubber, copper, folding bars) • describe the storage and maintenance of the listed tools • how to store and maintain hand tools correctly
2.4 Power tools	• know different power tools and their uses	• identify different power tools and their uses • use the following power tools safely: - angle grinder - electric hand drill - bench grinder - jig saw - soldering iron

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.5 Metals	• know the three classes and types of metals • understand the heat treatment processes	• explain the tests to identify the different types of metals • name and list properties and uses of: ferrous metals (containing iron) - mild steel - galvanized sheet - tool steel non-ferrous metals: - lead - zinc - copper - tin • list properties and uses of alloys (mixture of non-ferrous metals) • explain the following heat treatment processes: - annealing - hardening - tempering
2.6 Joining methods	• understand basic joining methods	• identify and simulate (demonstrate) the correct procedure of temporary joining methods: - screws - bolts - nuts - rivets • identify and simulate (demonstrate) the correct procedure of permanent joining methods: - welding (arc welding, soldering, brazing, oxy-acetylene welding) - riveting (hand riveting, pop riveting)

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.7 Oxy-acetylene	- understand the safety measures regarding the use of oxy-acetylene equipment - be aware of precautionary measures in storing, handling assembling and maintenance of equipment - know different types flame	- list the precautionary measures and safety rules to be taken in joining metals: - storage - handling - maintenance - identify the difference in screw threads and colour coding (cylinders) - explain the dangers and causes of back flashing and back firing - differentiate between back flashing and back firing and their causes - discuss the dangers of welding on containers with flammable gases or liquids - apply precautionary measures in storing, handling assembling and maintenance of equipment - identify, name and draw the different flames and describe the uses of each
2.8 Arc welding	know precautionary measures in handling and assembling of equipment	- list the precautionary measures and safety rules to be taken in joining the metals with the arc welding equipment: - personal - machines and equipment - firefighting equipment

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.8 Arc welding (continued)	- understand the correct usage of welding equipment - know basic welding joints - know the elements in a protective arc weld - understand welding defects	- list the components of arc welding equipment: - electrodes - chipping hammer - helmet - safety clothing - draw basic welded joints: - square butt joint - T-joint - lap joint - use sketches to explain the following elements in a protective arc weld: - weld pool - electrode - base metal - arc length - slag coating - gas shield - distinguish between the following welding defects: - spatter - undercutting - distortion
2.9 Sheet metalwork	know sheet metalwork tools and equipment	- identify, name and state the uses of the following tools: - tin snips - folding bars - bench shears - mallets

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 2: METALWORK AND WELDING (CONTINUED)		
2.9 Sheet metalwork (continued)	• know sheet metalwork tools and equipment • understand different edges and joints	• correctly use the following tools: - tin snips - folding bars - bench shears - mallets • apply the following edges and joints: - safe edge - wire edge - lap joint
2.10 Finishing on metals	• know the correct surface finishing applications	• identify and describe finishes (painting, polishing) • apply appropriate finishing procedures

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS		
3.1 Safety	• know safety rules and safety signs in a workshop • know safety rules for machines and equipment	• list safety rules • identify safety signs and explain their meaning • discuss workshop safety • explain the purpose of evacuation routes • explain the storage of fluids and waste materials • list safety rules for the following machines and equipment: - compressors - compressed air - electrical equipment - hoists - trestles engine (2-post/4-post) hoists - jacks; trolley jacks and - trestles - slinging equipment
3.2 Vehicle care	• understand safety measures during practical work • know the importance of vehicle interior and exterior care and cleaning • know about technical service bulletins, job cards and vehicle identification number (VIN) codes	• apply safety measures during practical work • clean the interior and exterior of a vehicle • pressure washers • solvent tanks (parts washers) • explain the following terms: - technical service bulletins - job cards - VIN codes
3.3 Car body designs	• know car body types and characteristics	• identify car body types and characteristics

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.4 Vehicle layout	understand the functions of the components of a drive train	- explain the functions of the components of a drive train: - engine - clutch - gearbox - drive shaft/side shafts and CV joints - final drive - transfer box (4-wheel drive)
3.5 Tools	- know the layouts of front mounted engine - rear wheel drive (FME-RWD) and front mounted engine – front wheel drive (FME-FWD) - know measuring and marking out tools - know how to maintain measuring and marking out tools	- describe the vehicle layouts of FME-RWD and FME-FWD at the hand of diagrams - use measuring and marking out tools: - squares - ruler and tapes - callipers - micro meters - straight edge - scribes - dividers - dial gauge - telescopic gauge - feeler gauge - multi-tester - maintain measuring and marking out tools

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.5 Tools (continued)	• know the uses and maintenance of hand and special tools	• describe the uses and maintenance of the following hand and special tools: - punches - hammers - tinsnips - screwdrivers - spanners - tyre levers - sockets - files - hacksaws - torque wrench - pliers - chisels - multi-tester - drills - ring squeezer - strap wrench - timing light - Allen keys - clamps - tap and die sets - pullers - electronic diagnostic tester (scan tools) - battery charger

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.6 Materials	• know the metals used in the automotive industry • know materials used in the automotive industry	• identify metals used in automotive industry: - mild steel - aluminium - brass - cast iron - copper - chromium - high carbon steel - lead - stainless steel - tin • identify materials used in automotive industry: - carbon - cloth - fiberglass - glass - leather - nylon - polyvinyl chloride (PVC) - rubber - vinyl
3.7 Fasteners	• understand the use of fasteners	• use fasteners: - bolts, studs, nuts and screws - washers - rivets - split pins and keys

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.8 Lubrication	know how to perform a lubrication service on a vehicle	- perform a lubrication service on a vehicle: - brake and clutch fluid - engine, gearbox, differential and power steering oil - automatic transmission fluid - grease nipples - wheel bearings - door locks, bonnet and boot catches
3.9 Tyres and wheels	- know the function of wheels and tyres - know types of rims and tyres	- discuss the function of wheels and tyres - name and identify types of rims and tyres
3.10 Suspension, brakes and steering	- understand the function of suspension components - know chassis configurations - understand the function of brake components	- explain the function of suspension components: - leaf and coil springs - shock absorbers - shackles - torsion bars - distinguish between passenger and light delivery vehicles, chassis constructions and suspension mounting points - explain the function of the following brake components: - master cylinder - wheel cylinders - discs and/or drums - brake booster - steering wheel - steering column - rack and pinion - manual steering box - hydraulic steering box - steering linkages

TOPIC	GENERAL OBJECTIVES <i>Learners will:</i>	GRADE 9 SPECIFIC OBJECTIVES <i>Learners should be able to:</i>
MODULE 3: MOTOR MECHANICS (CONTINUED)		
3.10 Suspension, brakes and steering (continued)	understand the function of steering components	explain the function of the different steering components
3.11 Engine parts	understand the operation of the engine parts	- explain the operation of the main engine parts: - cylinder block - cylinder head - pistons and rings - con rods - crankshaft - camshaft - bearings - flywheel - carburetor - electronic fuel injection - starter motor - cooling system
3.12 Engine operation	- know compression ignition engines (2 and 4-stroke) - understand the operation of the compression ignition (2 and 4-stroke) engines	- identify and compare compression ignition engines and spark ignition engines (2 and 4-stroke) - explain the operating principles of: compression ignition (2 and 4-stroke) engines - describe the cycles of operation
3.13 Electricity and magnetism	- know basic electrical circuits - be able to care for and maintain a battery - know International System (SI) units and symbols	- draw basic electrical circuits - compare series and parallel circuits - maintain a battery - name SI units and their symbols

10. ASSESSMENT

A learner-centred curriculum and learner-centred teaching encompass a broad range of knowledge and skills which are relevant to the knowledge-based society. The specific objectives in the syllabus state what understanding and skills a learner must demonstrate as a result of this teaching-learning process, and which objectives will be assessed. However, it is intended that the curriculum should focus on learning, not on assessment and examination. Assessment and examination are only to support learning.

10.1 Types and methods of assessment

Continuous assessment

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

Informal and formal methods

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

When it is necessary to structure assessment more formally, the teacher should as far as possible use situations similar to ordinary learning and practice situations to assess the competency of the learner. Formal written and oral tests can be used to assess only a limited range of specific objectives and therefore should not take up a great deal of time. Short tests should be limited to part of a lesson and only in exceptional cases use up a whole lesson.

Formative and summative assessment

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

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

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

Technical Studies B syllabus, Grade 8 & 9, NIED 2024

Evaluation

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

Criterion-referenced grades

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

10.2 Grade descriptors

The learner's summative achievement in the specific objectives will be shown in letter grades A to E, where A is the highest and E the lowest grade for learners achieving minimum competency level. In cases where a learner has not reached the minimum level of competency a U will be awarded. When letter grades are awarded, it is essential that they reflect the learner's actual level of achievement in relation to the specific objectives. The relation between the letter grades and specific objectives is shown in the table below.

Grade	% Range	Grade descriptions
A	80%+	Achieved objectives exceptionally well. The learner is outstanding in all areas of competency.
B	70-79%	Achieved objectives very well. The learner's achievement lies substantially above average requirements and the learner is highly proficient in most areas of competency.
C	60-69%	Achieved objectives well. The learner has mastered the specific objectives and can apply them in unknown situations and contexts.
D	50-59%	Achieved objectives satisfactorily. The learner's achievement corresponds to average requirements. The learner may be in need of learning support in some areas.
E	40-49%	Achieved the minimum number of objectives to be considered competent. The learner may not have achieved all the specific objectives, but the learner's achievement is sufficient to exceed the minimum competency level. The learner is in need of learning support in most areas.
U	0-39%	Ungraded. The learner has not been able to reach a minimum level of competency in the objectives, even with extensive help from the teacher. The learner is seriously in need of learning support.

10.3 Assessment objectives

The assessment objectives for Technical Studies B are:

Assessment objective A: Knowledge with understanding

Learners should be able to:

- demonstrate the ability to state facts, recall and name items, recall and describe processes
- demonstrate the ability to apply and relate knowledge to basic design and manufacturing
- make reasoned arguments and anticipate consequences about outcomes of the design and realisation process
- demonstrate a crucial awareness of the interrelationship between design and the needs of society.

Assessment objective B: Design problem solving

Learners should be able to:

- identify clearly, from a situation, a specific need for which a solution is required and compose a design brief;
- analyse a problem by considering any relevant functional, aesthetic, human, economic and environmental design issues and draw up a design specification;
- generate a range of outline solutions to a design problem, giving consideration to the constraints of time, skills and resources;
- test and refine the functional and aesthetic effectiveness of design solutions.

Assessment objective C: Design communication

Learners should be able to:

- recognise information in one form and where necessary change it into a more applicable form;
- propose and communicate ideas graphically;
- develop ideas and represent details of form, shape, constructive movement, size and structure through graphical presentation.

Assessment objective D: Realisation

Learners should be able to:

- plan and organise the work procedure involved in the realisation of a solution;
- select, from a range of resources, those appropriate for the realisation of the product;
- demonstrate appropriate manipulative skills by showing an understanding of materials and their characteristics in relation to their use;
- demonstrate appropriate manipulative skills by showing the ability to correctly and efficiently use instruments and tools used in the realisation of a product.

10.4 Continuous assessment: detailed guidelines

A specified number of continuous assessment activities per term should be selected, graded and recorded. Not more than three assessments per term are to be topic tests. These continuous assessments must be carefully planned and marked according to a marking scheme, marking criteria or memorandum. The criteria used to assess activities other than tests should be given to the learner before the assessment activity. Evidence of the work produced by good, average and low-achieving learners, as well as the written assignment and marking scheme, has to be kept at school until the end of the next year. Teachers can choose to grade and/or record more than the required continuous assessments if it is necessary for formative purposes. An end- of-year summative grade will be based only on the assessment tasks described in the syllabus. Not more than 40% of the continuous assessment may be based on tests, which include topic tests and end-of-term tests.

Types of continuous assessment tasks

In Technical Studies B in the Junior Secondary phase the continuous assessment tasks are as follows:

Observations/reports/worksheets or topic tasks: These are activities that most teachers already use in their day-to-day teaching. These are recorded, assessed activities that could introduce a topic, be used during the teaching of a topic and /or revision of a topic. They may well include assessment involving specific objectives to do with locating information, conducting surveys, analysing information or presenting information. This will involve assessments of specific objectives in all assessment objectives; however, not all assessment objectives need to be present in every topic task.

Practicals: These are assessments of practical skills done during a practical activity where learners are required to plan and to carry out investigations and to collect, report and analyse information. After each topic, a practical exercise should be conducted to evaluate learners' skills.

Topic tests: Completed topics should be concluded with a test indicating the achievements of the learners in these topics.

End-of-term test: This will be a more comprehensive topic test of the term's work. Teaching should continue, but no homework should be assigned during the time of writing the end-of-term tests.

Summary of continuous assessment tasks

Continuous assessment Grade 8						
	Term 1		Term 2		Term 3	
Components	Number & marks	Total	Number & marks	Total	Number & marks	Total
Observations/reports/worksheets	3×20	60	3×20	60	3×20	60
Practical	3×30	90	3×30	90	3×30	90
Topic tests	3×20	60	3×20	60	3×20	60
End-of-term tests	100÷2	50	100÷2	50		
Term marks		260		260		210
Weighted term marks (report marks)		$(260 \div 2.6)$ 100		$(260 \div 2.6)$ 100		

Continuous assessment Grade 9						
	Term 1		Term 2		Term 3	
Components	Number & marks	Total	Number & marks	Total	Number & marks	Total
Observations/reports/worksheets/topic tasks	3×20	60	3×20	60	1×20	20
Practicals	3×30	90	3×30	90	1×30	30
Topic tests	3×20	60	3×20	60	1×20	20
End-of-term tests	100÷2	50	100÷2	50		
Term marks		260		260		70
Weighted term marks (report marks)		$(260 \div 2.6)$ 100		$(260 \div 2.6)$ 100		

The continuous assessment (CA) marks for one term is converted to a mark out of 100 (weighted term mark). Only this mark should be used for the report at the end of term 1 and term 2. Learners should not write an examination at the end of the first term, but only an end-of-term test which is part of the CA and part of the weighted term mark.

10.5 End-of-year examinations: detailed guidelines

At the end of Grade 8 and 9 there will be an end-of-year examination. The Grade 9 papers will be set by DNEA/Regions and marked regionally. The purpose of this examination is to focus on how well learners can demonstrate their thinking, communication, and problem-solving skills related to the areas of the syllabus which are most essential for continuing in the next grade. Preparing for and conducting these examinations should not take up more than two weeks altogether right at the end of the year.

The description of the various papers for the written examination is as follows:

Written examination			
Grade	Description of papers	Duration	Marks
8	This paper will consist of three sections: Section A: Section A will consist of ten short answer compulsory questions intended to assess knowledge of all three modules (10 marks). Section B: Section B will consist of six questions of which a learner will be required to answer one question from each of the three modules (20 marks x 3 = 60 marks). Section C: Section C will consist of three structured questions, one from each of the three modules, of which a learner will be required to answer one question (30 marks).	2 h 30 min	100
9	This paper will consist of three sections: Section A: Section A will consist of ten short answer compulsory questions intended to assess knowledge of all three modules (10 marks). Section B: Section B will consist of six questions of which a learner will be required to answer one question from each of the three modules (20 marks x 3 = 60 marks). Section C: Section C will consist of three structured questions, one from each of the three modules of which a learner will be required to answer one question (30 marks).	2 h 30 min	100

Promotion marks

For Technical Studies B in Grade 8 & 9 continuous assessment contributes 50% to the promotion mark and the end-of-year examination contributes 50%. The weighting of each assessment component is as follows:

Component	Description	Marks	Weighting
Written examination	Section A: Section B: Section C:	10 60 30	50%
Continuous assessment	Observation/report/work sheets, practical, topic tests, end-of-term test	100	50%
Total marks		200	100%

The promotion marks are calculated as follows:

Promotion mark Grade 8				
	Term 1	Term 2	Term 3	Total
Term mark	210	210	210	630
CA mark	$(630 \div 6.3)$			100
End-of-year examination				100
Promotion mark	$(\text{CA mark} + \text{end-of-year examination}) \div 2$ $(200 \div 2)$			100

Promotion mark Grade 9				
	Term 1	Term 2	Term 3	Total
Term mark	210	210	70	490
CA mark	$(490 \div 4.9)$			100
End-of-year examination				100
Promotion mark	$(\text{CA mark} + \text{end-of-year examination}) \div 2$ $(200 \div 2)$			100

10.6 Specification grid

The Specification grid below indicates the weighting allocated to each objective for both continuous assessment and for the written examination.

Components	Weighting	Total (marks)
Assessment objectives for written examination		
Objective A Knowledge with understanding	40%	40
Objective B Design problem solving	16%	16
Objective C Design communication	22%	22
Objective D Realisation	22%	22
Assessment objectives for continuous assessment		
Objective A Knowledge with understanding	16%	16
Objective B Design problem solving	42%	42
Objective C Design communication	16%	16
Objective D Realisation	26%	26

ANNEXE 1: GLOSSARY OF TERMS

aesthetics	how something looks, especially when considering how pleasing it is
anti-freeze	a combination of ethylene glycol and water used in the engine cooling system to prevent freezing and overheating
automatic transmission fluid	a mixture of chemicals that has various lubrication properties used in automatic transmissions and have no mineral oils
axonometric	used to describe a method of drawing a 3-dimensional object so that the vertical and horizontal axes are drawn to scale but the curves and diagonals appear distorted
brake fluid	a combination of chemicals that have a specific property to allow high temperatures and rubber swell protection and is used in hydraulic brake systems
CAD	Computer Aided Drafting, used to make sketches with the help of a computer e.g. building plans
calculate	a numerical answer is required - working must be shown
CAM	Computer Aided Manufacturing, used where instructions for manufacturing is given via a computer
coil springs	circular shaped high tensile spring used to absorb road shocks
communication (graphical)	the exchange of information between individuals, by means of speaking or using a system of signs or behaviour (drawing)
compare	find resemblances and differences
compressor	machine that compresses air and stores it in a pressure vessel
conceptualise	to arrive at a concept or generalization as a result of things seen experienced or believed
DC circuit	a Direct Current circuit is a circuit where electric current flows through in one direction
dial gauge	a measuring instrument that uses a clock type dial to measure specific tolerances and side movement
electronic diagnosis tester	a combination of various instruments used by the workshop to diagnose the specific electrical faults of the engine management system
ergonomics	the study of how a workplace and the equipment used there can best be designed for comfort, safety, efficiency and productivity
evaluate	use the information provided to make a judgement about something
filter strap wrench	a metal lever and belting used to undo an oil filter

final drive	a set of gears that allow drive at a 90 degree angle
give/state/write	write down your answer
hoist	has 2 or 4 legs and platform where a vehicle is driven on and then hydraulically lifted to allow work to be done underneath
jack	a special designed hydraulic cylinder and stand to lift a vehicle
keys	a special shape of metal that is used to prevent a pulley on a shaft from rotating on it and is mostly located in a groove on the shaft and slot on pulley
leaf springs	a set of high strength metal blades staked on top of each other to allow the vehicle to drive over a rough terrain and let the axle move independent of the vehicle body
media	the various means of mass communication thought of as a whole, including radio, television, magazines and newspapers, together with the people involved in their production
micro meter	a precision measuring instrument that can read in very small increments and is mostly used at machine shops to measure small tolerances
mineral oil	is a by-product of crude oil and is extracted in a refinery and used for lubrication purposes
multi meter	an electrical measuring combination instrument that can measure volts ohms and amps
NOSA	National Occupational Safety Association which set safety standards for industry
oblique	sloping or joining something at an angle that is not a right angle
Ohm's law	a law stating that electric current is proportional to voltage and inversely proportional to resistance
owner's manuals	an information book about the specific vehicle model operating procedures and specifications, used by vehicle owner to operate and do minor maintenance himself
pictorial	containing illustrations or photographs as opposed to written text (3-D sketches)
ring squeezer	a round sheet metal and lock used to compress piston rings for installation
scale	a ratio representing the size of an illustration or reproduction, especially a map or a model, in relation to the object it represents

shackles	a movable joint between the axle and leaf spring and allows expansion and contraction
shock absorbers	cylinder shaped tube filled with oil and gas to allow the axles to move up and down independently to body and thereby providing comfort driving
sketch	in case of diagrams, make a simple, freehand drawing and in graph work, the shape and/or position of the curve should be given
sling	a steel wire rope or special materials that has steel rings on ends used to lift any heavy object by crane
specification	a detailed description of a particular thing, especially one detailed enough to provide somebody with the information needed to make that thing
split pins	a pin with two legs that are used on special castled nuts to prevent them from loosening during vehicle operations
studs	a special type of bolt that has no head but both sides are threaded
technology	scientific knowledge used in practical ways in industry
telescopic gauge	a measuring tool that has two legs that move outwards and are locked to measure inside diameters
time management	to plan and execute a task within a given period
timing light	a strobe light that uses electrical impulses to measure the degree of engine ignition timing
torsion bars	a very high tensile steel bar used in suspensions that provides springing by being twisted
trestles	a leg made of pipe and three side legs that support the vehicle safely when lifted by jack
triangulation	a navigation technique that uses the trigonometric properties of triangles to determine a location or course by means of compass bearings from two points a known distant apart.
wasting	misuse / use to no purpose / extravagant or ineffective use of an asset or materials
workshop manuals	a specialised technical book that has text and pictures and specifications on how to repair, adjust or maintain a vehicle, used in workshops

ANNEXE 2: LIST OF TOOLS, EQUIPMENT AND MATERIALS

Metalwork and Welding

Marking out tools

- steel rule
- folding rule
- tape measure
- the try square

Basic hand tools

- files and rasps
- saws
- hammers
- boring tools
- screwdrivers
- pincers

Machines

- electrical hand drill
- drill stand machine
- welding machine

Materials

- steel
- copper
- angle iron

Motor Mechanics

Marking out tools

- steel rule
- folding rule
- tape measure
- winged compasses and compasses
- callipers
- micro meters
- dial gauge
- telescopic gauge

Basic hand tools

- files and rasps
- hammers and mallets
- boring tools
- screwdrivers
- pincers
- punches
- spanners sockets
- feeler gauge
- torque wrench
- chisels
- ring squeezer
- filter strap wrench
- battery tester
- jack
- trestles
- multi tester

Machines

- electrical hand drill
- pedestal drill
- engine/vehicle

Materials

- washers
- nuts and screws,
- grease
- oil
- brake fluid
- engine cleaner
- hand cleaner
- rags

Electricity and Electronics

- ☐ oscilloscopes
- ☐ multi meters
- ☐ tong tester
- ☐ bench grinder
- ☐ transistor, bipolar, power, BD 138
- ☐ transistor, bipolar, NPN, BC109
- ☐ diode, small-signal, DO35, 1N4148, 20pcs
- ☐ capacitor, electrolytic, axial, wire ended, 85degC, +-20%, 450Vdc, 10uF
- ☐ potentiometer, cermet's, 12 mm, 1.0W, 149, lin, 500R
- ☐ resistor, carbon film, high stab, 2W, 5%, 10R
- ☐ resistor, carbon film, high stab, 2W, 5%, 1k5
- ☐ switch, toggle, std, panel, 1A, DPCO
- ☐ switch, pushbutton assembly, V3 micro, 2 pole, plain
- ☐ relay, plug-in, power, 16A, 12Vdc, SPCO, with LED
- ☐ electric LAB 700

ANNEXE 3: ASSESSMENT RECORD SHEET FOR GRADE 8

Assessment record sheet: Technical Studies B Grade 8: Year:

School: Teacher:

Name of Learner	Term	Observations/ Reports/ Worksheets			Practicals			Topic tests			CA Marks	End-of-term test	Term mark (CA + end of term test)	Weighted term mark (260÷2.6)	Total of CA marks	CA mark (630÷6.3)	End-of-year examination	(CA + Examination)	Promotion mark (200÷2)
		20	20	20	30	30	30	20	20	20	210	50	260	100	630	100	100	200	100
	1																		
	2																		
	3																		
	1																		
	2																		
	3																		
	1																		
	2																		
	3																		
	1																		
	2																		
	3																		
	1																		
	2																		
	3																		

Term 1
 Moderator: Rank:
 Signature: Date:

Term 2
 Moderator: Rank:
 Signature: Date:

Term 3
 Moderator: Rank:
 Signature: Date:

ANNEXE 4: ASSESSMENT RECORD SHEET FOR GRADE 9

Assessment record sheet: Technical Studies B												Grade 9:		Year:						
School:												Teacher:								
Name of Learner	Term	Observations / Reports/ Worksheets			Practicals			Topic tests			CA marks		End-of-term test	Term mark (CA + end of term test)	Weighted term mark (260÷2.6)	Total CA marks	CA mark (490÷4.9)	End-of-year examination	(CA + Examination)	Promotion mark (200÷2)
		20	20	20	30	30	30	20	20	20	210	70	50	260	100	490	100	100	200	100
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			
	1																			
	2																			
	3																			

Term 1
 Moderator: Rank:
 Signature: Date:

Term 2
 Moderator: Rank:
 Signature: Date:

Term 3
 Moderator: Rank:
 Signature: Date:



The National Institute for Educational Development

P/Bag 2034

Okahandja

NAMIBIA

Telephone: +264 62 509000

Facsimile: +264 62 509073

E-mail: info@nied.edu.na

Website: <http://www.nied.edu.na>