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Dr Lyabwene M. Mtahabwa
Commissioner for Education

PLUMBING AND PIPE FITTING SYLLABUS FOR ORDINARY SECONDARY EDUCATION VOCATIONAL STREAM FORM I-IV

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Abbreviations and Acronyms

CO_2	Carbon Dioxide
DC	Direct Current
GS	Galvanized Steel
IC	Inspection Chamber
NEMC	National Environmental Management Council
PPF	Plumbing and Pipe Fitting
OSHA	Occupational Safety and Health Authority
PPE	Personal Protection Equipment
TIE	Tanzania Institute of Education
VET	Vocational Education and Training
VETA	Vocational Education and Training Authority
WC	Water Closet

Definition of Key Terms

Assessment: The process of collecting evidence and making judgments on whether competency has been achieved, or whether specific skills and knowledge have been achieved that will lead to attaining competency.

Circumstantial knowledge: Detailed knowledge, which allows the decision-making regarding different circumstances and cross cutting issues.

Competence: The ability to use knowledge, understanding, practicality, and thinking skills to perform effectively to the workplace standards required in employment.

Element: A sub-unit (step) reflects the learning sequence to achieve a unit's broad learning objectives.

Performance criteria: indicate the expected end results or outcome in evaluative statements.
Standard: A set of statements, which if proven true under working conditions, means that an individual is meeting an expected level and type of performance.

Knowledge Assessment: This is essential knowledge needed to demonstrate the competences associated with performing a given task.

Unit: A statement of broad learning objectives, which prescribe the requirements of a standard in form of practical skills, knowledge and appropriate attitudes.

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For and on behalf of:

Vocational Education and Training Authority

CPA. Anthony M. Kasore

Director General

1.0. Introduction

Plumbing and Pipe Fitting is one of the occupations taught in the Ordinary Secondary Education Vocational Stream Form I-IV. Learning Plumbing and Pipe Fitting is essential as these skills have both practical and economic value in everyday life. By learning Plumbing and Pipe Fitting, students will develop knowledge and practical skills that enable them to install and repair plumbing systems for domestic and industrial purposes.

Upon completion of the program, students will possess both theoretical and practical skills of Plumbing and Pipe Fitting, they will be capable of operating plumbing tools and equipment, install and repairing plumbing fixtures, and adhering to health and safety regulations and practices. Additionally, students will be equipped with the business skills necessary for managing a Plumbing and Pipe Fitting Workshop, ensuring high standards of quality and innovation in all aspects of the occupation.

A graduate of this occupation may be employed in both Government and private sectors such as Water Authorities, Hospitals, Colleges, Ministries, Mining, Marines, Air Craft, Irrigation Schemes, Construction Companies and industries (Cement, Textiles) or self-employed.

The Plumbing and Pipe Fitting Syllabus designed to guide the teaching and learning of Plumbing and Pipe Fitting at Ordinary Secondary Education Form I-IV Vocational Stream in the United Republic of Tanzania. The syllabus interprets the competences a student needs to develop while learning Plumbing and Pipe Fitting. It contains valuable information that will enable teachers to effectively plan their teaching process and help learners to develop the intended competences.

2.0. Main Objectives of Education in Tanzania

The main objectives of education in Tanzania are to enable every Tanzanian to:

(a) Develop and improve his or her personality so that he or she values himself or herself and develops self-confidence;

(b) Respect the culture, traditions, norms and customs of Tanzania; cultural differences; dignity; human rights; attitudes and inclusive actions;

(c) Advance knowledge and apply science and technology, creativity, critical thinking, innovation, cooperation, communication and positive attitudes for his or her own development and the sustainable development of the nation and the world at large;

(d) Understand and protect national values, including dignity, patriotism, integrity, unity, transparency, honesty, accountability and the national language;

(e) Develop life and work-related skills to increase efficiency in everyday life;

(f) Develop a habit of loving and valuing work to increase productivity and efficiency in production and service provision;

(g) Identify and consider cross-cutting issues, including the health and well-being of the society, gender equality, as well as the management and sustainable conservation of the environment; and

(h) Develop national and international cooperation, peace and justice per the Constitution of the United Republic of Tanzania and international conventions.

3.0. General Competencies for Ordinary Secondary Education Vocational Stream

The general competences for Ordinary Secondary Education, Form 1–IV, Vocational Education stream are to:

(a) Apply the knowledge, skills and attitudes the student developed in the primary school stage to increase his/her understanding of technical skills;

(b) Apply technical skills in designing, inventing and making various things to cope with life and solve challenges in society;

(c) Appreciate citizenship and national virtues;

(d) Use language skills;

(e) Demonstrate self-confidence in learning in various fields, including science and technology, technical knowledge and technical skills;

(f) Apply technical knowledge and skills in designing, discovering and making various things to solve challenges in society, including cross cutting issues;

(g) Appreciate procedures and safety rules in using technical tools correctly; and

(h) Apply the technical knowledge and skills acquired to develop oneself with vocational and technical education and join the workforce.

4.0. General Competences of the Occupation

Upon completion of this occupation, students are expected to have ability to:

(a) Install sanitary fixtures and pipes systems

(b) Maintain safety and health awareness;

(c) Manage Plumbing and Pipe Fitting industry activities; and

(d) Maintain tools, equipment and machines.

5.0. Main and Specific Competences

The main and specific competences to be developed are presented in Table 1

Table 1: *Main and Specific Competences for Form I-IV*

Modules (Main Competence)	Units (Specific competences)
1.0 Maintaining safety of workshop and surroundings.	1.1 Maintaining workshop safety 1.2 Handling accidents and incidents 1.3 Handling fire accidents 1.4 Performing first aid 1.5 Maintaining environmental issues
2.0 Performing bench work	2.1 Performing hand hacksaw cutting 2.2 Performing power hacksaw cutting 2.3 Performing metal filing 2.4 Performing hand drilling 2.5 Performing bench drilling 2.6 Performing manual thread cutting
3.0 Installing pipe, taps and valves	3.1 Cutting pipes 3.2 Bending pipes 3.3 Installing taps and valves
4.0 Installing water supply system	4.1 Performing pipe joining 4.2 Installing cold water supply to the building
5.0 Installing domestic water supply system	5.1 Installing irrigation system 5.2 Installing, servicing and repairing hot water supply system
6.0 Installing sanitary appliances	6.1 Installing and repairing waste appliances 6.2 Installing and repairing soil appliances
7.0 Installing sanitary pipe work system	7.1 Installing and maintaining above ground drainage system 7.2 Installing and maintaining underground drainage system
8.0 Installing domestic gas supply systems	8.1 Installing Gas Pipe System to the Building
9.0 Performing sheet metal works	9.1 Performing hand shearing 9.2 Performing machine shearing 9.3 Performing sheet metal forming

Modules (Main Competence)	Units (Specific competences)
	9.4 Performing soft soldering 9.5 Performing riveting 9.6 Performing grinding 9.7 Project
10.0 Fabricating sheet metal works	10.1 Performing gas welding and brazing 10.2 Performing arc welding
11.0 Preforming rain water harvest	11.1 Performing roof guttering 11.2 Performing installation of rain water harvesting system 11.3 Performing capturing of water run-off from road surfaces 11.4 Performing servicing of rain water harvesting system components
12.0 Installing water mains	12.1 Installing water distribution mains 12.2 Installing and operating centrifugal pump
13.0 Performing water treatment	13.1 Performing water treatment 13.2 Maintaining water quality level
14.0 Performing basic estimating and costing	14.1 Estimating materials 14.2 Performing costing
15.0 Installing industrial hot water supply system	15.1 Installing heating systems 15.2 Maintaining heating system
16.0 Project	16.1 Project
17.0 Installing pumps	17.1 Installing reciprocating/piston pump appliances 17.2 Installing rotary pump 17.3 Installing hydraulic ram pump
18.0 Constructing wells	18.1 Constructing hand drilled shallow wells 18.2 Constructing dug wells
19.0 Managing workshop	19.1 Planning layout and workshop 19.2 Managing tools, equipment, machines and materials 19.3 Supervising subordinates in a workshop
20.0 Managing safe work environment	20.1 Managing hazards 20.2 Carrying out risk assessment 20.3 Managing environment
21.0 Managing preventive maintenance	21.1 Planning preventive maintenance 21.2 Supervising preventive maintenance
22.0 Project	22.1 Project

6.0. The Roles of Teachers, Students and Parents in Teaching and Learning

Good relationships between a teacher, student and parent, or guardian is fundamental to ensuring successful learning. This section outlines the roles of each participant in facilitating effective teaching and learning of Plumbing and Pipe Fitting.

7.0. The teacher

The teacher is expected to:

(a) Help the student to learn and develop the intended competences in Plumbing and Pipe Fitting

(b) Use teaching and learning approaches that will allow students with different needs and abilities to:

(i) Develops the competences needed in the 21st Century; and

(ii) Actively participate in the teaching and learning process.

(c) Use student centred instructional strategies that make the student a Centre of learning which allow them to think, reflect and search for information from various sources;

(d) Create a friendly teaching and learning environment;

(e) Prepare and improvise teaching and learning resources;

(f) Conduct formative assessment regularly by using tools and methods which assess theory and practice;

(g) Treat all the students according to their learning needs and abilities;

(h) Protect the student from the risky environment while he or she is at school;

(i) Keep track of the student's daily progress;

(j) Identify individual student's needs and provide the proper intervention;

(k) Involve parents/guardians and the society at large in the student's learning process; and

(l) Integrate cross-cutting issues and ICT in the teaching and learning process.

8.0. The student

The student is expected to:

(a) Develop the intended competences by participating actively in various learning activities inside and outside the classroom; and

(b) Participate in the search for knowledge from various sources, including textbooks, reference books and other publications in online libraries.

9.0. The parent/guardian

The Parents/Guardian is expected to:

(a) Monitor the child's academic progress in school;

(b) Where possible, provide a child with the needed academic support;
(c) Provide a child with a safe and friendly home environment which is conducive for learning;
(d) Keep track of a child's progress in behaviour;
(e) Provide the child with any necessary materials required in the learning process; and
(f) Instill in a child a sense of commitment and positive value towards education and work.

10.0. Teaching and Learning Methods

The teaching and learning methods are instrumental in developing student's competencies. This Syllabus suggests teaching and learning methods for each Practical Activity which includes but are not limited to demonstration, practical/hands-on activities, brainstorming, Think-ink-pair-share, simulation, group works, peer teaching/learning, discussions, assignment, field visits, and project works. However, a teacher is advised to plan and use other appropriate methods based on the environment or context. All the teaching and learning methods should be integrated with the everyday lives of students. The focus is expected to be on practical application and developing cognitive, affective, and psychomotor skills through learner-centred methods. Vocational teachers act as facilitators, incorporating both school base teaching and project work supervision.

11.0. Teaching and Learning Resources

The process of teaching and learning requires different resources. In that regard, both a teacher and students should work together to collect or improvise alternative resources available in the school and home environment when needed. Teachers and students are expected to constantly seek for information from various sources to effectively facilitate the teaching and learning process. The list of approved textbooks and reference books shall be provided by the TIE.

12.0. Assessment

Assessment is important in teaching and learning of Plumbing and Pipe Fitting occupation. It is divided into formative and summative assessments. Formative assessment informs both the teacher and students on the progress of teaching and learning, and in making decisions on improving the teaching and learning process. Teachers are, therefore, expected to apply a wide range of formative assessment methods which include but are not limited to demonstrations, discussions, presentations, oral questions, experiments, observations, practical assignments, and projects.

Summative assessment, on the other hand, will focus on determining student's achievement of learning. Teachers are expected to use a variety of summative assessments including Form Two National Assessment, terminal examination, annual examination, mock examination, and project. The scores obtained from these assessments will be used as Continuous Assessment (CA). Therefore, the continuous assessments shall contribute 60% and the National Form IV Examination shall be 40% as indicated in Table 2.

13.0. Project Work

Project work is a carefully planned and clearly defined task or problem that a student undertakes, either alone or in a group, to enhance and apply the skills and knowledge gained in the classroom, workshop, kitchen, or laboratory. It is based on the principles of "Learning by Doing" and "Learning by Living." In this context, the implementation of Project Work in secondary schools' vocational streams is essential. Projects in the vocational stream should be conducted in the core subject (occupation). To ensure its success, the supervision and assessment of student project work must be consistent with the established guidelines provided by National Examinations Council of Tanzania (NECTA).

Table 2: *Contribution of Continuous Assessment and National Examination in the final score*

Assessment Category	Weight (%)	National Examination
Form Two National Assessment (FTNA)	6.0	40
Form Three Terminal Examination	5.0	
Form Three Annual Examination	5.0	
Form Four Mock Examination	7.0	
Project	7.0	
Form Two Practical	10.0	
Form Three Practical	10.0	
Form Four Practical	10.0	
Total	**60**	

14.0. Number of Periods

The Plumbing and Pipe Fitting Syllabus for Ordinary Secondary Education Vocational Stream Form I-IV provides time estimates for teaching and learning each specific competence. The estimates consider the complexity of the specific competences and the learning activities. Eight (08) periods of 40 minutes each have been allocated per week, whereby two (02) periods will be used for theory and 6 for practical sessions which may require double periods (e.g., 80). Double periods will allow sufficient time for hands-on activities.

15.0. Teaching and Learning Contents

The contents of the Syllabus are organised into a matrix with seven (07) columns which are main competences, specific competences, learning activities, suggested teaching and learning methods, assessment criteria which are divided into (process assessment, products/service assessment, and underpinning knowledge), suggested teaching and learning resources and the number of periods as presented in Table 3 to 6.

Form One

Table 3: *Detailed contents for Form One*

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
1.0 Maintaining Safety of Workshop and Surroundings	1.1 Maintaining workshop safety	(a) Maintaining workshop safety rules and regulations.	**Brainstorm** Guide students to explain the concept of workshop safety rules and regulations. **Group discussion** Guide students in groups to explore the importance of maintaining workshop safety rules and regulations correctly. **Group Practical Activity** Organize students in groups to practice safety rules and regulation in plumbing workshop.	**The student should be able to:** •Maintain workshop •Interpreted different safety signs in the workshop. •Draw safety signs •Maintain personal environments •Clean workshop, tools, equipment and workshop surroundings •Store equipment and safety gears •Apply safety gears	Workshop safety rules and regulations are maintained correctly.	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: • Maintain workshop safety rules and regulations **Principles:** The student should explain principles of: • Maintaining workshop safety rules and regulations **Theories:** The student should explain: - • Safety rules and regulations **Circumstantial knowledge** Detailed knowledge about: • OSHA rules and regulations • Workshop rules and regulations	This element can be achieved at school workshop and the following tools and equipment are to be available. • Overalls • Safety gears • Personal Protective Equipment • Dust mask	74

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Maintaining workshop-working environment.	**Brainstorm** Guide students to describe the concept of a workshop working environment **Interactive simulation and Animation** Guide students through interactive simulation and animation to visualize the workshop working environment. **Group assignment** Organize the students in manageable groups to identify causes of accidents in a workshop-working environment	**The student should be able to:** •Select relevant safety gears • Apply safety gears •Identify causes of health and safety hazards in a workshop and its surroundings •Take precautions against health and safety hazards •Maintain safe working environment. •Clean workshop surroundings •Store equipment and safety gears. •Dispose different types of wastes as per OHS.	Workshop-working environment maintained as per safety rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: • Maintain workshop working environment. **Principles:** The student should explain principles of: • Maintaining workshop working environment **Theories:** The student should explain: - • Safe work environment **Circumstantial knowledge** Detailed knowledge about: • OSHA rules and regulations • Safe working practices • Waste disposal procedures	This element can be achieved at school workshop and the following tools and equipment are to be available: • Safety boots • Cleaning materials • Hoe • Broom • Brush • Dust covers • Dust bins • PPEs, • Video clip • Computer with internet	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Maintaining personal safety	**Brainstorm** Guide the students to identify causes of safety hazards in a workshop and its surroundings. **Practical work** Guide the student on how to maintain personal safety.	**The student should be able to:** • Select relevant safety gears • Take precautions against health and safety hazards. • Interpreted different safety signs in the workshop • Draw safety signs • Maintain personal environment • Clean workshop, tools, equipment, and workshop surroundings • Store equipment and safety gears. • Apply safety gears • Dispose of different types of wastes as per OHS.	Personal safety maintained as per safety rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Maintain personal safety **Principles:** The student should explain principles of: • Maintaining personal safety **Theories:** The student should explain: - • Advantage of maintaining personal safety **Circumstantial knowledge** Detailed knowledge about: • OSHA rules and regulations • Safe working practices • Waste disposal procedures	This element can be achieved at school workshop and the following tools and equipment are to be available: • PPEs, • Hoe • Dust bin • Safety gears	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Maintaining safety gears	**Brainstorm** Guide the students to explain the concept of safety gears, and identify uses of safety gears. **Group work** Guide the students in groups to identify personal protective equipment (PPE) in plumbing and pipe fitting workshops. **Practical work** Organize the students in manageable groups to practice maintenance of safety gears in the plumbing workshop	**The student should be able to:** •Select relevant safety gears •Take precautions against health and safety hazards. •Interpret different safety signs in the workshop. •Draw safety signs •Store equipment and safety gears. •Apply safety gears	Safety gears maintained safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: Maintain safety gears while using them. **Principles:** The student should explain principles of: • Maintaining safety gears **Theories:** The student should explain: - • Safety gears • Types of safety gears • Handling of safety gears **Circumstantial knowledge** Detailed knowledge about: • OSHA rules and regulations • Safe working practices • Waste disposal procedures	This element can be achieved at school workshop and the following tools and equipment are to be available: • PPEs, • Plain paper, • Ruled paper • Pens	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.2 Handling Accidents and Incidents	(a) Handling mechanical hazards	**Brainstorm:** Guide the students to explain the concept of hazard **Video Presentation** Use video clips to enhance student understanding on how to handle tools, equipment, and machines safely in a plumbing workshop	**The student should be able to:** • Carry out first aid to person involved in accidents related to mechanical hazards • Use service manual • Interpret workshop rules and regulations • Locate first aid kit • Record accidents • Make periodic inspection of workshop area and equipment • Identify hazard material • Handle mechanical hazard • Use color code and • know what color represent • Handle mechanical equipment • Handle machines • Use safety gears • Clean tools, equipment, and workplace • Store tools and equipment	Mechanical hazards handled as per workshop rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle mechanical hazard. **Principles:** The student should explain principles of: • Handling mechanical hazards **Theories:** The student should explain: - • Effect of mechanical hazard • Mechanical hazard materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while handling mechanical hazard • Safe handling of tools, equipment, and machines • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to be available: • Tool kit • Describe health hazards • Describe health hazard • Video clips with p • Projector • Internet facilities • Fire extinguisher • Overalls • Rubber gloves • Gloves • Safety boots • Safety clear glasses • First aid kit poster • Helmet • Service manual	50

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Handling Physical hazards	**Interactive Demonstrations and Simulations** Virtual Reality to simulate real-world environments where physical hazards are present (e.g., construction sites, workshops, or factories). **Group Discussions and Case Studies** Case Study Analysis: Present students with real or fictional scenarios where physical hazards have led to accidents for students to analyze the situation, identify the hazards, discuss the causes, and propose solutions or preventive measures.	**The student should be able to:** • Carry out first aid to persons involved in accidents related to physical hazard • Use the service manual • Interpret workshop rules and regulations • Apply safety gears • Record accidents • Make periodic inspections of workshop area and equipment • Identify hazard material • Handle hazard material • Follow good environmental practices • Use safety gears • Store tools and equipment	Physical hazards are handled as per workshop rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle physical hazard. **Principles:** The student should explain principles of: • Handling physical hazards **Theories:** The student should explain: - • Effect of physical hazard • Physical hazard materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while handling physical hazard • Safe handling of tools, equipment and machines • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to beare to be available: • Tool kit • Real or fiction case study • Overalls • Rubber gloves • Gloves • Safety boots • Safety clear glasses • First aid kit • First aid poster • Helmet • Ear plug • Mask • Workshop rules and regulations guidelines • Service manual	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Handling chemical hazards	**Virtual Reality (VR) and Simulations** Use VR to simulate a chemistry lab where students can safely interact with chemicals and learn about potential hazards (e.g., handling acids, bases, or flammable substances). **Demonstrations** Demonstrate to students on safe handling of chemicals, such as proper labeling, storing, and mixing.	**The student should be able to:** • Carry out first aid to persons involved in accidents related to chemical hazards • Use the service manual • Interpret workshop rules and regulations • Locate first aid kit • Record accidents • Make periodic inspection of workshop area and equipment • Identify hazard material • Handle hazard material • Use color code and know what color represent • Use safety gears • Clean tools, equipment and workplace • Store tools and equipment	Chemical hazards handled as per workshop rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle chemical hazard. **Principles:** The student should explain principles of: • Handling chemical hazards **Theories:** The student should explain: - • Effect of chemical hazard • Chemical hazard materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while handling chemical hazard • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to be available: • Tool kit • Fire extinguisher • Overalls • Rubber gloves • Safety boots • Safety clear glasses • First aid kit • First aid poster • Helmet • Mask • Workshop rules and regulations guidelines • Service manual	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Handling electrical hazards	**Virtual Reality (VR) Simulations** Use VR technology to simulate environments where electrical hazards are common, such as home appliances, electrical circuits, or construction sites. **Demonstrations** Demonstrate to students how to safely connect electrical wires, use circuit breakers, and install switches.	**The student should be able to:** • Carry out first aid to person involved in accidents related to electrical hazards • Use the services manual • Interpret workshop rules and regulations • Carry out artificial respiration • Record accidents • Use color code and know what color represent • Handle electrical equipment • Use safety gears • Store tools and equipment	Electrical hazards are handled as per workshop rules and regulations	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle electrical. **Principles:** The student should explain principles of: • Handling electrical hazards **Theories:** The student should explain: - • Effect of electrical hazard • Electrical hazard materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while handling electrical hazard • Safe handling of tools, equipment and machines • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to be available: • Tool kit • Fire extinguisher • Power Machines • Overalls • Rubber gloves • Safety boots • First aid kit • First aid poster • Mask • Workshop rules and regulations guidelines • Service manual	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(e) Handling ergonomic hazards</td><td>Interactive Demonstrations and Simulations
Use virtual reality (VR) or tools to simulate environments where ergonomic hazards exist, such as offices, classrooms, or factories.
Group Discussions and Case Studies
Case Study Analysis: Present students with real or fictional scenarios where ergonomic hazards have led to effects for students to analyze the situation, identify the hazards, discuss the causes and propose solutions or preventive measures.</td><td>The student should be able to:
• Carry out first aid to persons involved in accidents related to ergonomic hazards
• Interpret workshop rules and regulations
• React correctly and safely when faced with an emergency
• Identify ergonomic hazard material
• Handle ergonomic hazard material</td><td>Ergonomic hazards handled as per OSHA</td><td>Knowledge evidence:
Detailed knowledge of:
Method used:
The student should explain how to:
•Handle ergonomic.
Principles: The student should explain principles of:
• Handling ergonomic hazards
Theories: The student should explain: -
• Effect of ergonomic hazard
• Ergonomic hazard materials
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while handling ergonomic hazard
• Safe handling of tools, equipment and machines</td><td>This element can be achieved at school workshop and the following tools and equipment are to be available:
• Overalls
• Gloves
• First aid kit
• Workshop rules and regulations guidelines</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.3 Handling Fire Accidents	(a) Handling firefighting equipment and materials	**Brainstorm:** Guide the students to explain the concept of firefighting equipment **Virtual Reality (VR) Simulations** Use VR to simulate fire scenarios where students can virtually practice using firefighting equipment such as fire extinguishers, hoses, and fire blankets **Simulation:** Organize students to participate in a simulated fire scenario using firefighting equipment. Where they can identify hazards, use extinguishers, and follow the evacuation process. **Invite guest speaker** Invite guest speaker to share the knowledge and demonstrate how to handle fire classes	**The student should be able to:** • Select tools, equipment, and safety gears • Use first aid kit • Apply the right class of fire extinguisher • Use a fire extinguisher • Apply the right class of firefighting materials • Check and test fire extinguishers • Clean up tools, equipment, and working place • Store tools, equipment, and safety gears	Firefighting equipment and materials handled safely as per safety rules and regulations.	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle firefighting equipment and materials. **Principles:** The student should explain principles of: • Handling firefighting equipment and materials **Theories:** The student should explain: - • Identify different classes of fire extinguisher • Apply the right type of fire extinguishers • Apply right type of firefighting materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while handling firefighting equipment • Safe handling of tools, equipment and machines • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to be available: • Flip chart. • Marker pen • Firefighting equipment. • Safety gears	53

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Handling different classes of fire	**Brainstorm:** Guide the students to: define fire, outline classes of fire, and explain safety precautions when fighting for fire. **Demonstration:** Demonstrate to students how to handle different classes of fire. **Practical Activity:** Organize the students in manageable groups to practice on fighting different classes of fire with different fighting materials.	**The student should be able to:** • Select tools, equipment, and safety gears • Identify common classes of fire • React correctly and safely when faced with different classes of fire • Handle different classes of fire • Apply the right class of firefighting materials • Check and test fire extinguishers.	Classes of fire handled as per safety rules and regulations.	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: •Handle fire classes **Principles:** The student should explain principles of: • Handling different classes of fire. **Theories:** The student should explain: - • Identify different types of fire extinguishers • Apply the right type of fire extinguishers • Apply the right type of firefighting materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while different classes of fire. • Safe handling of tools, equipment, and machines • Waste disposal methods	This element can be achieved at school workshop and the following tools and equipment are to be available: • Firefighting equipment • Safety gears • A controlled fire simulation area • Markers for different fire	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.4 Performing First Aid	(a) Performing artificial respiration.	**Brainstorm:** Guide the students to: define first aid, artificial respiration, and explain principles of performing artificial respiration. **Interactive simulation and animation**: Guide students through interactive simulation and animation to visualize the artificial respiration process	**The student should be able to:** • Select tools and equipment. • Perform artificial respiration. • Observe safety precautions	Artificial respiration performed conforms to medical requiremen ts	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to perform artificial respiration **Principles:** The student should explain principles of: • Performing artificial respiration **Theories:** The student should explain: - • Importance of performing artificial respiration materials **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing artificial respiration • First aid	This element can be achieved at school workshop and the following tools and equipment are to be available: • Stretcher • Light blanket • Video clip • Projector • Internet facilities • Animation • Smart tv	53

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing first aid to minor wound scalpels.	**Brainstorm:** Guide the students to: define wounds, burns, first aid kit, the importance of first aid, use of accessories in a first aid kit. **Practical work:** Guide the student on how to select the correct tools and materials used to perform first aid to minor wounds and scalps. **Interactive simulation and animation**: Guide students through interactive simulation and animation on how to perform first aid to minor wounds and scalpels.	**The student should be able to:** • Select tools and equipment. • Identify types of injuries. • Attend minor wounds. • Sterilize first aid tools. • Observe safety precautions. • Store first aid kit	First aid to minor wound scalpels performed conforms to medical requiremen ts	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to perform first aid to minor wound scalpels. **Principles:** The student should explain principles of: • Performing first aid to minor wound scalpels **Theories:** The student should explain: - • Types of wounds • Types of accidents **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing first aid to minor wound scalpels. • Waste disposal • First aid	This element can be achieved at school workshop and the following tools and equipment are to be available: • First aid kit • Safety gears • Sterilizer • Medical gloves • Video clips • Animation • Projector • Internet facilities	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.5 Maintain Environment Issues	(a) Maintaining environmental pollution.	**Group discussion:** Guide the students in manageable groups to discuss environmental pollution and strategies of managing environmental pollution. **Think-ink-pair-share:** Guide the students through Think-ink-pair-share to identify pollutants found in plumbing workshop. **Hands on Practical Activity:** Organize the students to clean and arrange the workshop environment.	**The student should be able to:** • Prepare a schedule for cleaning and demarcation. • Collect items for Recycling. • Identify areas to plant trees	Environmental pollution maintained conforms the standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to Maintain environmental pollution. **Principles:** The student should explain principles of: Maintain environmental pollution. **Theories:** The student should explain: - • Environment issues • Types of accidents **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while maintaining environmental pollution • Waste disposal • First aid	This element can be achieved at school workshop and the following tools and equipment are to be available: • Garden equipment • Safety boots • Safety gloves • Wheel barrow • Overall	26

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Maintaining safe waste disposal	**Brainstorm:** Guide the students to: define wastes, waste disposal, identify different types of recycling and non-recycling items. **Demonstration** Demonstrate to students on how to collect different types of waste around the workshop **Practical Activity:** Organize the students in manageable groups to dispose correctly different types of waste collected around the workshop environment	**The student should be able to:** • Identify waste items. • Identify areas for disposal • Prepare a schedule for cleaning and demarcation	Waste disposal maintained safely to conform to the standard	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to Maintain waste disposal safely. **Principles:** The student should explain principles of: Maintaining environmental pollution **Theories:** The student should explain: - • Environment issues • Types of accidents • Types of wastes **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while maintaining environmental pollution. • Waste disposal • First aid	This element can be achieved at school workshop and the following tools and equipment are to be available: • Garden equipment • Safety boots • Safety gloves • Wheel barrow • Overall	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
2.0 Perform Bench works	2.1 Performing hand hacksaw cutting	(a) Performing straight sawing	**Brainstorm:** Guide the students to: define workbench, straight, hand hacksaw, and identify the importance of straight sawing **Demonstration:** Demonstrate how straight sawing is performed. **Group Practical Activity:** Organize the students to perform straight sawing on a piece of pipe.	**The student should be able to:** • Interpret working drawings. • Identify tools. • Select materials. • Clamp the work piece on a bench vice. • Take measurements. • Mark work piece • Perform straight sawing • Clean work area and work piece • Store work piece and tools in a safe place	Straight sawing performed conforms to given technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing straight sawing **Principles:** The student should explain principles of: • Performing straight sawing **Theories:** The student should explain: - • Straight sawing • Types of hacksaws and their main parts. • Different types of hacksaw blades. • Properties of materials. (Ferrous and nonferrous metal) • Types of materials used to manufacture blade **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing straight sawing • Waste disposal First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of work • Hacksaw • Bench vice • Tape measure • PPE's • File • Mark pen	73

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing angular sawing	**Brainstorm:** Guide the students to: define angular sawing, and identify the importance of angular sawing. **Demonstration:** Demonstrate how to perform angular sawing correctly. **Practical Activity:** Organize the students to perform angular sawing on a piece of pipe on workbench.	**The student should be able to:** • Interpret working drawings • Identify tools. • Select materials. • Clamp the work piece on a bench vice. • Take measurements. • Mark work piece • Perform angular sawing • Clean the work area and work piece • Store work piece and tools in a safe place.	Angular sawing performed conforms to given technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing angular sawing **Principles:** The student should explain principles of: • Performing angular sawing **Theories:** The student should explain: - • Importance of angular sawing • Safety precautions. • Types of angles. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing angular sawing • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of work • Hacksaw • Bench vice • Tape measure • PPE's • File • Mark pen	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	2.3 Performing power hacksaw cutting	(a) Performing sawing a round metal	**Brainstorm:** Guide the students to: define a round metal, describe parts of the power hacksaw **Demonstration:** Demonstrate how to saw a round metal **Practical Activity:** Organize the students to perform sawing a round on a piece of metal	**The student should be able to:** • Interpret working drawings. • Select material to be cut. • Clamp work piece. • Adjust machine. • Select blade teeth • Set the right direction of blades. • Take measurements. • Select cutting speed. • Operate the machine. • Cut a round metal with a power saw. • Use cooling media • Check imperfections on cut surface • Clean work place, tools and equipment. • Store tools and equipment safely.	Sawing a round metal performed conforms to given technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures used in: - • Cutting a round metal. **Principles:** The student should explain principles of: • Sawing a round metal **Theories:** The student should explain: - • Types of blades and sizes • Types of grinding disc and sizes • Different types of cooling media, and their applications. • Parts of power saw, and their functions • Types of angles. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing round metal sawing • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of round metal • Power saw • Bench vice • Tape measure • PPE's • File • Mark pen	73

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing sawing a flat metal	**Brainstorm:** Guide the students to: define a flat metal, identify the uses of flat metal, safety precautions when sawing a flat metal. **Demonstration:** Demonstrate how to prepare the piece of flat metal to be cut safely. **Practical Activity:** Organize the students to perform sawing flat on a piece of metal as per standards	**The student should be able to:** • Interpret working drawings • Select material to be cut. • Clamp work piece. • Adjust machine. • Select blade teeth • Set the right direction of blades. • Take measurements • Select cutting speed • Operate the machine • Cut a flat metal with a power saw • Use cooling media. • Check imperfections on the cut surface • Clean work place, tools, and equipment. • Store tools and equipment safely	Sawing a flat metal performed conforms to given technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures used in: - • Sawing a flat metal **Principles:** The student should explain principles of: • Sawing a flat metal **Theories:** The student should explain: - • Types of metals • Metal properties **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing sawing a flat metal • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of flat metal • Power saw • Bench vice • Tape measure • PPE's • File • Mark pen	

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<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td>2.4 Performing metal filing</td><td>(a) Performing draw filling.</td><td>Brainstorm:
Guide the students to: define filing, draw filing, and identify: tools used for filing metal, and safety precautions when performing draw filing on a metal.
Demonstration
Demonstrate to students how draw filing is performed correctly
Practical Activity:
Organize the students to perform drawing filing on a piece of metal.</td><td>The student should be able to:
• Interpret working drawings.
• Select a file.
• Select the direction of filing.
• Perform draw filing on a work piece
• Take measurements
• Clean workplace, tools, and equipment
• Store tools and equipment safely</td><td>Draw filling performed conforms to given technical specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used:
The student should explain the procedures of:
• Performing draw filing
Principles: The student should explain principles of:
• Performing draw filing
Theories: The student should explain: -
• Types of files
• Types of file cuts
• Characteristic of materials
• How to remove chips from files
• Filling technique
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while performing draw filing
• Waste disposal
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of work
• File
• Bench vice
• PPE’s</td><td>69</td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing longitudinal filling.	**Discussion:** Guide the students to: briefly explain longitudinal filing, identify: tools used for filing metal, safety precautions while performing longitudinal filing on a metal **Demonstration:** Demonstrate to students how to file a piece of metal safely. **Practical Activity:** Organize the students to perform longitudinal filing of a piece of metal	**The student should be able to:** • Interpret working drawings • Select a file. • Select direction of filing. • Perform longitudinal filing on a work piece • Take measurements • Clean workplace, tools and equipment • Store tools and equipment safely	Longitudinal filling performed conforms to given technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures involved in: - • Performing longitudinal filing **Principles:** The student should explain principles of: • Performing longitudinal filing **Theories:** The student should explain: - • Importance of longitudinal **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing longitudinal filing • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of work • File • Bench vice • PPE's • Hacksaw • Tape measure	

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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(c) Performing cross filling.</td><td>Brainstorm:
Guide the students to: define cross filing, identify: tools used for filing metal, safety precautions performing cross filing on a metal.
Demonstration:
Demonstrate to students how to perform cross filing on a piece of metal correctly
Practical Activity:
Organize the students to perform cross filing of a piece of metal.</td><td>The student should be able to:
• Interpret working drawings.
• Select a file
• Select direction of filing
• Perform cross filing on a work piece
• Take measurements
• Clean workplace, tools and equipment
• Store tools and equipment safely</td><td>Cross filling performed conforms to given technical specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain the principles of:
• Performing cross filing
Principles: The student should explain principles of:
• Performing cross filing
Theories: The student should explain: -
• Importance of cross filing
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while performing cross filing
• Waste disposal
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of flat metal
• Power saw
• Bench vice
• Tape measure
• PPE’s
• File
• Mark pen</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	2.5 Performing Hand drilling	(a) Drilling a hole on a plate.	**Brainstorm:** Guide the students to: define drilling, and identify: the types of drilling bits. **Demonstration:** Demonstrate to students how to prepare tools and drill a hole correctly **Practical Activity:** Organize the students to drill a hole on a piece of plate.	**The student should be able to:** • Interpret working drawings. • Select bits • Select speed and feed • Select type of metal to be drilled. • Clamp work piece • Regulations. • Take measurements • Drill a metal • Check accuracy of drilled holes • Clean machine and tools after work • Keep machine and tools in safe custody	A hole drilled correctly as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: • Drill a hole on a plate by hand **Principles:** The student should explain principles of: • Drilling a hole on a plate **Theories:** The student should explain: - • The drilling procedures • Types hand frill • Explain ferrous and non-ferrous metal **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while drilling a hole on a plate by hand • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of work • Drill machine • Drill bit • Bench vice • Tape measure • PPE’s	61

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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td>2.6 Performing bench drilling</td><td>(a) Drilling hole on a plate.</td><td>Brainstorm:
Guide the students to: define drilling, and identify the types of drilling machines, drill bits.
Demonstration:
Demonstrate to students how to prepare tools and drill a hole correctly
Practical Activity:
Organize the students to drill a hole in a piece of plate</td><td>The student should be able to:
• Interpret working drawings
• Select bits
• Select speed and feed.
• Select the type of metal to be drilled.
• Clamp work piece
• Regulations
• Take measurements
• Drill a metal
• Check the accuracy of drilled holes
• Clean machine and tools after work
• Keep machine and tools in safe custody</td><td>A hole drilled correctly as per specificatio n</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain he procedures of:
• Drilling a hole on a plate by machine
Principles: The student should explain principles of:
• Drilling a hole on a plate by machine
Theories: The student should explain: -
• Factors to consider when selecting suitable metals for drilling
• Parts of bench drilling machine and their functions.
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while drilling a hole on a plate by machine
• Waste disposal
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of work
• Drill machine
• Drill bit
• Bench vice
• Tape measure
• PPE’s</td><td>84</td></tr>
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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(b) Counter sinking a drilled hole.</td><td>Brainstorming:
Guide the students to: define countersinking, and identify the tools used in countersinking
Demonstration:
Demonstrate to students how to countersink a drilled hole safely
Practical Activity:
Organize the students in small groups to perform countersinking on a drilled hole using piece work, tools, and operation sheet.</td><td>The student should be able to:
• Interpret working drawings
• Take measurements.
• Clamp work piece
• Select drilling speed
• Use cooling materials
• Drill work piece
• Perform counter sink.
• Check the accuracy of holes
• Clean machine and tools
• Clean work place
• Keep machine and tools in safe custody</td><td>Countersink on a drilled hole performed as per specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain the procedure of:
• Countersinking a drilled hole
Principles: The student should explain principles of:
• Countersinking a drilled hole
Theories: The student should explain: -
• Safety precautions when using counter sink drill bit.
• The of counter sink hole
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while countersinking a drilled hole
• Waste disposal
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of metal
• Scriber
• Counter sink drill bit
• Centre punch
• Bench vice
• Tape measure
• PPE’s
• Cooling oil
• Drill machine
• Drill bit</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Counter boring a drilled hole.	**Brainstorm:** Guide the students to: define counter boring, and identify the tools used in counter boring. **Demonstration:** Demonstration to students on how to counter boring a drilled hole safely **Individual Practical Activity:** Organize the students individually to perform counter boring on a drilled hole	**The student should be able to:** • Interpret working drawings. • Take measurements. • Clamp work piece. • Select drilling speed • Use cooling materials • Drill work piece. • Perform counter bore • Check accuracy of holes • Clean machine and tools • Clean work place • Keep machine and tools in safe custody	Counter bore on a drilled hole performed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Counter boring a drilled hole **Principles:** The student should explain principles of: • Counter boring a drilled hole **Theories:** The student should explain: - • Safety precautions when using counter bore drill bit. • The of counter bore hole **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while counter boring a drilled hole • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of metal • Scriber • Counter bore bit • Centre punch • Bench vice • Tape measure • PPE's • Cooling oil • Drill machine • Drill bit	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	2.7 Performing manual thread cutting	(a) Tapping a drilled hole.	**Brainstorm:** Guide the students to: define tapping a drilled hole, and identify the importance of tapping a drilled hole, safety precautions when tapping a drilled hole **Demonstration:** Demonstrate to students on how to tape a drilled hole correctly **Individual Practical Activity:** Organize the students individually to make internal threads on a piece of pipe	**The student should be able to:** • Interpret working drawings. • Select materials. • Select tap. • Select drill bits. • Mark work piece. • Clamp work piece • Determine tapping direction • Drill and chamfer the hole • Perform internal threading • Check the accuracy of threads • Clean machine and tools • Clean work place • Store machine and tools in safe custody	Internal threads made correctly as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedure of: • Tapping a drilled hole. **Principles:** The student should explain principles of: • Tapping a drilled hole **Theories:** The student should explain: - • Main parts of taps • Categories of taps • Types of threads • Function of threads. • Calculation of Tap Drill Size (T.D.S **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while tapping a drilled hole • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Tap • Drill bit • Drill machine • Lubricant • Tape measure • PPE’s • File	54

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Die a round bar.	**Brainstorm:** Guide the students to: define a round bar, and identify the importance of threading a round bar. **Demonstration:** Demonstrate how to die a round bar safely **Practical Activity:** Organize the students to perform external threading on a round bar	**The student should be able to:** • Interpret working drawings. • Select materials. • Select die. • Mark work piece. • Clamp work piece • Perform external threading • Check the accuracy of threads • Clean machine and tools • Clean work place • Store machines and tools in safe custody	External threads made perfectly as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to: • Perform die cutting. **Principles:** The student should explain principles of: • Performing die cutting **Theories:** The student should explain: - • Main parts of dies. • Categories of dies. • Explain types of threads **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while die a round bar • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece round bar • Die and die holder • Cutting oil or lubricant • Tape measure • Safety gears	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
3.0 Installing pipes, taps and valves	3.1 Cutting pipes	(a) Performing square cut.	**Brainstorm:** Guide the students to: define pipe, and pipe square cut, determine the application of square cut, and cutting tools, and identify tools used for square cutting. **Demonstration** Demonstrate to students how to maintain cutting tools correctly. **Practical Activity:** Organize the students to perform a square cut on a piece of pipe	**The student should be able to:** • Clamp work piece • Take measurements • Operate the cutting tool/machine • Cut the pipe square • Clean the work area • Store the work piece and tools in a safe place	Square cut performed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing a square cut. **Principles:** The student should explain principles of: • Performing a square cut **Theories:** The student should explain: - • How cutting is performed • Advantages and disadvantages of different cutting tools The uses of oil. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing square cut • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Hacksaw • Lubricant • Wheel cutter • Bench vice • Tape measure • PPE's • Pipe cutter	151

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing external and internal reaming.	**Brainstorm:** Guide the students to: define reaming, and identify factors to consider when performing reaming tasks, and types of pipe reamer. **Demonstration** Demonstration to students how to maintain reaming tools correctly **Practical Activity:** Organize the students to perform external and internal reaming on a piece of pipe	**The student should be able to:** • Clamp work piece. • Take measurements. • Cut the pipe. • Perform reaming • Clean the work area • Store the work piece and tools in a safe place	External and Internal reaming performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • How to perform internal and external reaming. **Principles:** The student should explain principles of: Performing internal and external reaming. **Theories:** The student should explain: - • Advantages of performing the reaming process. The uses of oil **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing reaming • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Hacksaw • Coolant • Pipe reamer • Bench vice • Tape measure • PPE's • Pipe cutter	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Performing thread cutting. (On different materials)	**Brainstorm:** Guide the students to: define thread cutting, describe thread cutting tools, and identify the importance of thread cutting. **Demonstration** Demonstrate to students how to maintain thread cutting tools correctly. **Practical Activity:** Organize the students to perform thread cutting on different pipe materials.	**The student should be able to:** • Clamp work piece • Take measurements • Cut the pipe • Perform pipe threading • Operate the cutting tool/machine. • Clean the work area. • Store the work piece and tools in a safe place	Thread cutting on different materials performed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • How to perform thread cutting. **Principles:** The student should explain principles of: • Performing thread cutting. **Theories:** The student should explain: - • How to assemble and dismantle stocks and dies • Why the stock is slightly pressurized as it first turned to cut threads **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while performing thread cutting • Waste disposal • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Hacksaw • Lubricant • Die • Bench vice • Tape measure • PPE’s • Pipe cutter	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.2 Bending pipes	(a) Constructing square bend.	**Brainstorm:** Guide the students to: define square bend, describe methods of performing square bend, and identify the importance of square bend. **Demonstration** Demonstrate to students how to set and handle the bending machine **Practical Activity:** Organize the students to construct square bends on steel pipe	**The student should be able to:** • Interpret working drawings • Prepare sketch pattern • Prepare template • Prepare work pieces. • Construct square bending • Clean the work area and store tools in safe place • Store piecework.	Square bend constructed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedure of: • Constructing square bend **Principles:** The student should explain principles of: • Constructing square bend **Theories:** The student should explain: - • Different ways of performing square bend. • Types of bending machine and their main parts. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while constructing square bend • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Chalk • Pipe cutter • Hydraulic bending machine • Spring • Tape measure • PPE's	141

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Constructing offset bend.	**Brainstorm:** Guide the students to: define offset bend, describe methods of performing offset bend, and identify the importance of offset bend. **Demonstration** Demonstration to students how to construct offset bend correctly **Practical Activity:** Organize the students to construct offset bends on steel pipe	**The student should be able to:** • Interpret working drawings • Prepare sketches pattern. Prepare template • Prepare work pieces • Construct offset bending. • Clean the work area and store tools in a safe place • Store piecework	offset bend constructed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Constructing offset bend **Principles:** The student should explain principles of: • Constructing offset bend **Theories:** The student should explain: - • Different ways of performing offset bend. • Uses of offset bends **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while constructing offset bend • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Chalk • Pipe cutter • Hydraulic bending machine • Spring • Tape measure • PPE's	

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<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(c) Constructing saddle bend.</td><td>Brainstorm:
Guide the students to: define saddle bend, describe methods of performing saddle bend, and identify the importance of saddle bend.
Demonstration
Demonstration to students on how to construct saddle bend correctly
Practical Activity:
Organize the students to construct saddle bend on steel pipe</td><td>The student should be able to:
• Interpret working drawings.
• Prepare sketch pattern
• Prepare template
• Prepare work pieces
• Construct saddle bending
• Clean the work area and store tools in a safe place
• Store piecework</td><td>Saddle bend constructed as per specificatio n</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain:
• Constructing saddle bend
Principles: The student should explain principles of:
• Constructing saddle bend
Theories: The student should explain: -
• Different ways of performing saddle bend.
• Uses of saddle bends
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while constructing saddle bend
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of pipe
• Chalk
• Pipe cutter
• Hydraulic bending machine
• Spring
• Tape measure
• PPE’s</td><td></td></tr>
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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(d) Constructing “U” bend.</td><td>Brainstorm:
Guide the students to: define “U” bend, describe methods of performing “U” bend, and identify the importance of “U” bend.
Demonstration
Demonstration to the students on how to construct “U” bend correctly
Practical Activity:
Organize the students to construct “U” bend on a steel pipe</td><td>The student should be able to:
• Interpret working drawings.
• Prepare sketches pattern.
• Prepare template
• Prepare work pieces
• Construct “U” bending.
• Clean the work area and store tools in a safe place
• Store piecework</td><td>“U” bend constructed as per specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain:
• Constructing ‘U’ bend
Principles: The student should explain principles of:
• Constructing “U” bend
Theories: The student should explain: -
• Different ways of performing “U” bend.
• Uses of “U” bends.
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while constructing ‘U’ bend
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of pipe
• Chalk
• Pipe cutter
• Hydraulic bending machine
• Spring
• Tape measure
• PPE’s</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Constructing expansion bend.	**Brainstorm:** Guide the students to: define expansion bend, describe methods of performing expansion bend, and identify the importance of expansion bend. **Demonstration** Demonstration to students how to construct expansion bend correctly **Practical Activity:** Organize the students to construct expansion bend on steel pipe	**The student should be able to:** • Interpret working drawing • Prepare sketches pattern. • Prepare template • Prepare work pieces. • Construct expansion bending. • Clean the work area and store tools in safe place • Store piecework	Expansion bend constructed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Constructing expansion bend **Principles:** The student should explain principles of: • Constructing expansion bend **Theories:** The student should explain: - • Different ways of performing expansion bend. • Uses of expansion bends. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while constructing expansion bend • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • A piece of pipe • Chalk • Pipe cutter • Hydraulic bending machine • Spring • Tape measure • PPE’s	

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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(f) Constructing obtuse bend.</td><td>Brainstorm:
Guide the students to: define obtuse bend, describe methods of performing obtuse bend, and identify the importance of obtuse bend
Demonstration
Demonstrate to students how to construct obtuse bend correctly
Practical Activity:
Organize the students to construct obtuse bend on steel pipe</td><td>The student should be able to:
• Interpret working drawings.
• Prepare sketches pattern
• Prepare template.
• Prepare work pieces.
• Construct obtuse bending
• Clean the work area and store tools in a safe place
• Store piecework</td><td>Obtuse bend constructed as per specificatio n</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain:
• Constructing obtuse bend
Principles: The student should explain principles of:
• Constructing obtuse bend
Theories: The student should explain: -
• Different ways of performing obtuse bend
• Uses of obtuse bends
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while constructing obtuse bend
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• A piece of pipe
• Chalk
• Pipe cutter
• Hydraulic bending machine
• Spring
• Tape measure
• PPE’s</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.3 Installing taps and valves	(a) Fixing screw down taps	**Brainstorm:** Guide the students to: define screw down taps, explain types of quick closing tap, and identify tools required to fix quick closing taps, and common defects in working with quick closing tap. **Demonstration** Demonstration to students on how to install a quick closing tap effectively **Practical Activity:** Organize the students in manageable groups to install a quick closing tap	**The student should be able to:** • Identify proper tools for specific job. • Select the screw down taps • Install the screw down taps to proper location • Identify the defects of screw down taps • Service screw down taps • Clean tools and store them in a safe place	Screw down taps fixed conforms to given standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedure of fixing screw don taps **Principles:** The student should explain principles of fixing screw down taps **Theories:** The student should explain: - • Types of screw down taps. • Difference between taps and valves • How water hammer is caused and prevented • Working principles of screw down taps. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing screw down taps • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Screw down tap • Adjustable wrench/pliers • Screw driver • Thread tape • Sealant • PPE's	148

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Fixing quick closing taps	**Brainstorm:** Guide the students to: define quick closing taps, explain types of quick closing taps, and identify tools required to fix quick closing taps, and common defects in working with quick closing taps. **Demonstration** Demonstration to students on how to install screw down tap effectively **Practical Activity:** Organize the students in manageable groups to install screw down taps in plumbing appliances	**The student should be able to:** • Identify proper tools for a specific job • Select the quick closing taps. • Install the quick closing taps to the proper location • Identify the defects of quick closing taps • Service quick closing taps • Clean tools and store them in a safe place	Quick closing taps fixed as per specification.	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of fixing quick closing taps **Principles:** The student should explain the principles of: • Fixing quick closing taps **Theories:** The student should explain: - • Difference between quick closing taps and screw down taps • Why quick closing taps never fitted to high-pressure supply • Working principles of quick closing taps **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing quick closing taps • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Quick closing tap • Adjustable wrench/pliers • Screw driver • Thread tape • Sealant • PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Fixing valve	**Brainstorm:** Guide the students to: define valves, and identify the components of valves, the types of valves, and the uses of valves. **Demonstration** Demonstrate to the students how to install valves effectively **Practical Activity:** Organize the students in manageable groups to fix and repair valves in a pipeline system	**The student should be able to:** • Identify proper tools for specific jobs. • Select the appropriate valves • Install the valves at the proper location. • Identify the defects of valves. • Service valves • Clean tools and store in a safe place	Valves fixed as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of fixing valves **Principles:** The student should explain principles of: • Fixing valves **Theories:** The student should explain: - • Types of valves. • Types of tools used to install and repair valve • Symbols presenting valves • Working principles of valves. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing valves • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Water valve • Adjustable wrench/pliers • Screw driver • Thread tape • Sealant • PPE’s	

<table>
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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(d) Fixing float valve</td><td>Brainstorm:
Guide the students to: define float valves, and identify the application of float valves, the components of float valves, and types of float valves.
Demonstration
Demonstrate to students how to install ball valve effectively
Practical Activity:
Organize the students in manageable groups to fix and repair float valves in a storage tank</td><td>The student should be able to:
• Identify proper tools for fixing float valves.
• Select the float/ball valve
• Install the ball valve to the proper location
• Identify the defects of the ball/float valve
• Service ball/float valve
• Clean tools and store them in a safe place</td><td>Float valve fixed as per specificatio n</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain the procedures of fixing float valve
Principles: The student should explain principles of:
• Fixing float valve
Theories: The student should explain: -
• Working principles of ball valves.
• Types of tools used to install and repair float valve
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while fixing float valves
• Environment requirements
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Ball/float valve
• Storage tank
• Adjustable wrench/pliers
• Screw driver
• Thread tape
• Sealant
• PPE’s</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
4.0 Installing water supply systems	4.1 Performing pipe joining	(a) Joining different types of plastic pipes	**Brainstorm:** Guide the students to: define plastic pipe, and identify importance of plastic pipe, tools used for joining plastic pipes. **Demonstration** Demonstrate to students how to join plastic pipe correctly **Practical Activity:** Organize the students in manageable groups to perform plastic pipe joining by using different methods.	**The student should be able to:** • Interpret working drawings • Select plastic pipe. • Take measurements • Cut plastic pipe. • Clamp the work piece on a pipe vice • Perform joining on plastic pipe • Clean the work area and work piece • Store the tools and work piece at a safe place	Plastic pipes joined in different methods as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of joining plastic pipes. **Principles:** The student should explain principles of: • Joining plastic pipes **Theories:** The student should explain: - • Different procedures of joining plastic pipes • Types of plastic pipe **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while joining plastic pipe. • Environment requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Plastic pipe • Threaded plastic fitting • Butt fusion machine • Alignment tools • Cleaning tools (scraper • Pipe cutter • Measuring tape • Temperature sensor • PPE’s	57

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Joining steel pipes	**Brainstorm:** Guide the students to: define steel pipes, and identify types of steel pipes, the importance of using steel pipes, **Demonstration** Demonstrate to the students how to join steel pipe correctly **Practical Activity:** Organize the students in manageable groups to perform steel pipe joining by using different methods.	**The student should be able to:** • Interpret working drawings • Select steel pipe • Take measurements • Cut steel pipe • Clamp the work piece on a pipe vice. • Perform joining on steel pipe • Clean the work area and work piece • Store the tools and work piece at a safe place	Steel pipes joined as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of joining steel pipes. **Principles:** The student should explain principles of: • Joining steel pipes **Theories:** The student should explain: - • Different procedures of joining steel pipes. • Joints used on steel pipes. • The differences between soldering and welding. • The difference between capillary joints and screwed joints. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while joining steel pipes. • Environment requirements • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Steel pipe • Welding machine • Wrench pipe • Thread seal tape • Filler rod • Brazing machine • Cleaning tools (scraper • Measuring tape • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Joining copper pipes	**Brainstorm:** Guide the students to: define copper tubes/pipes, and identify the importance of using copper pipes, and tools used to join copper pipes **Demonstration** Demonstrate to students how to join copper pipe correctly **Practical Activity:** Organize the students in manageable groups to perform copper pipe joining by using different methods	**The student should be able to:** • Interpret working drawings. • Select copper tubes • Take measurements • Cut copper pipe • Clamp the work piece on a pipe vice • Perform joining on copper tubes • Clean the work area and work piece • Store the tools and work piece at a safe place	Copper pipes joined as per specificatio n	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of joining copper pipes. **Principles:** The student should explain principles of: • Joining copper pipes **Theories:** The student should explain: - • Different procedures of joining copper pipes. • Types of joints used on copper tubes. • The uses of flux when soldering • Types of solders • Methods used to join copper pipes **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while joining copper pipes • Environment requirements • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Copper tubes • Crimping tool • Deburring tool • Flux • Solder • Propane torch • Alignment tools • Brazing torch • Brazing rod • Pipe cutter • Measuring tape • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	4.2 Installing cold water supply to building	(a) Installing and repairing direct cold-water supply systems	**Discussion:** Guide the students to: discuss direct cold-water supply, and identify direct cold water system components, **Demonstration** Demonstrate to students how to install and repair direct cold water supply systems correctly **Practical Activity:** Organize the students in manageable groups to calculate the costs of installing a cold-water supply system.	**The student should be able to:** • Interpret working drawings. • Take measurements. • Select materials. • Hacking the wall. • Make a good disturbed area. • Perform joining pipes • Perform pipe installation for cold water • Clean the work area. • Clean tools • Store tools	Direct cold-water systems installed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing direct cold-water supply systems. **Principles:** The student should explain the principles of: • Installing direct cold-water supply **systems** **Theories:** The student should explain: - • Advantages and disadvantages of the system • Tools used **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing direct cold-water supply systems • Environment requirements • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Stock and die • Pipe vice • Pipe wrench • Cold chisel • Sprit level • Hacksaw • Ball pain hammer • Pipe cutter • Tape measure • Thread seal tape • PPE's	145

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and repairing indirect cold water supply system	**Discussion:** Guide the students to: define indirect cold-water supply system, and storage tank and identify indirect cold water system components. **Demonstration** Demonstrate to students how to install and repair indirect cold water supply systems correctly **Practical Activity:** Organize the students in manageable groups to repair the indirect cold water supply system in school premises	**The student should be able to:** • Interpret working drawings • Take measurements • Select materials. • Hacking the wall. • Make a good disturbed area • Perform joining pipes • Perform pipe installation • Clean the work area • Clean tools • Store tools	Indirect cold-water system installed and repaired as per the specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing indirect cold-water supply system. **Principles:** The student should explain principles of installing indirect cold-water supply systems **Theories:** The student should explain: - • The merits and limitations of systems • The advantages of using plastic pipes as compared to steel pipes **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing indirect cold-water supply system • Environment requirements • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Stock and die • Pipe vice • Pipe wrench • Cold chisel • Storage tank • Ball valve • Sprit level • Hacksaw • Ball pain hammer • Pipe cutter • Tape measure • Thread seal tape • PPE’s	

Form Two

Table 4: *Detailed Contents for Form Two*

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
1.0 Domestic water supply systems	1.1 Installing irrigation system	(a) Install and maintain sprinkler irrigation system.	**Brainstorm:** Guide the students to: define sprinkler, and irrigation system, and identify tools, advantages and disadvantages of sprinkler irrigation systems **Demonstration** Demonstrate how to install the sprinkler irrigation system correctly. **Practical Activity:** Organize the students in manageable groups to install/repair a simple sprinkler irrigation system in school farms.	**The student should be able to:** • Interpret working drawing • Take measurements • Select materials • Perform joining pipes • Construct a simple sprinkler irrigation system using • Clean the work area • Clean tools • Store tools	Sprinkler irrigation system installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing sprinkler irrigation. **Principles:** The student should explain principles of: • Installing sprinkler irrigation **Theories:** The student should explain: - • The different types of irrigation system • The advantages of using sprinklers as compared to a dripping system **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing sprinkler irrigation • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Sprinkler • Water valves • Stock and die • Pipe vice • Pipe wrench • Storage tank • Ball valve • Hacksaw • Tape measure • Thread seal tape • PPE's	69

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Install and maintain dripping irrigation system.	**Brainstorm:** Guide the students to: define the dripping irrigation system, and identify the advantages and disadvantages in dripping irrigation system **Demonstration** Demonstrate to the students how to install the dripping irrigation system correctly **Practical Activity:** Organize the students in manageable groups to install/repair a simple dripping irrigation system in school farms	**The student should be able to:** • Interpret working drawing • Take measurements • Select materials • Dripper spacing • Perform joining pipes • Construct a simple dripping irrigation system • Clean the work area • Clean tools • Store tools	Dripping irrigation system installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: The student should explain: **Method used:** The student should explain the procedures of installing dripping irrigation. **Principles:** The student should explain the principles of: • Installing dripping irrigation **Theories:** The student should explain: - • The merits and limitations of dripping irrigation systems • Application of dripping system. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing dripping irrigation. • Environment requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Pipes • Sprinkler • Water valves • Stock and die • Pipe vice • Pipe wrench • Storage tank • Ball valve • Hacksaw • Tape measure • Thread seal tape • PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Install and maintain furrow surface Irrigation system	**Brainstorm:** Guide the students to: define the furrow surface irrigation system, and identify the advantages and disadvantages of using furrow surface irrigation system, and apply of furrow surface irrigation system **Demonstration** Demonstrate to the students how to install the furrow surface irrigation system correctly **Practical Activity:** Organize the students in manageable groups to install/repair a simple furrow surface irrigation system in school farms	**The student should be able to:** • Interpret working drawings • Take measurements • Select materials • Perform joining pipes • Construct a simple furrow surface irrigation system • Clean the work area • Clean tools • Store tools	Furrow surface irrigation system installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing furrow surface irrigation. **Principles:** The student should explain the principles of: • Installing furrow surface irrigation **Theories:** The student should explain: - • The merits and limitations of furrow surface irrigation systems • Application of furrow surface system. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing furrow surface irrigation • Environment requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Pipes • Sprinkler • Water valves • Stock and die • Pipe vice • Pipe wrench • Storage tank • Ball valve • Hacksaw • Tape measure • Thread seal tape • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.2 Installing, servicing and repairing hot water supply system	(a) Install and repair direct hot water supply.	**Brainstorm:** Guide the students to: define direct hot water supply, and identify components of direct hot water supply system, advantages and disadvantages of the system, **Demonstration** Demonstrate to students how to install a direct hot water supply system correctly **Group Practical Activity:** Organize the students in manageable groups to service and repair direct hot water supply systems on school premises	**The student should be able to:** • Interpret working drawings. • Take measurements. • Install boilers electric heaters, cylinders, and tanks. • Install hot water supply pipes • Install cold-water storage tanks • Clean the work area • Store the tools in a safe place	Direct hot water supply system installed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing a direct hot water supply **Principles:** The student should explain the principles of: • Installing a direct hot water supply **Theories:** The student should explain: - • Fixing primary circulation • Types of valves for hot water system. • Importance of vent. • The causes of airlock, and boiler noises and how to prevent **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing direct hot water supply • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Stock and die • Boiler/heaters • Pipe vice • Storage tank • Pipe wrench • Cold chisel • Sprit level • Hacksaw • Ball pain hammer • Pipe cutter • Tape measure • Thread seal tape • PPE’s	138

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Install and repair indirect hot water supply.	**Brainstorm:** Guide the students to: define indirect hot water supply system, and storage, and identify components of indirect hot-water supply, **Demonstration** Demonstrate to the students how to install an indirect hot water supply system correctly **Practical Activity:** Organize the students in manageable groups to service and repair indirect hot water supply systems on school premises	**The student should be able to:** • Interpret working drawings. • Take measurements. • Install boilers electric heaters, cylinders, and tanks. • Install hot water supply pipes • Install hot water supply tank • Install cold-water storage tanks • Clean the work area • Store the tools in a safe place	The indirect hot water supply system was installed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing indirect hot water supply **Principles:** The student should explain principles of: • Installing indirect hot water supply **Theories:** The student should explain: - • Advantages and disadvantages of the system, • Faults of the system **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing indirect hot water supply • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Stock and die • Boiler/heaters • Pipe vice • Storage tank • Pipe wrench • Cold chisel • Sprit level • Hacksaw • Ball pain hammer • Pipe cutter • Tape measure • Thread seal tape • PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Install and repair hot water storage tank.	**Brainstorm:** Guide the students to: Explain the function of the storage hot water tank and safety precautions **Demonstration** Demonstrate students how to install hot water storage tank correctly **Practical Activity:** Organize the students in manageable groups to install a hot water storage tank on the school premises	**The student should be able to:** • Interpret working drawings. • Take measurements. • Install hot water storage tank • Clean the work area. • Store the tools in a safe place	The hot water storage tank installed and repaired as per the specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing a hot water storage tank **Principles:** The student should explain the principles of: • Installing a hot water storage tank **Theories:** The student should explain: - • Different ways of fixing storage tanks. • Calculate the storage capacity of tanks **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing a hot water storage tank • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Ladder • Storage tank • Pipe wrench • Sprit level • Tape measure • Mark pen • Hammer • Related PPEs	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Install and repair electrical heaters.	**Brainstorm:** Guide the students to: Define the electrical heater and explain parts of the water heater, and safety precautions. **Demonstration** Demonstrate to students how to install electrical water heater correctly **Group Practical Activity:** Organize the students in manageable groups to install electrical water heater in school premises	**The student should be able to:** • Interpret working drawings. • Take measurements. • Install electric heaters. • Clean the work area • Store the tools in a safe place	Electrical heaters installed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: The student should explain the procedures of installing electrical heater **Principles:** The student should explain principles of: • Installing electrical heater **Theories:** The student should explain: - • Different ways of fixing electrical heaters • Different Types of electrical heater • Calculation of heat rates **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing electrical heaters • Environmental requirement	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Ladder • Electrical heater • Pipe wrench • Sprit level • Tape measure • Mark pen • Hammer • Related PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Install and repair solar water heater system	**Brainstorm:** Guide the students to: Define solar water heaters and explain parts of solar water heaters, and safety precautions. **Demonstration** Demonstrate to students on how to install solar water heaters correctly **Group Practical Activity:** Organize the students in manageable groups to install solar water heaters in school premises	**The student should be able to:** • Interpret working drawings. • Take measurements. • Install solar heater/panel • Connect cold water to the solar heater/panel • Install cold and hot water storage tanks. • Clean the work area • Store the tools in a safe place	Solar water heater system installed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Installing solar water heater **Principles:** The student should explain principles of: • Installing solar water heater. **Theories:** The student should explain: - • Different ways of fixing solar heaters. • Different types of solar heater • Calculation of heat rates **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing a solar water heater • Waste disposal • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Ladder • Solar water heater • Solar water heater fixing toolbox • Sprit level • Tape measure • Mark pen • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(f) Install and repair Gas heaters	**Brainstorm:** Guide the students to: Define gas heater and explain safety precautions when working with gas heaters. **Demonstration** Demonstrate to students how to install gas heaters correctly **Group Practical Activity:** Organize the students in manageable groups to install gas heaters on school premises.	**The student should be able to:** • Interpret working drawings • Take measurements. • Install gas heater. • Clean the work area • Store the tools in a safe place	Gas heater was installed and repaired as per the specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedure of: Installing gas heater **Principles:** The student should explain the principles of: • Installing gas heater. **Theories:** The student should explain: - • Different ways of fixing gas heaters • Different types of gas heater • Calculation of heat rates **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while installing gas heater • Waste disposal • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Ladder • Gas heater • Sprit level • Tape measure • Mark pen • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
2.0 Installing sanitary appliances	2.1 Installing and repairing waste appliances	(a) Fixing and repairing hand washbasin.	**Brainstorm:** Guide the students to: Define sanitary appliances, hand washbasins, and identify: the types of hand wash basins, materials for manufacture, and tools for installation **Demonstration** Demonstrate to students how to install hand washbasin correctly **Practical Activity:** Organize the students in manageable groups to install/repair hand washbasins in school infrastructures	**The student should be able to:** • Interpret working drawings • Take measurements. • Drilling. • Install hand washbasin. • Repair and service hand washbasin. • Clean tools and workplace • Store tools and equipment • Fixing brackets • Connecting waste pipe • Connecting water to hand washbasin	Hand washbasin fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of performing installation, servicing and repairing hand washbasin. **Principles:** The student should explain the principles of: • Fixing and repair hand washbasin. ` **Theories:** The student should explain: - • Position of installation hand washbasin **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing hand wash basin • Waste disposal • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Hand wash basin • Silicone caulk • Sprit level • Brackets • Mark pen/chalk • Basin wrench • Basin screw • Adjustable wrench • Drill machine • Hacksaw • Tape measure • Screw driver • Related PPE's	138

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Fixing and repairing bathtub	**Brainstorm:** Guide the students to: Define bathtub, and identify: types of bathtubs, materials for manufacture, and tools for installation. **Demonstration** Demonstrate to students how to install bathtub correctly. **Practical Activity:** Organize the students in manageable groups to install/repair bathtub in school bathrooms	**The student should be able to:** • Interpret working drawings. • Take measurements. • Drilling. • Install bathtub • Repair and service bathtub. • Clean tools and workplace • Store tools and equipment. • Connecting waste pipe • Connecting water to bathtub	Bathtub fixed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of performing installation, servicing and repairing bathtub. **Principles:** The student should explain principles of: • Installing bath tube • Drilling a floor **Theories:** The student should explain: - • Position of installing bathtub • Advantages and disadvantages of bath tub • The use of Sauna bath (Steam bathing) **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing bathtub • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Bathtub • Silicone caulk • Bathtub skirt/apron • Pliers • Knife • Sprit level • Brackets • Mark pen/chalk • Adjustable wrench • Drill machine • Hacksaw • Faucet • Tape measure • Screw driver • Related PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Fixing and repairing traps	**Brainstorm:** Guide the students to: Define traps, and water seal, and identify: the types of traps, function of traps, causes of water seal loss in traps, materials for manufacture, and tools for installation. **Practical work:** Guide the student on how to install the trap correctly. **Practical Activity:** Organize the students in manageable groups to install/repair traps in school sanitary appliances.	**The student should be able to:** • Interpret working drawings • Take measurements • Install trap • Repair and service traps. • Clean tools and workplace • Store tools and equipment. • Connect waste appliance	Traps fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of performing installation, servicing and repairing traps. **Principles:** The student should explain the principles of: • Installing traps. **Theories:** The student should explain: - • Position of installation of traps. • How trap seals are broken • Types of traps and their Importance • Maintaining a trap seals • Types of resealing trap **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing traps • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Traps • Plumbing tape • Sprit level • Mark pen/chalk • Adjustable wrench • Hacksaw • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Fixing and repairing sink	**Brainstorm:** Guide the students to: Define sink, kitchen sink, and identify types of sinks, materials for manufacture, and tools for installing. **Practical work:** Guide the students on how to install the kitchen sink correctly **Practical Activity:** Organize the students in manageable groups to install/repair the kitchen sink in the school kitchen.	**The student should be able to:** • Interpret working drawings • Take measurements • Drilling • Install kitchen sink. • Repair and service kitchen sink • Clean tools and workplace. • Store tools and equipment • Fixing brackets • Connecting waste pipe • Connecting water to kitchen sink	The kitchen sinks fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of performing installation, servicing and repairing the kitchen sink. **Principles:** The student should explain the principles of: • Installing kitchen sink. **Theories:** The student should explain: - • Position of installation of kitchen sink **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing sink • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Kitchen sink • Sprit level • Brackets • Mark pen/chalk • Adjustable wrench • Drill machine • Hacksaw • Faucet • Centre punch • Basin screw • Tape measure • Screw driver • Related PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Fixing and repairing bidets	**Brainstorm:** Guide the students to: Define bidets, and identify: types of bidets, materials for manufacture, and tools for installation. **Practical work:** Guide the students on how to install bidets correctly. **Practical Activity:** Organize the students in manageable groups to install/repair bidets in school toilets for girls.	**The student should be able to:** • Interpret working drawings. • Take measurements. • Drilling • Install bidets • Install related trap. • Repair and service bidets. • Clean tools and workplace • Store tools and equipment. • Connecting waste pipe • Connecting water to bidets	Bidets fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of performing installation, servicing and repairing bidets. **Principles:** The student should explain principles of: • Installing bidets. **Theories:** The student should explain: - • Position of installing bidets. **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing bidets • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Bidets • Sprit level • Mark pen/chalk • Adjustable spanner • Drill machine • Concrete bit • Hacksaw • Centre punch • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(f) Fixing and repairing drinking fountain	**Brainstorm:** Guide the students to: Define drinking fountain, and identify: components of drinking fountain, types of drinking fountain, materials for manufacture, and tools for installing, and location for installing **Demonstration** Demonstrate to students how to install drinking fountain correctly. **Practical Activity:** Organize the students in manageable groups to install drinking fountain in school premises	**The student should be able to:** • Interpret working drawing • Take measurements. • Drilling • Install drinking fountain. • Repair and service drinking fountain • Clean tools and workplace • Store tools and equipment • Connecting waste pipe • Connecting water to drinking fountain	Drinking fountain fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of performing installation, servicing and repairing drinking fountain. **Principles:** The student should explain principles of: • Installing drinking fountain. **Theories:** The student should explain: - • Fixing standard measurements of drinking fountain • Different designs of drinking fountain • Materials manufacturing drinking fountain **Circumstantial knowledge** Detailed knowledge about: • Safety precautions while fixing drinking fountain • Environment requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Drinking fountain • Fittings • Sprit level • Adjustable wrench • Drill machine • Drill bit • Hacksaw • Pipe cutter • Tape measure • Screw driver • Related PPE's	

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<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td>2.2 Installing and repairing soil appliances</td><td>(a) Fixing and repairing water closet pans</td><td>Brainstorm:
Guide the students to: Define water closet, and identify: types of water closet, function requirement of water closet, materials for manufacture, and tools for installing.
Demonstration
Demonstrate to student on how to fix and repair WC’s correctly
Practical Activity:
Organize the students in manageable groups to fix/repair water closet pans in school toilets.</td><td>The student should be able to:
• Interpret working drawings
• Take measurements
• Install traps
• Install water closet pan
• Detect any defects
• Connecting soil pipe
• Connecting water to W.</td><td>Water closet pans fixed and repaired as per specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used:
The student should explain different procedures of fixing and repair water closet pans.
Principles: The student should explain principles of:
• Installing the water closet pans.
Theories: The student should explain: -
• Repair of water closet
• Types of Water closet
• Manufacturing materials
Circumstantial knowledge
Detailed knowledge about:
• Safety precautions while fixing water closet
• Environment requirements</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Water closet pan
• Trap (P or S)
• Sprit level
• Mark pen/chalk
• Adjustable spanner
• Drill machine
• Concrete bit
• Hacksaw
• Tape measure
• Screw driver
• Related PPE’s</td><td>115</td></tr>
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Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Fixing and repairing flushing cisterns	**Brainstorm:** Guide the students to: Define Flushing cistern, and identify: types of flushing cistern, function requirement of flushing cistern, materials for manufacture, and tools for installing. **Demonstration** Demonstrate to students how to fix and repair flushing cistern correctly. **Practical Activity:** Organize the students in manageable groups to fix/repair flushing cistern in school toilets.	**The student should be able to:** • Interpret working drawings • Drilling • Take measurements. • Installing flushing cisterns • Detect any defects • Connecting soil pipe • Connecting water to flushing cistern	Flushing cisterns fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures of fixing and repair flushing cisterns. **Principles:** The student should explain principles of: • Installing the flushing cistern **Theories:** The student should explain: - • Position of installation flushing cistern. • Fixing standard measurements of flushing cistern Materials manufacturing water closet. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing flushing cistern • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Flushing cistern • Sprit level • Mark pen/chalk • Adjustable spanner • Wall screw • Drill machine • Concrete bit • Hacksaw • Tape measure • Screw driver • Related PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Fixing and repairing urinals	**Brainstorm:** Guide the students to: Define urinals, and identify: types of urinals, uses of urinals, materials for manufacture, and tools for installing. **Demonstration** Demonstrate to students on how to fix and repair urinals correctly **Practical Activity:** Organize the students in manageable groups to fix/repair urinals in school toilets	**The student should be able to:** • Interpret working drawings • Drilling • Take measurements. • Install traps • Install urinals • Detect any defects. • Connecting soil pipe • Connecting water to urinals	Urinals fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures of fixing and repair urinals. **Principles:** The student should explain principles of: • Installing the urinals. **Theories:** The student should explain: - • Position of installing urinals • Types of urinals • Fixing standard measurements of urinals. • Materials manufacturing urinals. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing urinals • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Urinal • Trap (P or S) • Sprit level • Mark pen/chalk • Adjustable spanner • Drill machine • Concrete bit • Hacksaw • Tape measure • Screw driver • Related PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Fixing and repairing flush valve	**Brainstorm:** Guide the students to: Define flush valve, and identify: types of flush valve, function requirement of flush valve, materials for manufacture, and tools for installing. **Demonstration** Demonstrate to students how to fix and repair flush valve correctly **Practical Activity:** Organize the students in manageable groups to fix/repair water flush valve in school toilets.	**The student should be able to:** • Interpret working drawings • Drilling • Take measurements. • Install flush valve. • Detect any defects. • Connecting water to appliances	Flush valve fixed and repaired as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures of fixing and repair flush valve. **Principles:** The student should explain principles of: • Installing the flush valve. **Theories:** The student should explain: - • Position of installing flush valve • Types of flash valve • Fixing standard measurements of flush valve • Materials for manufacturing flush valve **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing flush valve. • Environmental requirements	This element can be achieved at school workshop and the following material, tools and, equipment are to be available: • Flush valve • Sprit level • Mark pen/chalk • Adjustable spanner • Wall screw • Drill machine • Concrete bit • Hacksaw • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Fixing and repairing spray pipes	**Brainstorm:** Guide the students to: Define spray pipe, and identify: types of spray pipe, function requirement of spray pipe, materials for manufacture, and tools for installing. **Demonstration** Demonstrate to students how to fix and repair spray pipes correctly. **Practical Activity:** Organize the students in manageable groups to fix/repair spray pipes in school plumbing infrastructures	**The student should be able to:** • Interpret working drawings • Take measurements. • Install spray pipes • Detect any defects • Connecting water to spray pipes	Spray pipes fixed and repaired as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain different procedures of fixing and repair spray pipes. **Principles:** The student should explain principles of: • Installing the spray pipe **Theories:** The student should explain: - • Position of installing spray pipes • Types of spray pipes **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing spray pipe • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Spray pipe • Sprit level • Mark pen/chalk • Adjustable spanner • Wall screw • Drill machine • Concrete bit • Hacksaw • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
3.0 Installing sanitary pipe work systems	3.1 Installing and maintaining above ground drainage system	(a) Installing and maintaining two pipe systems.	**Brainstorm:** Guide the students to: Define two pipe systems, and identify: sanitary fixtures of two pipe drainage system, Pipe size and materials for two pipe drainage systems **Demonstration** Demonstrate to students on how to install two-pipe drainage system safely. **Practical Activity:** Organize the students in manageable groups to install/maintain two-pipe system in school drainage infrastructures.	**The student should be able to:** • Interpret working drawing layout. • Take measurements. • Install, service, and repair the above two pipe system • Join soil and waste stocks • Join trap ventilation • Perform drainage testing • Store tools and equipment in a safe place	Two-pipe system installed and maintained as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to install and maintain two pipe system. **Principles:** The student should explain the principles of: • Installing two pipes system. **Theories:** The student should explain: - • Importance of two-pipe system • Cleansing velocity. • Different methods of cleaning a blocked two-pipe system • Explain how to maintain two-pipe system **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining two-pipe system • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Clamps • Sprit level • Mark pen/chalk • Adjustable wrench • Hacksaw • Tape measure • Screw driver • Related PPE’s	69

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and maintaining single stack system	**Brainstorm:** Guide the students to: Define single stack system, and identify Pipe size and materials for single stack drainage system **Demonstration** Demonstrate to students how to install single stack drainage system safely. **Practical Activity:** Organize the students in manageable groups to install/maintain single stack system in school drainage infrastructures.	**The student should be able to:** • Interpret the working drawing layout • Take measurements. • Install, service and repair the above single stack system. • Join soil and waste stocks • Join trap ventilation • Perform drainage testing • Store tools and equipment in a safe place	Single stack system installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to install and maintain single stack system. **Principles:** The student should explain principles of: • Installing single stack system. **Theories:** The student should explain: - • Importance of single stack system. • Tools used for installation **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining single stack system. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes • Clamps • Sprit level • Mark pen/chalk • Adjustable wrench • Hacksaw • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Installing and maintaining one pipe system	**Brainstorm:** Guide the students to: Define one pipe system, and identify Pipe size and materials for one pipe drainage system. **Demonstration** Demonstrate to students on how to install one pipe drainage system safely **Practical Activity:** Organize the students in manageable groups to install/maintain one pipe system in school drainage infrastructures	**The student should be able to:** • Interpret working drawing layout. • Take measurements • Install, service, and repair the above one pipe system. • Join soil and waste stocks • Join trap ventilation • Perform drainage testing • Store tools and equipment in a safe place	One pipe system was installed and maintained as per the specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to install and maintain one pipe system. **Principles:** The student should explain the principles of: • Installing one pipe system **Theories:** The student should explain: - • Importance of one pipe system. • Tools used for installation **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining one pipe system. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipe • Clamps • Sprit level • Mark pen/chalk • Adjustable wrench • Hacksaw • Tape measure • Screw driver • Related PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.2 Installing and maintaining underground drainage system	(a) Installing and maintaining separate systems.	**Brainstorm:** Guide the students to: Define separate system, and identify features of separate system, advantages & disadvantages of the system, factors to be considered when installing the system. Pipe size and materials for a separate system. **Demonstration** Demonstrate to students how to install separate systems safely. **Practical Activity:** Organize the students in manageable groups to install/maintain separate systems in school drainage infrastructures	**The student should be able to:** • Interpret working drawings • Identify tools • Select materials • Determine drain fall. • Lay drain • Perform drain test • Backfill the trench • Connect pipes to sewerage disposal • Clean the work place • Clean tool and store in a safe place	Separate system installed and maintained as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to install and maintain separate system. **Principles:** The student should explain principles of: • Installing separate system. **Theories:** The student should explain: - • The importance of drain ventilation. • Properties of a good separate drainage system **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining separate system. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (cast iron/plastic) • Glazed stone wire • Pitch fiber • Concrete • Elbow • T‟s Couplings • Pipe cutter • Wrenches • Screwdriver Sprit level • PPE's	138

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and maintaining combined systems.	**Brainstorm:** Guide the students to: Define the combined system, and identify features of the combined system, advantages & disadvantages of the system, factors to be considered when installing the system. Pipe size and materials for the combined system. **Demonstration** Demonstrate to students on how to install the combined system safely. **Practical Activity:** Organize the students in manageable groups to install/maintain the combined system in school drainage infrastructures	**The student should be able to:** • Interpret working drawings. • Identify tools • Select materials • Determine drain fall • Lay drain • Perform drain test • Backfill the trench • Connect pipes to sewerage disposal • Clean the work place. • Clean tool and store in a safe place	Combined system installed and maintained as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to install and maintain combined system. **Principles:** The student should explain principles of: • Installing combined system. **Theories:** The student should explain: - • Advantages of combined system • Components of combine system • Application/location of combine system **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining combined system. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (cast iron/plastic) • Glazed stone wire • Pitch fiber • Concrete • Elbow • T"s Couplings • Clamps, • Pipe cutter • Wrenches • Screwdriver • Tape measure • Sprit level • PPE's	

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				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Laying pipe to the required slope	**Brainstorm:** Guide the students to: Define pipe-laying, trench, backfilling, and identify: the advantages of laying pipe to the desired slope, and key issues to consider during trenching. **Demonstration** Demonstrate to students how to lay pipe to the desired slope **Practical Activity:** Organize the students in manageable groups to perform laying of pipe to the required slope.	**The student should be able to:** • Interpret working drawings • Identify tool • Select materials. • Determine drain fall • Lay the pipe to the required slope. • Clean the work place • Clean tool and store in a safe place.	Pipes laid to the required slope as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to lay a pipe to the required slope. **Principles:** The student should explain principles of laying pipe. **Theories:** The student should explain: - • Things to be considered when a drain passes through a building • Cleansing velocity • The differences between septic tank and soak away pit • The use of bacteria in a septic tank. • Different method of cleaning a blocked drainage. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while laying pipe to the required slope. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (cast iron/plastic) • Hoe • Wheelbarrow • Concrete • Elbow • T"s • Pipe cutter • Wrenches • Sprit level • Measuring tape • PPE's	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(d) Performing drain tests</td><td>Brainstorm:
Guide the students to: Define drain test, and identify: the types of drain test and, importance of drain test
Demonstration
Demonstrate to the students how to perform drain tests.
Practical Activity:
Organize the students in manageable groups to perform drain test by different methods.</td><td>The student should be able to:
• Interpret working drawing
• Identify tools
• Select materials
• Perform drain test
• Clean the work place
• Clean tool and store in a safe place</td><td>Drain tests performed as per specification
.</td><td>Knowledge evidence:
Detailed knowledge of:
Method used:
The student should explain: -
• How to perform drain tests
Principles: The student should explain principles of:
• Performing drain test.
Theories: The student should explain: -
• Things to be considered when a drain passes through a building
• Why drain is tested.
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while performing drain test
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Pipes (cast iron/plastic)
• Pressure gauge
• Water filing apparatus
• Smoke generators
• Soap
• Tape measure
• Pipe cutter
• Wrenches
• PPE’s</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Constructing inspection chambers	**Brainstorm:** Guide the students to: Define: the inspection chamber. identify: types of inspection chamber, principles of inspection chamber, importance of inspection chamber, materials used for construction. **Demonstration** Demonstrate to students how to construct inspection chamber correctly **Practical Activity:** Organize the students in manageable groups to construct inspection chambers around the school environment.	**The student should be able to:** • Interpret working drawings • Identify tools • Select materials. • Take measurement. • Construct inspection chamber • Clean the work place. • Clean tool and store in a safe place.	Inspection chamber constructed as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to construct inspection chambers. **Principles:** The student should explain principles of: • Constructing inspection chambers. **Theories:** The student should explain: - • The differences between septic tank and soak away pit • The use of bacteria in a septic tank. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while constructing inspection chamber • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (cast iron/plastic) • Hoe • Water • Wire mesh • Wheelbarrow • Concrete • Cement • Sand • Sprit level • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
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		(f) Connect pipes to septic tanks, sewers, and chamber, soak ways, cesspool, and bio digester oxidation ponds	**Brainstorm:** Guide the students to: explain: septic tank, sewers, soak away, cesspool, bio digester oxidation ponds. **Demonstration** Demonstrate to students on how safely to connect pipes to various drainage components. **Practical Activity:** Organize the students in manageable groups to connect pipes to various drainage components in the school environment	**The student should be able to:** • Interpret working drawings • Identify tools • Select materials • Take measurement • Connect pipes. • Clean the work place • Clean tools and store them in a safe place	Pipes connected as per specification .	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • How to connect pipes to septic tanks, sewers, and chamber, soak ways, cesspool, and bio digester oxidation ponds chambers. **Principles:** The student should explain principles of: • Connecting pipes to drainage components **Theories:** The student should explain: - • Identify construction materials **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while connecting pipes to drainage components. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (cast iron/plastic) • Hoe • Wheelbarrow • Concrete • Elbow • T"s • Pipe cutter • Wrenches • Sprit level • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
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4.0 Installing Domestic Gas Supply Systems	4.1 Installing Gas Pipe System to The Building	(a) Drilling and connecting services pipe from main.	**Brainstorm:** Guide the students to: define: gas pipe, and natural gas, identify: methods of drilling and tapping a gas pipe, common types of valves in a gas pipe, and safety precautions when working with gas pipes. **Demonstration** Demonstrate to students on how to drill and connect service pipe from the main safely **Practical Activity:** Organize the students in manageable groups to drill and connect service pipe from main	**The student should be able to:** • Interpret working drawings • Select tools • Take measurements. • Select suitable pipe materials. • Install pipes • Test leakage. • Clean tools and work place. • Store tools in a safe place	Service pipe from main drilled and connected as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain how to install gas service pipe from the main/tank. **Principles:** The student should explain the principles of: - • Connecting gas service pipe from main. **Theories:** The student should explain: - • Types of gas • Planning pipe sizing • Cost estimate **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing gas service pipe • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pipes (Steel, Copper, Plastic). • Coolant • Tape measure • PPE's	115

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and maintaining gas meter	**Brainstorm:** Guide the students to: define: gas meters, identify: types of gas meters, uses of gas meters, and safety precautions when working with gas meters **Demonstration** Demonstrate how safely to install gas meters to the appliances **Practical Activity:** Organize the students in manageable groups to install/maintain the gas meter	**The student should be able to:** • Interpret working drawings • Take measurements. • Select gas meter • Install gas meter • Test leakage • Clean tools and work place. • Store tools in a safe place.	Gas meter installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain how to install gas meter **Principles:** The student should explain the principles of: - • Installing gas meter **Theories:** The student should explain: - • Types of gas meter • Cost estimate • Uses of gas meter **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing a gas meter. • First aid • Environmental equipment's	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Gas meter • Pipe wrench • Screw divers • Gas detector • Pressure gauge • Sprit level • Drill machine • Drill bits • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
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		(c) Installing and repairing domestic gas appliances.	**Brainstorm:** Guide the students to: define gas appliances, identify types of gas appliances, advantages of gas appliances, and safety precautions when installing gas appliances. **Demonstration** Demonstrate to students how to install gas appliances safely **Practical Activity:** Organize the students in manageable groups to install/repair gas appliances.	**The student should be able to:** • Interpret working drawings. • Select tool • Take measurements • Select domestic gas appliance • Install domestic gas appliance • Clean tools and work place • Store tools in a safe place	Domestic gas appliances installed and maintained as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain how to install gas appliances. **Principles:** The student should explain the principles of: - • Installing and repairing domestic gas appliances. **Theories:** The student should explain: - • Identify gas appliances • Types of gas burners • Cost estimate **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing domestic gas appliances. • First aid. • Environmental equipment.	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Gas appliances • Gas meter • Pipes • Pipe wrench • Screw divers • Gas detector • Pressure gauge • Sprit level • Drill machine • Drill bits • Tape measure • PPE’s	

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		(d) Performing gas test.	**Brainstorm:** Guide the students to: define: gas leakage testing, identify: methods of gas leakage test, and safety precautions when performing gas test. **Demonstration** Demonstrate to students how to perform gas tests safely. **Practical Activity:** Organize the students in manageable groups to perform gas tests.	**The student should be able to:** • Interpret working drawings • Select tools • Select the method of gas test • Perform gas test • Test leakage • Clean tools and work place • Store tools in a safe place	Gas tests performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain how to perform gas test **Principles:** The student should explain the principles of: - • Preforming gas test. **Theories:** The student should explain: - • Methods used for gas testing • Planning pipe sizing • Cost estimate **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing gas test. • First aid. • Environmental equipment's	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Soap and water • electronic gas detectors • Ultrasonic leak detectors • Pipe wrench • Screw divers • Gas detector • Gas meter • Pressure gauge • Sprit level • Drill machine • Drill bits • Tape measure • PPE's	

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		(e) Performing maintenance and servicing gas system	**Brainstorm:** Guide the students to: explain: gas systems **Demonstration:** Demonstrate to the students how to repair the gas system safely **Practical Activity:** Organize the students in manageable groups to maintain/service gas systems.	**The student should be able to:** • Interpret working drawings • Take measurements. • Select tools • Inspect the system • Maintain/service gas system • Test leakage • Clean tools and work place • Store tools in a safe place	Maintenance and servicing of gas system performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain how to maintain and service gas system. **Principles:** The student should explain the principles of: - • Servicing and maintaining gas system. **Theories:** The student should explain: - • Advantages of maintaining gas systems • Maintenance and service costs **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while servicing gas system. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Soap and water • electronic gas detectors • Ultrasonic leak detectors • Pipe wrench • Screw divers • Gas detector • Gas meter • Pressure gauge • Sprit level • Drill machine • Drill bits • Tape measure • PPE’s	

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				Process Assessment	Services Assessment	Knowledge Assessment		
5.0 Performing sheet metal works	5.1 Performing hand shearing	(a) Performing straight shearing.	**Brainstorm:** Guide the students to: define: straight shearing, and identify tools used for straight shearing, advantages of straight shearing, and safety precautions when performing straight shearing. **Practical work:** Guide the students on how to perform straight shearing tools correctly **Practical Activity:** Organize the students in manageable groups to perform straight shearing on a piece of metal	**The student should be able to:** • Interpret working drawings • Take measurements • Select sniper • Clamp work piece • Make calculation • Perform straight shearing • Clean machine and tools • Clean work place • Store tools safely	Straight shearing conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • The student should explain different techniques of performing straight shearing. **Principles:** The student should explain the principles of: - • Straight shearing **Theories:** The student should explain: - • Maintenance of straight shearing tools **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing straight shearing • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Sheet metal • Hand shear/snips • Mallets • Seaming tools • Drill bits • Tape measure • PPE’s	46

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<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(b) Performing circular shearing</td><td>Brainstorm:
Guide the students to: define: circular shearing, and identify tools used for circular shearing, advantages of circular shearing, and safety precautions when performing circular shearing
Demonstration
Demonstrate to students on how to perform circular shearing tools correctly.
Practical Activity:
Organize the students in manageable groups to perform circular shearing on a piece of metal</td><td>The student should be able to:
• Interpret working drawings
• Take measurements.
• Select sniper
• Clamp work piece
• Make calculations
• Perform circular shearing
• Clean machine and tools
• Clean work place
• Store tools safely</td><td>Circular shearing conforms to technical specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used:
The student should explain: -
The student should explain different techniques of performing circular shearing.
Principles: The student should explain the principles of: -
• Circular shearing
Theories: The student should explain: -
• Tools used for circular shearing
• Maintenance of circular shearing tools
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while performing circular shearing.
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Sheet metal
• Circular shear machine
• Hand shear/snips
• Mallets
• Seaming tools
• Drill bits
• Tape measure
• PPE’s</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.2 Performing machine shearing	(a) Performing straight edge shearing.	**Brainstorm:** Guide the students to: define: machine shearing, and identify tools used for machine shearing, advantages of machine shearing, and safety precautions when performing straight edge shearing. **Demonstration** Demonstrate to students on how to perform straight edge-shearing correctly. **Practical Activity:** Organize the students in manageable groups to perform machine shearing on a piece of metal	**The student should be able to:** • Interpret working drawings • Select materials • Take measurements • Mark out • Check the sharpness and tightness of the blade • Cut the metal • Check the accuracy of the cut • Clean tools and equipment • Clean work place • Store tools and equipment safely	Straight edge conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing straight edge shearing by machine **Principles:** The student should explain the principles of: - • Straight edge shearing by machine. **Theories:** The student should explain: - • Parts and functions of shearing machines • Measuring techniques • Calculate tolerance for allowances. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing straight edge shearing by machine. • First aid.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Sheet metal • Circular shear machine • Hand shear/snips • Mallets • Seaming tools • Drill bits • Tape measure • PPE's	23

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.3 Performing sheet metal forming	(a) Bending sheet metal at right angle	**Brainstorm:** Guide the students to: define bending, and folding, and identify types of bending processes, and safety precautions when performing bending sheet metal at a right angle. **Demonstration** Demonstrate to the students how to bend sheet metal at right angle correctly **Practical Activity:** Organize the students in manageable groups to perform bending a metal sheet at a right angle	**The student should be able to:** • Identify types of metals • Take measurements. • Calculate allowances • Develop patterns. • Set work piece into forming machine • Performing bending/ folding at a right angle • Check dimensions. • Clean machine and tools • Clean work place • Store tools and equipment safely	Bending/folding at the right angle conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of bending sheet metal at a right angle **Principles:** The student should explain the principles of: - • Bending sheet metal **Theories:** The student should explain: - • Importance of bending sheet metal at right angle. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions are to be observed while bending sheet metal at a right angle. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Sheet metal • Press Brake • Folding Machine (Folder) • Roll Bending Machine • Pan Brake (Box and Pan Brake) • Bending Pliers • Seaming Tool • Hammer • Anvil • Drill bits • Tape measure • PPE's	92

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Forming single and double seam	**Brainstorm:** Guide the students to: define Single and double seam, and identify characteristics of single and double seam, advantages of single and double seam, limitations of single and double seam. **Demonstration** Demonstrate to students how to form single and double seam correctly. **Practical Activity:** Organize the students in manageable groups to form single and double seam	**The student should be able to:** • Identify types of metals • Take measurements • Calculate allowances. • Develop patterns • Set work piece into a machine • Form single and double seam Check dimensions. • Clean machine and tools • Clean work place. • Store tools and equipment safely	Single and double seam conforms to technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of forming single and double seam. **Principles:** The student should explain the principles of: - • Forming single and double sea **Theories:** The student should explain: - • Importance of forming single and double seam • Uses of forming single and double sea. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while forming single and double seem. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Sheet metal • Press Brake • Folding Machine (Folder) • Roll Bending Machine • Pan Brake (Box and Pan Brake) • Bending Pliers • Seaming Tool • Hammer • Anvil • Drill bits • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Forming grooved seam	**Brainstorm:** Guide the students to: define grooved seam, and identify characteristics of grooved seam, advantages of grooved seam, and limitations of grooved seam. **Demonstration** Demonstrate to the students how to form grooved seam correctly. **Practical Activity:** Organize the students in manageable groups to form grooved seam	**The student should be able to:** • Identify types of metals • Take measurement • Calculate allowances • Develop patterns • Set work piece into a machine • Form grooved seam • Check dimensions. • Clean machine and tools • Clean work place • Store tools and equipment safely	Grooved seam conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of forming grooved seam. **Principles:** The student should explain the principles of: - • Forming grooved seam. **Theories:** The student should explain: - • Importance of forming grooved seam • Uses of forming grooved seam. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while forming grooved seam • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Grooving Tool • Crimping Tool • Steam Roller • Sheet Metal Brake, Steel, Aluminum, Copper, Brass • Press Brake • Folding Machine (Folder) • Roll Bending Machine • Pan Brake (Box and Pan Brake) • Bending Pliers • Seaming Tool • Hammer • Anvil • Drill bits • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Forming cylindrical shapes	**Brainstorm:** Guide the students to: define cylindrical shapes, and identify characteristics of cylindrical shapes, advantages of using cylindrical shapes, and safety precautions when forming cylindrical shapes **Demonstration** Demonstrate to students how to form cylindrical shapes correctly **Practical Activity:** Organize the students in manageable groups to form cylindrical shapes in the school workshop	**The student should be able to:** • Identify types of metals • Take measurements • Calculate allowances • Develop patterns. • Set work piece into a machine • Form cylindrical shape • Check dimensions. • Clean machine and tools • Clean work place • Store tools and equipment safely	Cylindrical shapes conform to technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of forming cylindrical shapes. **Principles:** The student should explain the principles of: - • Forming cylindrical shape. **Theories:** The student should explain: - • Importance of forming a cylindrical shape • Uses of cylindrical shape. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while forming grooved seam • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Lathe Machine • Rolling Machine (Plate or Sheet Metal Roller) • Mandrel and Die (for Tube and Pipe Forming) • Forging Press and Tube Bending Machine (pipe bender) • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.4 Performing soft soldering	(a) Joining metal sheets by soldering	**Brainstorm:** Guide the students to: define soldering, and flux and identify the classification of soldering, types of soft soldering, differentiate types of solders, and safety precautions when joining sheet metal by soldering **Demonstration** Demonstrate to the student how to join sheet metal by soldering correctly. **Practical Activity:** Organize the students in manageable groups to join sheet metal by soldering in the school workshop	**The student should be able to:** • Interpret working drawings • Choose a suitable metal sheet to be soldered. • Choose solder alloy. • Clean the work piece properly • Tinning copper bits • Perform soldering on sheet metal • Remove flux residues. • Check the quality of seams • Clean tools and equipment • Store the tools in a safe place	Sheet metal joined by soldering conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain techniques of joining sheet metal by soldering. **Principles:** The student should explain the principles of: - • Joining sheet metal by soldering **Theories:** The student should explain: - • Classification of soldering • Types of soft soldering • Characteristics of flux • Types of flux **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while joining sheet metal by soldiering • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Soldering gun • Soldering wire/ alloy • Sheet Metal • Slags remover • Tape measure • PPE’s	46

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Joining pipe by soldering	**Brainstorm:** Guide the students to: define soldering a pipe, and identify safety precautions when joining pipes by soldering. **Demonstration** Demonstrate to the students how to join pipes by soldering correctly **Practical Activity:** Organize the students in manageable groups to join pipe by soldering in school workshops	**The student should be able to:** • Interpret working drawings. • Choose a suitable pipe to be soldered. • Choose solder alloy. • Clean the work piece properly. • Tinning copper bits. • Perform soldering on pipe • Remove flux residues • Check the quality of seams • Clean tools and equipment • Store the tools in a safe place	Different type of pipes joined by soldering conforms to technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain techniques of joining pipe by soldering. **Principles:** The student should explain the principles of: - • Joining pipe by soldering **Theories:** The student should explain: - • Factors to consider when selecting a good flux • Different types of soldering guns/irons • Types of soldering filler wire • Types of flux **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while pipe joining by soldering method. • First aid.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Soldering gun • Soldering wire/ alloy • Soldered pipe • Slags remover • Tape measure • PPE's	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.5 Perform riveting	(a) Joining sheet metal by cold riveting	**Brainstorm:** Guide the students to: define reverting, and cold reverting, and identify the advantages of cold reverting, sizes of cold rivets, and safety precautions when joining sheet metal by cold reverting **Demonstration:** Demonstrate to the student how to join sheet metal by cold reverting correctly **Practical Activity:** Organize the students in manageable groups to join sheet metal by cold reverting in the school workshop	**The student should be able to:** • Interpret working drawings. • Take measurements of sheet metal for riveting • Calculate holes clearances • Select suitable drills and rivets • Align metal plates for riveting • Drill holes • Select rivet • Join two pieces of sheet metal by cold riveting • Check common defects in riveted joints • Clean work place • Clean tools and equipment • Store tools and equipment safely	Sheet metal joined by cold riveting conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different procedures of joining sheet metal by cold reverting **Principles:** The student should explain the principles of: - • Operating cold reverting tools/equipment **Theories:** The student should explain: - • Types of rivets • Sizes of cold rivets • Advantages of cold reverting **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while joining sheet metal by cold reverting method • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Room temperature • Rivets • Sheet metal • Tape measure • PPE’s	46

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Joining sheet metal by pop riveting	**Brainstorm:** Guide the students to: define pop reverting, and identify the advantages of pop reverting, sizes of pop revert, and safety precautions when joining sheet metal by pop reverting. **Demonstration:** Demonstrate to students how to join sheet metal by pop reverting correctly **Practical Activity:** Organize the students in manageable groups to join sheet metal by pop reverting in the school workshop.	**The student should be able to:** • Interpret working drawings • Take measurements of sheet metal for riveting. • Calculate holes clearances • Select suitable drills and rivets • Align metal plates for riveting • Drill holes • Select rivet • Join two pieces of sheet metal by pop riveting • Check common defects in riveted joints. • Clean work place • Clean tools and equipment • Store tools and equipment safely	Sheet metal joined by pop rivet conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different procedures of joining sheet metal by pop reverting **Principles:** The student should explain the principles of: - • Operating pop reverting tools/equipment **Theories:** The student should explain: - • Sizes of pop rivets • Advantages of pop reverting **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while joining sheet metal by pop reverting method • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Pop rivet gun • Rivets • Sheet metal • Tape measure • PPE’s	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.6 Performing grinding	(a) Grinding metal	**Brainstorm:** Guide the students to: define grinding, and identify types of grinding machines, and safety precautions when grinding a metal. **Demonstration:** Demonstrate to students how to grind a piece of metal correctly. **Practical Activity:** Organize the students in manageable groups to grind a piece of metal in a school workshop.	**The student should be able to:** • Interpret working drawings. • Install grinding wheel/disc. • Adjust wheel guards • Adjust work rest. • Select and hold work piece • Grind metal piece • Inspect the accuracy of work piece • Clean tools and machines. • Store tools in a safe place	Metals grinded conform to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different techniques for grinding a metal **Principles:** The student should explain the principles of: - • Grinding metal by using a pedestal machine. • Grinding metal by using an angle grinding machine **Theories:** The student should explain: - • Tools used for grinding a metal • Advantages of grinding a metal **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while grinding a metal • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Grinding Wheel • Bench Grinder • Surface Grinder • Cylindrical Grinder • Angle Grinder • Steel • Aluminum • Copper and cast • PPE's	46

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Sharpen cutting tools	**Brainstorm:** Guide the students to: define sharpening, and identify types of sharpeners cutting tools, and safety precautions when sharpening cutting tools. **Demonstration:** Demonstrate to the student how to join sharpen cutting tools correctly. **Practical Activity:** Organize the students in manageable groups to sharpen cutting tools in plumbing workshop.	**The student should be able to:** • Interpret working drawings • Install grinding wheel/disc • Adjust wheel guards • Adjust work rest • Select and hold cutting tool • Sharpen cutting tool. • Inspect accuracy of work piece • Clean tools and machines • Store tools in a safe place	Cutting tools sharpened conforms to the technical specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different techniques for sharpening cutting tools **Principles:** The student should explain the principles of: - • Maintaining cutting tools • Sharpening cutting tools **Theories:** The student should explain: - • Tools used of sharpening cutting tools • Advantages of sharpening cutting tools **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while sharpening cutting tools • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Flat Files • Round Files • Triangular Files • Sharpening Stones (Whetstones) • Grinding Wheels. • Bench vice • Steel • Aluminum • Copper and cast • PPE's	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr>
<td>6.0 Fabricating Sheet Metal Works</td>
<td>6.1 Performing gas welding and brazing</td>
<td>(a) Assembling oxy-acetylene plant.</td>
<td>Brainstorm:
Guide the students to: define gas welding, oxy-acetylene plant, and identify types of pressure regulators, materials used, tools during assembling and equipment used, and, safety precautions when assembling oxy-acetylene plant.
Demonstration:
Demonstrate to the students how to assemble oxy-acetylene plant correctly
Practical Activity:
Organize the students in manageable groups to assemble oxy-acetylene plant in the plumbing workshop.</td>
<td>The student should be able to:
• Interpret working drawing.
• Inspect oxy-acetylene gas welding equipment.
• Assemble oxy-acetylene gas cylinder
• Check root penetration
• Inspect the quality of the bronze weld
• Clean work place
• Clean tools and equipment
• Store tools and equipment safely</td>
<td>Oxy-acetylene plant assembled as per specification
.</td>
<td>Knowledge evidence:
Detailed knowledge of:
Method used:
• The student should explain different techniques of assembling oxy-acetylene plant.
Principles: The student should explain the principles of: -
• Assembling oxy-acetylene plant
Theories: The student should explain: -
• Maintaining rules oxy-acetylene plant
• Advantages of using gas to weld a metal
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while assembling oxy-acetylene plant
• First aid</td>
<td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Oxy-acetylene plant
• Pressure regulator.
• Welding torch.
• Hose pipe.
• Trolley.
• Blow pipe spanner
• Spark lighter
• Ball peen hammer
• Chisel
• Centre punch
• Tongs
• Goggle, safety boots, gloves, leather apron</td>
<td>92</td>
</tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing fusion welding	**Brainstorm:** Guide the students to: define fusion welding, non-fusion welding and identify types of joints made by fusion welding, materials and tools used during fusion welding, and, safety precautions when performing fusion welding. **Demonstration:** Demonstrate to the students how to perform fusion welding correctly **Practical Activity:** Organize the students in manageable groups to perform fusion welding in the plumbing workshop.	**The student should be able to:** • Interpret working drawings • Inspect oxy-acetylene gas welding equipment • Check root penetration • Perform fusion joint • Clean work place • Clean tools and equipment • Store tools and equipment safely	Fusion welding performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different techniques of performing fusion welding **Principles:** The student should explain the principles of: - • Performing fusion welding **Theories:** The student should explain: - • Materials used fusion welding • Importance of fusion welding **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing fusion welding • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Oxy-acetylene plant. • Pressure regulator. • Welding torch. • Hose pipe. • Trolley. • Blow pipe spanner. • Spark lighter. • Ball peen hammer • Chisel • Centre punch. • Tongs • Goggle, safety boots, gloves, leather apron • Steel/folding ruler. • Hacksaw	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Performing hard soldering	**Brainstorm:** Guide the students to: define soldering, hard soldering and identify types of soldering, materials, and tools used for hard soldering, and safety precautions when performing hard soldering. **Demonstration:** Demonstrate to the students how to perform hard soldering correctly. **Practical Activity:** Organize the students in manageable groups to perform hard soldering of metal in plumbing workshop	**The student should be able to:** • Interpret working drawings • Inspect the soldering gun • Perform hard soldering. • Clean work place • Clean tools and equipment • Store tools and equipment safely	Hard soldering performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different techniques of performing hard soldering **Principles:** The student should explain the principles of: - • Performing hard soldering **Theories:** The student should explain: - • Types of soldering • Materials used for soldering • Importance of hard soldering **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing hard soldering • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Soldering gun • Soldering wire. • Pressure regulator. • Welding torch • Hose pipe. • Trolley • Blow pipe spanner • Spark lighter • Ball pein hammer. • Chisel • Centre punch. • Tongs • Goggle, safety boots, gloves, leather apron • Steel/folding ruler • Hacksaw • Dust mask	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Gas cutting	**Brainstorm:** Guide the students to: define gas cutting and identify the application of gas cutting, the advantages and disadvantages of gas cutting, and safety precautions when cutting with gas. **Demonstration:** Demonstrate to students how to cut metal by gas correctly. **Practical Activity:** Organize the students in manageable groups to cut a metal with gas in the plumbing workshop	**The student should be able to:** • Interpret working drawings • Prepare the work piece to be cut • Perform gas cutting • Clean work place • Clean tools and equipment • Store tools and equipment safely	Cutting by gas performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different techniques of gas cutting. **Principles:** The student should explain the principles of: - • Gas cutting **Theories:** The student should explain: - • Procedures of gas cutting. • Advantages of using gas to cut a metal **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while cutting metal with gas • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Oxy-acetylene plant. • Pressure regulator. • Welding torch • Hose pipe • Trolley • Blow pipe spanner • Spark lighter • Ball peen hammer • Chase • Centre punch. • Tongs • Goggle • Safety boots • Gloves • Leather apron	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	6.2 Performing shielded metal arc welding	(a) Starting and welding straight bead	**Brainstorm:** Guide the students to: define welding, identify tools and materials used for welding straight bead, and safety precautions when welding straight beds. **Demonstration:** Demonstrate to students on how to weld straight beads correctly **Practical Activity:** Organize the students in manageable groups to weld straight beads in the plumbing workshop	**The student should be able to:** • Inspect the machine, cable, and electrode holder. • Interpret working drawing • Prepare welding materials • Select type and size of electrode • Set recommended current • Weld a work piece • Maintain electrode angle and arc length • Control electrode travel speed along the joint. • Inspect for weld defects • Clean work piece • Clean tools and equipment and store them in a safe place	Welding straight bead performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of welding straight beads by arc welding **Principles:** The student should explain the principles of: - Welding straight bead by arc welding **Theories:** The student should explain: - • Importance of welding straight bead **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while welding straight beads by arc welding • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Work bench. • Bench vice. • Try square. • Steel rule/tape. • Hacksaw. • Leather gloves. • Leather apron. • Overall • Safety boots. • Shield. • Welding machine • Chipping hammer. • Wire brush • Welding tong • Scriber • Shear machine • Ball peen hammer • Centre punch	138

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing butt joints	**Brainstorm:** Guide the students to: define butt joints, and identify tools and materials used for butt joint forming tools, safety precautions when making butt joints. **Demonstration:** Demonstrate to the students on how to perform the butt joint correctly **Practical Activity:** Organize the students in manageable groups to construct/make butt joints in the plumbing workshop	**The student should be able to:** • Inspect the machine, cable, and electrode holder • Interpret working drawings • Prepare welding materials. • Select the type and size of the electrode • Set recommended current • Weld a work piece • Maintain electrode angle and arc length • Control electrode travel speed along the join • Inspect for weld defects • Clean work piece • Clean tools and equipment and store them in a safe place	Butt joints performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing butt joint by arc welding **Principles:** The student should explain the principles of: - • Performing butt joint by arc welding **Theories:** The student should explain: - • Uses of butt joint **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing butt joint • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Work bench. • Bench vice • Try square • Steel rule/tape. • Hacksaw • Leather gloves • Leather apron • Overall • Safety boots • Shield. • Welding machine. • Chipping hammer • Wire brush • Welding tongs • Scribe • Shear machine • Ball pein hammer • Centre punch	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Performing groove butt joints	**Brainstorm:** Guide the students to: define groove butt joints, and identify tools and materials used for groove butt joint forming tools, and safety precautions when making groove butt joints. **Demonstration:** Demonstrate to the student how to perform the groove butt joint correctly. **Practical Activity:** Organize the students in manageable groups to construct/make a groove butt joints in the plumbing workshop.	**The student should be able to:** • Inspect the machine, cable, and electrode holder • Interpret working drawing • Prepare welding materials • Select type and size of the electrode • Set recommended current • Weld and make a grooved butt a work piece • Maintain electrode angle and arc length • Control electrode travel speed along the joint • Inspect for weld defects. • Clean work piece • Clean tools and equipment • Store tools, and equipment in a safe place	Groove butt joints performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing groove butt joint by arc welding **Principles:** The student should explain the principles of: - • Performing groove butt joint by arc welding **Theories:** The student should explain: - • Groove preparations. • Function of groove butt **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing groove butt joint • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Work bench. • Bench vic. • Try square • Steel rule/tape. • Hacksaw • Leather gloves. • Leather apron • Overall • Safety boots • Shield. • Welding machine • Chipping hammer • Wire brush. • Welding tongs • Scriber. • Shear machine. • Ball pein hammer • Centre punch	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Performing lap joints	**Brainstorm:** Guide the students to: define lap joints, identify tools and materials used for lap joint forming tools, and safety precautions when making lap joints **Demonstration:** Demonstrate to students how to perform lap joint correctly **Practical Activity:** Organize the students in manageable groups to construct/make lap joint in the plumbing workshop	**The student should be able to:** • Inspect the machine, cable, and electrode holder • Interpret working drawing • Prepare welding materials. • Select the type and size of the electrode • Set recommended current • Weld and make a lap joint • Maintain electrode angle and arc length. • Control electrode travel speed along the joint. • Inspect for weld defects. • Clean work piece • Clean tools and equipment and store them in a safe place	Lap joints performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing lap joint by arc welding **Principles:** The student should explain the principles of: - • Performing lap joint by arc welding **Theories:** The student should explain: - • Uses of lap joint **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing lap joint • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Workbench • Bench vice • Try square. • Steel rule/tape • Hacksaw • Leather glove • Leather apron • Overall • Safety boot. • Shield • Welding machine • Chipping hammer • Wire brush • Welding tongs • Scriber • Shear machine • Ball pein hammer • Centre punch	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(e) Performing corner joints	**Brainstorm:** Guide the students to: define corner joints, identify tools and materials used for corner joint forming tools, and safety precautions when making corner joints. **Demonstration:** Demonstrate to students how to form corner joint correctly **Practical Activity:** Organize the students in manageable groups to construct/make corner joints in the plumbing workshop.	**The student should be able to:** • Inspect the machine, cable, and electrode holder • Interpret working drawings • Prepare welding materials • Select type and size of the electrode • Set recommended current • Weld and make a corner joint • Maintain electrode angle and arc length • Control electrode travel speed along the joint. • Inspect for weld defects • Clean work piece • Clean tools and equipment • Store tools, and equipment in a safe place	Corner joints performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing corner joints by arc welding **Principles:** The student should explain the principles of: - • Performing corner joint by arc welding **Theories:** The student should explain: - • Uses of chipping hammer • Function of corner joint. • Weld symbols. • Angle of electrode. • Different positions of welding. • **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing corner joint • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Workbench. • Bench vice • Try square. • Steel rule/tape. • Hacksaw • Leather gloves • Leather apron • Overall. • Safety boot • Shield • Welding machine • Chipping hammer • Wire brush • Welding tongs • Scribe • Shear machine. • Ball pein hammer • Centre punch	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(f) Perform T- joint	**Brainstorm:** Guide the students to: define T-joint, and identify tools and materials used for T-joint forming tools, and safety precautions when making T-joint. **Demonstration:** Demonstrate to the students how to form T-joint correctly. **Practical Activity:** Organize the students in manageable groups to construct/make T-joints in the plumbing workshop	**The student should be able to:** • Inspect the machine, cable, and electrode holder • Interpret working drawings • Prepare welding materials • Select the type and size of the electrode • Set recommended current • Weld and make a T-joint piece • Inspect for weld defects • Clean work piece • Clean tools and equipment • Store tools, and equipment in a safe place	T-joint performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** • The student should explain different ways of performing T-joint by arc welding **Principles:** The student should explain the principles of: - • Performing T-joint by arc welding **Theories:** The student should explain: - • Types of metals and their properties • Types and functions of welding equipment **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing T- joint • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Work bench • Bench vice. • Try square • Steel rule/tap • Hacksaw • Leather gloves • Leather apron • Overall. • Safety boots • Shield. • Welding machine • Chipping hammer • Wire brush • Centre punch	
7.0 Project	7.1 Project	(a) Project						

Form Three

Table 5: *Detailed Contents for Form Three*

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
1.0 Performing rain water harvesting	1.1 Performing roof guttering	(a) Fixing eaves gutters.	**Brainstorm:** Guide the students to: define rain water, eave gutters, Common materials for gutter manufacturing, and shapes of gutter **Demonstration:** Demonstrate to the student how to fix the eaves gutter correctly. **Practical Activity:** Organize the students in manageable groups to fix eaves gutter in school buildings.	**The student should be able to:** • Interpret working drawing • Take measurement • Falling slope • Install gutters • Clean work place • Store tools and equipment in safe place • Fixing gutter bracket	Eave gutter fixed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to set and install the eave gutter. **Principles:** The student should explain the principles of: • Setting and fixing eave gutters. **Theories:** The student should explain: - • Types of gutter shapes/designs • Types of materials used for making gutters. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while fixing eave gutters • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Steel tapes/ruler. • Gutters • Hacksaw • Spirit level • Marking pen • Screwdriver • Ladder • Helmet • Safety boots • Gloves • Nails • Manila strings • Gypsum screw	86

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing rain water pipe.	**Brainstorm:** Guide the students to: define down pipe, and storage tank **Demonstration:** Demonstrate to the students how to install rain water pipe correctly **Practical Activity:** Organize the students in manageable groups to install rain water pipe in the building catchment	**The student should be able to:** • Interpret working drawing • Take measurement • Falling slope • Install gutters • Clean work place • Store tools and equipment in safe place • Fixing gutter bracket • Connect down pipes	Rain water pipe installed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to set and install rain water pipe **Principles:** The student should explain the principles of: • Installing rain water pipe **Theories:** The student should explain: • Why stored rain water is suspicious water • Common pipe used for rain water **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing rain water pipe • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Steel tapes/ruler. • Pipe • Hacksaw • Spirit level. • Marking pen • Screw driver • Ladder • Helmet • Safety boots • Gloves • Nails • Manila strings • Gypsum screw	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td>1.2 Performing installation of rain water harvesting system</td><td>(a) Installing rain water harvesting system</td><td>Brainstorm:
Guide the students to: Rain water harvest, and identify types of roof catchment, uses of rainwater, and components of rainwater harvest
Demonstration:
Demonstrate to the student how to install rain-harvesting system correctly
Practical Activity:
Organize the students in manageable groups to install a system of harvesting rain water to be used by school</td><td>The student should be able to:
• Interpret working drawing.
• Take measurement
• Falling slope.
• Install gutter
• Connect pipes
• Fixing gutter bracket
• Connect down pipes
• Clean work place
• Store tools and equipment in safe place</td><td>Rain water harvesting system installed as per specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain how to install rain water harvesting system
Principles: The student should explain the principles of:
• Installing rain water harvesting system
Theories: The student should explain: -
• Components of rain water harvest
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while installing a system of harvesting rainwater.
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Steel tapes/rule
• Pipe
• Gutters
• Hacksaw
• Spirit level
• Marking pen
• Screw driver
• Ladder
• Storage tank
• Helmet
• Gloves
• Nails
• Manila strings
• Gypsum screw</td><td>46</td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.3 Performing capturing of water run-off from road surfaces	(a) Capturing rain water run-off from road surface	**Brainstorm:** Guide the students to: Rain water run-off, ponds, dams, and identify methods for capturing rain water surface **Practical Activity:** Organize the students in manageable groups to capture rain water run-off in school road infrastructure.	**The student should be able to:** • Interpret working drawing • Take measurement • Find the slope • Excavate trench • Capture rain water • Clean work place • Store tools and equipment in safe place	Rain water run-off captured from road surface correctly	**Knowledge evidence:** **Detailed knowledge of:** **The method used:** The student should explain the procedures for capturing rain water run-off. **Principles:** The student should explain the principles of: • Capturing rain water run-off **Theories:** The student should explain: - • Sources of water **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while capturing rain water run-off from road surface • First aid.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Storage area • Hole • Pipe • Hacksaw • Spirit level • Marking pen • Helmet • Safety boots • Gloves • Nails • Manila strings	46

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.4 Performing servicing of rain water harvesting system components	(a) Servicing rain water harvesting system component s	**Brainstorm:** Guide the students to: identify components of rain water **Demonstration:** Demonstrate to the students how to service rain water harvest components correctly. **Practical Activity:** Organize the students in manageable groups to clean the catchment area, and storage tank gutters in the school	**The student should be able to:** • Interpret working drawings • Select tools • Inspect the system • Perform service • Perform testing if required • Clean work place • Store tools and equipment in safe place	Rain water harvesting system serviced as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of servicing rainwater-harvesting components **Principles:** The student should explain the principles of: • Servicing rain water harvesting components. **Theories:** The student should explain: - • Causes of rain water components deterioration **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while servicing rain water components. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Servicing tools • Storage area • Hole • Pipe • Hacksaw • Spirit level • Marking pe • Helmet • Safety boot • Gloves • Nails • Manila strings	43

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
2.0 Installing water mains	2.1 Installing water distribution mains	(a) Drilling and tapping from the water mains	**Brainstorm:** Guide the students to: define tapping, water main, and identify components of water main, and ways of drilling/tapping from water main. **Demonstration:** Demonstrate to the students how to tap from water main correctly. **Practical Activity:** Organize the students in manageable groups to drill and tap from the main to the school storage tank	**The student should be able to:** • Interpret working drawing. • Identify the size of distribution mains. • Identify pipe materials for distribution mains • Classify pipes for distribution mains (HDP, LDP) • Identify tools fittings to perform distribution mains • Excavate trench • Re-back filling the trench • Test • Clean the work place • Clean tools, equipment and store in a safe place	Drilling and tapping from water main were performed correctly	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - • Drilling and tapping from the water main. **Principles:** The student should explain the principles of: - • Classifying pipes for distribution mains. **Theories:** The student should explain: - • Types of distribution system. • All fittings fixed in the distribution main. • Joining techniques. • The differences between tapping under pressure and non-pressure **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while drilling and tapping from water main. • Environmental issue • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Pipe vices/chain vice • Stock and dies/power threading machine • Hacksaw/chain cutter. • Oil can. • Drilling and tapping machine • Gloves • Safety boots • Pipe wrench • Overall • Shovel • Pick axes • Spade	129

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing service pipe	**Brainstorm:** Guide the students to: define service pipe, and identify safety precautions when installing service pipe from water main. **Demonstration:** Demonstrate to the students on how to install service pipe safely. **Practical Activity:** Organize the students in manageable groups to install service pipes from distribution to the school compound	**The student should be able to:** • Interpret working drawing. • Identify the size of distribution mains • Identify trench depths. • Identify pipe materials for distribution mains. • Classify pipes for distribution mains (HDP, LDP). • Identify tools fittings to perform distribution main • Excavate trench. • Re-back filling the trench • Test • Clean the work place • Clean tools, and equipment and store them in a safe place	Service pipe installed safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: - • Installing service pipe. **Principles:** The student should explain the principles of: - • Installing service pipe. **Theories:** The student should explain: - • The differences between tapping under pressure and non-pressure tapping. • Calculate the number of branches from the distribution main. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing service pipe • Environmental issue. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Pipe vices/chain vice • Stock and dies/power threading machine • Hacksaw/chain cutter • Oil can • Reamer/file • Plier wrenches. • Adjustable spanner • Drilling and tapping machine. • Gloves. • Safety boots • Pipe wrench • Open end spanner • Helmet • Overall • Shovel • Pick axes • Spade	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Fixing water meters	**Brainstorm:** Guide the students to: define water meters, and identify the components of water meters, types of water meter, working principles of water meter, and materials for manufacturing. **Demonstration:** Demonstrate to students how to fix water meter to customers **Practical Activity:** Organize the students in manageable groups to fix water meters to customer	**The student should be able to:** • Interpret working drawings • Select tools • Identify pipe materials for distribution mains. • Fix a water meter • Test leakage • Clean the work place • Clean tools, equipment and store them at a safe place	The water meter fixed correctly and safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: - Procedures for fixing water meter **Principles:** The student should explain the principles of: - • Fixing water meter. **Theories:** The student should explain: - • Types of water meters. • Calculate water consumption as per meter readings • The difference between relative capacity and relative discharging capacity **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while fixing the water meter • Environmental issue • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Pipe vices/chain vices. • Water meter • Stock and dies threading machine. • Hacksaw • Oil can. • Reamer/file. • Plier wrenches • Adjustable spanner • Drilling and tapping machine. • Gloves • Safety boots • Pipe wrench • Open end spanner • Helmet • Overall • Shovel • Pick axes • Spade	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	2.2 Installing and operating centrifugal pump	(a) Installing and repairing centrifugal pump.	**Brainstorm:** Guide the students to: define the pump, centrifugal pump, and identify types of impellers, maintenance of centrifugal pump and its impeller, troubleshooting in centrifugal pump. **Demonstration:** Demonstrate to the students how to install the centrifugal pump correctly. **Practical Activity:** Organize the students in manageable groups to install/repair a centrifugal pump in school wells	**The student should be able to:** • Interpret working drawings • Prepare base for centrifugal pump. • Select tools • Perform pump alignment • Install centrifugal pumps • Fit air relieve valve • Fit foot valve • Operate pump • Clean work place, tools, and equipment	Centrifugal pump installed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Installing centrifugal pump. **Principles:** The student should explain the principles of: - • Installing centrifugal pump. • **Theories:** The student should explain: - • Types of pumps. • Parts of centrifugal pump. • Efficiency of centrifugal pump • Classification of pumps. • Types of impellers of pump. • Importance of non-return valve. • Function of foot valve. • **Circumstantial knowledge:** • Detailed knowledge about: • Safety precautions to be observed while installing the centrifugal pump • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Tool kit. • Spirit level. • Safety boots. • Overall • Gloves • Helmet • Power drill • Steel rule/tapes • Hammer • Centrifugal Pump plier • Screw drivers • Washer cutters • Stock and dies • Oil can • Pipe vice • Hacksaw • Pipe wrenches • Soft hammer	86

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and repairing submersible pump	**Brainstorm:** Guide the students to: define submersible pump, and identify troubleshooting in the submersible pump. **Demonstration:** Demonstrate to the students how to install the submersible pump correctly **Practical Activity:** Organize the students in manageable groups to install/repair a submersible pump in school wells	**The student should be able to:** • Interpret working drawing. • Select tools. • Perform pump alignment • Install submersible pump • Fit air relieve valve • Fit foot valve • Operate pump • Clean work place, tools, and equipment	Submersible pump installed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Installing submersible pump. **Principles:** The student should explain the principles of: - • Installing submersible pump • **Theories:** The student should explain: - • Parts of submersible pump. • Efficiency of submersible pump. • **Circumstantial knowledge:** • Detailed knowledge about: • Safety precautions to be observed while installing the submersible pump • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Tool kit • Spirit level • Safety boots • Overall • Gloves • Helmet • Power drill • Steel rule/tapes • Hammer • Submersible Pump pliers. • Screw drivers • Washer cutters • Stock and dies • Oil can • Pipe vice • Hacksaw • Pipe wrenches • Soft hammer	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
3.0 Performing water treatment	3.1 Performing water treatment	(a) Performing sedimentation of raw water	**Brainstorm:** Guide the students to: define water treatment, and sedimentation, and identify factors considered when performing the sedimentation process **Demonstration:** Demonstrate to students how to perform sedimentation of raw water safely **Field study:** Organize the students to visit any nearby water authority to study on sedimentation process	**The student should be able to:** • Allow raw water to inter to sedimentation pond • Mix coagulant with raw water • Filter raw water • Apply chlorine • Determine ph. • Clean instrument • Sterilize instruments. • Store the instrument in a safe place	Sedimentation performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing Sedimentation of raw water **Principles:** The student should explain the principles of: - • Sedimentation **Theories:** The student should explain: - • Permanent hard water. • Temporary hard water • Soft water • Effects of hard water • Water borne diseases • Laboratory rules and regulation **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing sedimentation • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • White over coat. • Groves • School bus • Nose mask • Gum boots • Filters • Sterilizer • Test tubes • Bica. • Fridge (deep freezer) • Bunsen burner	219

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing filtration	**Brainstorm:** Guide the students to: define filtration, and identify factors considered when performing the filtration process **Demonstration:** Demonstrate to the students how to perform filtration of raw water safely **Field study:** Organize the students to visit any nearby water authority to study on filtration process	**The student should be able to:** • Mix the coagulant with raw water. • Filter raw water • Apply chlorine. • Determine ph. • Clean instrument • Sterilize instruments • Store the instrument in a safe place	Filtration performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Filtration **Principles:** The student should explain the principles of: - • Performing Filtration. **Theories:** The student should explain: - • Types of filters. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing filtration • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Raw water • White overcoat • Groves • School bus • Nose mask • Gumboots • Filters • Sterilizer • Test tube • Bica • Fridge (deep freezer) • Bunsen burner	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Performing aeration	**Brainstorm:** Guide the students to: define aeration, and identify factors considered when performing the aeration process. **Demonstration:** Demonstrate to the students how to perform aeration of raw water safely **Field study:** Organize the students to visit any nearby water authority to study on aeration process	**The student should be able to:** • Prepare point for aeration • Allow water to capture oxygen from the air	Aeration performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing Aeration. **Principles:** The student should explain the principles of: - • Aeration **Theories:** The student should explain: - • Aeration process. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing aeration. • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Raw water • White overcoat. • Groves • School bus • Nose mask. • Gumboots • Filters • Sterilizer • Test tubes • Bica • Fridge (deep freezer) • Bunsen burner	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Performing coagulation	**Brainstorm:** Guide the students to: define coagulation, and identify factors considered when performing the coagulation process. **Demonstration:** Demonstrate to the students how to perform coagulation of raw water safely **Field study:** Organize the students to visit any nearby water authority to study on coagulation process.	**The student should be able to:** • Prepare coagulants • Mix the coagulant with raw water • Filter raw water	Coagulation performed as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Performing coagulation. **Principles:** The student should explain the principles of: - • Coagulation and flocculation **Theories:** The student should explain: - • Types of coagulants used. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing coagulation. • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Raw water • Coagulants • White overcoat • Groves • School bus • Nose mask • Gum boots • Filters • Sterilizer • Test tubes. • Bica • Fridge (deep freezer) • Bunsen burner	

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<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(e) Performing chlorination</td><td>Brainstorm:
Guide the students to: define chlorination, PH of water and identify factors affecting water treatment.
Demonstration:
Demonstrate to the students how to perform chlorination of raw water safely.
Field study:
Organize the students to visit any nearby water authority to study on chlorination process</td><td>The student should be able to:
• Prepare chlorine
• Apply chlorine
• Determine PH.
• Clean instrument
• Sterilize instruments
• Store the instrument in a safe place</td><td>Chlorination performed as per specification</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain the procedures of:
• Performing chlorination.
Principles: The student should explain the principles of: -
• Disinfection/chlorination.
Theories: The student should explain: -
• Types of chemicals used.
• Clean tools and equipment
• Water quality
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while performing chlorination
• First aid
• Environmental requirements</td><td>This element can be achieved at school workshop and the following material, tools, and equipment are to be available:
• Raw water
• Chlorine
• Coagulants
• White overcoat
• Groves
• Nose mas.
• Gumboots.
• Filters
• School bus
• Sterilizer
• Test tubes
• Bica
• Fridge (deep freezer)
• Bunsen burner</td><td></td></tr>
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Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.2 Maintaining quality of water level	(a) Carrying out water quality test	**Brainstorm:** Guide the students to: define water quality tests, and identify factors affecting quality of water **Demonstration:** Demonstrate to the student on how to perform water quality tests **Field study:** Organize the students to visit any nearby water authority to study visually on water quality tests	**The student should be able to:** • Test water quality level • Protect water catchment. • Remove the test and smell • Control algae • Clean instrument • Store instruments at a safe place tool	The water quality test carried out conforms to the given standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Carrying out water quality tests **Principles:** The student should explain the principles of: - • Carrying out water quality tests **Theories:** The student should explain: - • The water cycles • The diseases spread through water • How water is contaminated • The sources of water smell and taste **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while carrying out a water test • First aid • Environmental requirement	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Gloves • Water taste kit • Gum boots • PH scale • School bus	86

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Maintaining adequate water treatment level	**Brainstorm:** Guide the students to: define the level of water treatment, and identify factors affecting adequate water treatment level. **Field study:** Organize the students to visit any nearby treated water storage tank to study on water authority to study visually on water quality test.	**The student should be able to:** • Check water quantity level • Maintain water storage tank • Remove e-test and smell • Control the level of treated water • Clean instrument. • Store instruments in a safe place tool	Water treatment level maintained conforms to the given standards.	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Maintaining water treatment level. **Principles:** The student should explain the principles of: - • Maintaining water treatment level. **Theories:** The student should explain: - • Water level • Quantity of water **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while maintaining water level • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Gloves. • Water taste kit • Gumboots • PH scale	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
4.0 Performing basic estimating and costing	4.1 Estimating materials	(a) Identifying required materials and items.	**Practical work:** Guide the students on how to identify different required materials in plumbing works **Group Practical Activity:** Organize the students in manageable groups to identify materials and items required for the specific work.	**The student should be able to:** • Interpret working drawing. • Identify items. • Take measurement • Calculate • Drawing	Materials and items identified as required	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Identifying materials and items required. **Principles:** The student should explain the principles of: - • Identifying materials and items required **Theories:** The student should explain: - • Method of identifying materials and items required **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while identifying materials and items required • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Safety gears • Scale rule • Drawing • Standard material price book • Tape measure • Calculate	86

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Calculating required materials	**Demonstration:** Guide the student on how to calculate the required materials correctly **Practical Activity:** Organize the students in manageable groups to calculate the materials required for the specific work.	**The student should be able to:** • Interpret working drawing • Identify items • Take measurement • Calculate • Drawing	Materials required calculated as required	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Calculating material required. **Principles:** The student should explain the principles of: - • Calculating material required **Theories:** The student should explain: - • Method of calculating material required. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while calculating materials required • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Safety gears • Scale rule • Drawing • Standard material price book • Tape measure • Calculate	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	4.2 Performing costing	(a) Preparing list of materials and items.	**Brainstorm:** Guide the students to: Explain materials and items to be listed. **Demonstration:** Demonstrate to the student how to prepare a list of materials **Practical Activity:** Organize the students in manageable groups to prepare a list of materials and items in the workshop.	**The student should be able to:** • Interpret working drawing. • Identify items. • Take measurement • Calculate • Drawing	Materials and items prepared correctly	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • List material for pricing. **Principles:** The student should explain the principles of: - • List material for pricing **Theories:** The student should explain: - • Format of listing material for costing • Method of identifying material **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing a list of items and materials • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Safety gears • Scale rule • Drawing • Standard material price book • Tape measure • Calculator	130

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Calculating material cost	**Brainstorm:** Guide the students to: Explain materials cost. **Demonstration:** Demonstrate to the students how to calculate material costs. **Practical Activity:** Organize the students in manageable groups to calculate the material cost of customer work	**The student should be able to:** • Interpret working drawing • Identify items • Take measurement • Calculate • Drawing	Material cost calculated as per standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Calculating material cost. **Principles:** The student should explain the principle of: - • Calculating material cost **Theories:** The student should explain: - • Method of calculating material **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while calculating materials • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Safety gears. • Scale rule. • Drawing • Standard material price book • Tape measure • Calculator	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Calculating labor charge and profit.	**Brainstorm:** Guide the students to: Explain labor charges and profit **Demonstration:** Demonstrate to the student how to calculate labor charges and profit **Practical Activity:** Organize the students in manageable groups to calculate labor charges and profit of work	**The student should be able to:** • Interpret working drawing • Identify items • Take measurement • Calculate • Drawing	Labor charge and profit calculated as per standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Calculating labor charge and profit. **Principles:** The student should explain the principle of: - • Calculating labor charge and profit **Theories:** The student should explain: - • Method of calculating labor charge and profit. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while calculating labor charges and profit • First aid • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Safety gears • Scale rule • Drawing • Standard material price book • Tape measure • Calculator	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
5.0 Installing industrial hot water supply system	5.1 Installing heating system	(a)Installing and maintaining solid fuel boiler.	**Brainstorm:** Guide the students to: define heating, and solid fuel boilers, and identify ways of heat transfer, and safety precautions when installing and repairing solid fuel boilers **Demonstration:** Demonstrate to the students how to install/maintain a solid fuel boiler correctly. **Practical Activity:** Organize the students in manageable groups to install/repair a solid fuel boiler at school	**The student should be able to:** • Interpret working drawings • Take measurement. • Layout • Select material • Mark the floor for drilling holes • Drill holes for bolts. • Fix solid fuel boiler. • Fix safety valves. • Align the solid fuel boiler • Tight bolts • Install storage tank • Connect primary circulation pipe • Connect secondary circulation pipe • Connect hot/steam pipes • Test leakage • Clean the work place, tools, and equipment • Store tools and equipment in a safe place	Solid fuel boiler installed conforms toms to standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of installing and maintaining the sold fuel boiler: **Principles:** The student should explain the principle of: - installing and maintaining solid fuel boiler **Theories:** The student should explain: - • Types of industrial heating devices • The differences between a solid fuel boiler and a diesel fuel boiler • Calculate solid fuel boiler rating **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing a solid fuel boiler • Environmental requirements. • First aid • Firefighting techniques.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Bench vice. • Solid fuel boiler • Wheel cutter. • Spirit level • Plumb bob/chalk line • Box spanner. • Pliers • Hacksaw • Stocks and die • Pipe wrenches • Bending machine • Measuring tape/steel tape • Power drilling machine • Cold chisel • Safety boots • Gloves • Wire brush • Overall • Dust mask	86

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and maintaining diesel fuel boiler	**Brainstorm:** Guide the students to: define, diesel boiler, and identify safety precautions when installing and repairing a diesel boiler. **Demonstration:** Demonstrate to the students how to install/maintain diesel boiler correctly **Practical Activity:** Organize the students in manageable groups to install/repair diesel boilers at school	**The student should be able to:** • Interpret working drawings • Take measurement • Layout • Select material • Mark the floor for drilling holes • Drill holes for bolts. • Fix diesel fuel boiler • Fix safety valves • Align the diesel fuel boiler • Tight bolts • Install storage tank • Connect primary circulation pipe • Connect secondary circulation pipe • Connect hot/steam pipes • Test leakage • Clean the work place, tools, and equipment • Store tools and equipment in a safe place	Diesel fuel boiler installed conforms toms to standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain: • Installing and maintain diesel boiler. **Principles:** The student should explain the principles of: - Installing and maintain diesel boiler **Theories:** The student should explain: - • The use of ventilation. • The different types of safety valve • The use of thermostat. • Calculate diesel boiler rating **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing diesel boiler • Environmental requirements • First aid • Firefighting techniques.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Bench vice. • Diesel fuel boiler • Wheel cutter. • Spirit level • Plumb bob/chalk line • Box spanner. • Pliers • Hacksaw. • Stocks and die • Pipe wrenches • Bending machine • Measuring tape/steel tape • Power drilling machine • Cold chisel. • Safety boots • Gloves • Wire brush • Overall • Dust mask	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.2 Maintaining the heating system	(a) Installing and repairing the heating system	**Brainstorm:** Guide the students to: define a heating system, and identify tools used for repair install and repair **Practical work:** Guide the student on how to install the heating system correctly **Practical Activity:** Organize the students in manageable groups to install/repair the heating system at the school	**The student should be able to:** • Interpret working drawing • Select tools • Take measurements • Select materials • Inspect the system • Install/repair heating system • Clean the work area • Clean tools • Store tools	Heating systems installed and repaired to conform to standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures: • Installing and repairing the heating system. **Principles:** The student should explain the principles of: - •Installing and repairing the heating system **Theories:** The student should explain: - • Maintenance of heating system. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing the heating system • Environmental requirements • First aid • Firefighting techniques.	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Bench vice. • Wheel cutter • Spirit level • Plumb bob/chalk line • Box spanner • Pliers • Hacksaw • Stocks and di • Pipe wrenches • Bending machine • Measuring tape/steel tape • Power drilling machine	43
6.0 Project	6.1 Project	(a) Project						

Form Four

Table 6: *Detailed Contents for Form Four*

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
1.0 Installing pumps	1.1 Installing reciprocating/piston pump appliances	(a) Installing and repairing jack pumps.	**Brainstorm:** Guide the students to: define jack pump, and identify components of jack pump, application area of the jack pump, tools used to install it, advantages and disadvantages of using the jack pump, and safety precautions while installing the jack pump **Demonstration:** Demonstrate to the student on how to repair the jack pump correctly **Practical Activity:** Organize the students in manageable groups to install/repair jack pump available in the school campus.	**The student should be able to:** • Interpret working drawing • Install jack pump. • Perform jack pump alignment. • Priming jack pump • Operate jack pumps • Clean workplace, tools, and equipment • Store tools in a safe place	Installed jack pump conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain the procedures of: • Installing jack pump. **Principles:** The student should explain the principles of: - • Installing jack pump **Theories:** The student should explain: - • Parts of jack pump. • Efficiently of jack pumps. **Circumstantial knowledge:** **Detailed knowledge bout:** • Safety precautions to be observed while installing the jack pump • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Jack pump • Tool kit • PPE's • Spirit level • Power drill • Hammer • Pump pliers • Screw driver • Stock and dies • Pipe wrenches. • Crane machine • Chain	102

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(b) Installing and repairing lift pumps</td><td>Brainstorm:
Guide the students to: define lift pump, and identify components of lift pump, application area of lift pump, tools used to install, advantages and disadvantages using lift pump, and safety precautions while installing lift pump
Demonstration:
Demonstrate to students how to repair lift pump correctly.
Practical Activity:
Organize the students in manageable groups to install/repair lift pump available in school campus.</td><td>The student should be able to:
• Interpret working drawings
• Install lift pump
• Perform lift pump alignment
• Priming lift pump
• Operate lift pumps
• Clean workplace, tools and equipment
• Store tools in safe place</td><td>Installed lift pump conforms to given technical specifications</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain procedures of:
• Installing lift pump.
• Maintenance and repair of lift pumps
Principles: The student should explain the principle of: -
• Installing lift pump.
Theories: The student should explain: -
• Parts of lift pump.
• Efficiently of lift pumps.
• Calculate amount of water discharge
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while installing lift pump
• Environmental requirements
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Lift pump
• Tool kit
• Safety boots.
• Overall.
• Gloves.
• Helmet.
• Spirit level
• Power drill
• Steel rule/tapes
• Hammer.
• Pump pliers.
• Screw drivers
• Washer cutters
• Stock and dies.
• Oil can
• Pipe vice
• Hacksaw
• Pipe wrenches
• Crane machine
• Chain</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Installing and repairing lift and force pumps	**Brainstorm:** Guide the students to: define lift and force pump, and identify components of lift and force pump, application area of lift and force pump, tools used to install, advantages and disadvantages using lift and force pump, and safety precautions while installing lift and force pump **Demonstration:** Demonstrate to students how to repair lift and force pump correctly. **Practical Activity:** Organize the students in manageable groups to install/repair lift and force pump available in school campus	**The student should be able to:** • Interpret working drawings • Install lift and force pump • Perform lift and force pump alignment • Priming lift and force pump • Operate lift and force pumps • Clean workplace, tools and equipment • Store tools in safe place	Installed lift and force pump conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Installing lift and force pump. **Principles:** The student should explain the principle of: - • Installing lift and force pump **Theories:** The student should explain: - • Parts of lift and force • Efficiently of lift and force pumps • Calculate amount of water discharge. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing lift and force pump. • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Lift and force • Tool kit • Safety boots • Overall • Gloves. • Helmet • Spirit level • Power drill. • Steel rule/tapes. • Hammer • Pump pliers. • Screw drivers • Washer cutters. • Stock and dies • Oil can • Pipe vice. • Hacksaw • Pipe wrenches • Crane machine • Chain	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.2 Installing rotary pumps	(a) Installing and repairing rotary pumps	**Brainstorm:** Guide the students to: define rotary pump, and identify components of rotary pump, application area of rotary pump, tools used to install, advantages and disadvantages using rotary pump, and safety precautions while installing rotary pump **Demonstration:** Demonstrate students how to repair rotary pump correctly. **Practical Activity:** Organize the students in manageable groups to install/repair rotary pump available in school campus.	**The student should be able to:** • Interpret working drawing. • Prepare base for rotary pump • Select tools Perform pump alignment • Install the rotary pump • Clean work place. • Clean tools and equipment • Store tools and equipment safely	Installed rotary pump conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Installing rotary pump. **Principles:** The student should explain the principle of: - • Installing rotary pump **Theories:** The student should explain: - • Parts of rotary pump. • Efficiency of rotary pump. • Routine Maintenance and repair. • Working mechanism of rotary pump. • Factors of selecting pump **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing rotary pump • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Rotary pump • Tool kit • Safety boots • Overall • Gloves • Helmet • Spirit level • Power drill. • Steel rule/tapes. • Hammer. • Pump pliers • Screw drivers • Washer cutters • Stock and dies • Oil can • Pipe vice. • Hacksaw • Pipe wrenches • Crane machine • Chain	68

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing and repairing semi rotary pumps	**Brainstorm:** Guide the students to: define semi rotary pump, and identify components of semi rotary pump, application area for semi rotary pump, tools used to install, advantages and disadvantages using semi rotary pump, and safety precautions while installing semi rotary pump **Demonstration:** Demonstrate to the student how to repair semi rotary pump correctly. **Practical Activity:** Organize the students in manageable groups to install/repair semi rotary pump available in school campus	**The student should be able to:** • Interpret working drawing • Prepare base for rotary pump • Select tools • Perform pump alignment. • Install the semi rotary pump • Clean work place • Clean tools and equipment • Store tools and equipment safely	Installed semi rotary pump conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Installing semi rotary pump. **Principles:** The student should explain the principle of: - • Installing semi rotary pump. **Theories:** The student should explain: - • Parts of semi rotary pump. • Efficiency of semi rotary pump • Routine Maintenance and repair. • Working mechanism of semi rotary pump. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing semi rotary pump. • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Semi rotary pump • Tool kit • Safety boots • Overall • Gloves • Helmet • Spirit level • Power drill. • Steel rule/tapes. • Hammer. • Pump pliers • Screw drivers • Washer cutters • Stock and dies • Oil can • Pipe vice • Hacksaw • Pipe wrenches • Crane machine • Chain	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	1.3 Installing hydraulic ram pump	(a) Installing and repairing hydraulic ram pumps	**Brainstorm:** Guide the students to: define hydraulic ram pump, and identify components of hydraulic ram pump, application area for hydraulic ram pump, tools used to install, advantages and disadvantages using hydraulic ram pump, and safety precautions while installing hydraulic ram pump **Demonstration:** Demonstrate to students the how to repair hydraulic ram pump correctly. **Practical Activity:** Organize the students in manageable groups to install/repair hydraulic ram pump available in school campus.	**The student should be able to:** • Interpret working drawings • Prepare base for hydraulic ram pump. • Select tools • Perform pump alignment • Install pump • Clean work place • Clean tools and equipment • Store tools and equipment safely	Installed hydraulic ram pump conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Installing hydraulic ram pump **Principles:** The student should explain the principle of: - • Installing hydraulic ram pump. **Theories:** The student should explain: - • Parts of hydraulic ram pump. • Efficiency of hydraulic ram pump. • Routine Maintenance and repair • Working mechanism of hydraulic ram pump. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing hydraulic ram pump. • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Hydraulic ram pump • Tool kit • Safety boots. • Overall. • Gloves • Helmet • Spirit level • Power drill. • Steel rule/tapes. • Hammer • Pump pliers • Screw drivers • Washer cutters • Stock and dies • Oil can • Pipe vice • Hacksaw • Pipe wrenches • Crane machine • Chain	34

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
2.0 Constructing wells	2.1 Constructing hand drilled shallow wells	(a) Performing boring	**Brainstorm:** Guide the students to: define boring, and identify steps to follow when performing boring, and safety precautions while performing boring. **Practical work:** Guide the students on how to perform boring correctly. **Practical Activity:** Organize the students in manageable groups to perform boring when constructing new well in school campus.	**The student should be able to:** • Interpret working drawings • Clear site • Lay out construction site • Perform boring • Clean tools and work area • Keep tools at a safety place	Boring performed conforms to given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing boring. **Principles:** The student should explain the principle of: - • Performing boring. **Theories:** The student should explain: - • Location of bore hole. • How to establish location of bore hole. • Bailing techniques. • Preparation for bailing. • Estimate the cost of labour and materials. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing boring pump • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Tripod • Drill bits • Tape measure. • Steel foot plates. • Casing • Auger bit. • Filter pipe • Extension rods • Cross-piece handle • Riverside auger (conical auger) • Bailers • Casing clamp. • Casing hanger • Chain spanner • Safety boots • Groves • Helmet • Overall	136

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Installing a PVC filter pipe	**Brainstorm:** Guide the students to: define filter, filter pipe, and identify steps to follow when installing PVC filter pipe, and safety precautions while installing PVC filter pipe. **Demonstration:** Demonstrate to students how to install filter pipe correctly. **Practical Activity:** Organize the students in manageable groups to install filter pipe in a well.	**The student should be able to:** • Interpret working drawings • Clear site • Install PVC filter pipe • Clean tools and work area • Keep tools at a safety place	PVC filter pipe installed as per given technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Installing a PVC filter pipe. **Principles:** The student should explain the principle of: - • Installing pvc filter pipe. **Theories:** The student should explain: - • The use of PVC filter pipe. • Estimate the cost of labour and materials **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while installing PVC filter pipe • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Tripod. • Drill bits • Tape measure. • Steel foot plates. • Casing • Auger bit • Filter pipe • Extension rods • Cross-piece handle • Riverside auger (conical auger) • Bailers • Casing clamp • Casing hanger • Chain spanner • Safety boots • Groves • Helmet • Overall	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td></td><td>(c) Performing grouting and sealing well</td><td>Brainstorm:
Guide the students to: define grouting, sealing, and identify steps to follow when performing grouting, and safety precautions while performing grouting and sealing.
Demonstration:
Demonstrate to students how to perform grouting correctly
Practical Activity:
Organize the students in manageable groups to perform grouting in a well</td><td>The student should be able to:
• Interpret working drawings
• Clear site
• Perform grouting/sealing
• Clean tools and work area.
• Keep tools at a safety place</td><td>Grouting and sealing well performed as per specifications</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain procedures of:
• Performing grouting
Principles: The student should explain the principle of: -
• Performing grouting.
Theories: The student should explain: -
• Sealing process
• Installation of casing and bailing
• Bailing techniques
• Preparation for bailing
Circumstantial knowledge:
Detailed knowledge about:
• Safety precautions to be observed while performing grouting.
• Environmental requirements
• First aid</td><td>This element can be achieved at school workshop and the following material, tools and equipment are to be available:
• Tripod
• Drill bits
• Tape measure
• Steel foot plates
• Casing.
• Auger bit
• Filter pipe.
• Extension rods
• Cross-piece handle
• Riverside auger (conical auger
• Bailers
• Casing clamp
• Casing hanger
• Chain spanner
• Safety boots
• Groves
• Helmet
• Overall</td><td></td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(d) Performing well maintenance and repair	**Brainstorm:** Guide the students to: define maintenance, and identify types of well, and safety precautions while performing maintenance of well **Field visit:** Organize the student and conduct a study tour to any wells found nearby to study on how wells maintained. **Practical Activity:** Organize the students in manageable groups to maintain/repair a well	**The student should be able to:** • Interpret working drawings • Select tools and materials. • Perform well maintenance • Clean tools and work area • Keep tools at a safety place	Well maintenance and repair performed as per specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing well maintenance **Principles:** The student should explain the principle of: - • Performing well maintenance **Theories:** The student should explain: - • Types of maintenance • Maintenance of casing and bailing • Estimate the cost of labour and materials. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing maintenance of well • Environmental requirement • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Tripod • Drill bits • Tape measure • Steel foot plates • Casing • Auger bit • Filter pipe • Extension rods • Cross-piece handle • Riverside auger (conical auger) • Bailers • Casing clamp • Casing hanger • Chain spanner • Safety boot • Groves • Helmet • Overall	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	2.2 Constructing dug wells	(a) Digging the hole for the concrete rings	**Brainstorm:** Guide the students to: identify steps to follow when digging the hole for the concrete rings, and safety precautions while digging a hole for the concrete rings. **Demonstration:** Demonstrate to student s how to dig the hole for the concrete rings correctly **Practical Activity:** Organize the students in manageable groups to dig the hole for the concrete rings when constructing a well in school campus.	**The student should be able to:** • Interpret working drawings • Identify tools • Take measurements • Set up the well. • Clean tools • Store tools	Hole for the concrete rings dug as per technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Digging the hole for concrete rings **Principles:** The student should explain the principle of: - • Digging the hole for concrete ring **Theories:** The student should explain: - • Site exploration. • Calculate cost of labour and materials • Covering of dug well **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while digging hole for concrete rings. • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Shovel. • Hoe • Trowel • Pickaxe • Wooden float • Bucket • Pipe wrenches • Adjustable spanners • Safety boots • Groves • Helmet • Overall	102

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Lowering the concrete rings	**Brainstorm:** Guide the students to: define backfilling, and identify steps to follow when lowering the concrete rings, and safety precautions while lowering the concrete rings. **Demonstration:** Demonstrate to the students how to lower the concrete rings correctly. **Practical Activity:** Organize the students in manageable groups to lower concrete rings in constructing new well in school campus.	**The student should be able to:** • Interpret working drawing • Identify tools • Take measurements. • Set up the well. • Select site • Clean tools • Store tools	Hole for the concrete rings dug as per technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Setting up wells. **Principles:** The student should explain the principle of: - • Lowering concrete rings. **Theories:** The student should explain: - • Lowering the concrete rings • Maintaining a dug well **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while lowering the concrete rings. • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Shovel • Hoe • Trowel • Pickaxe • Wooden float • Bucket • Pipe wrenches • Adjustable spanners • Safety boots • Groves • Helmet • Overall	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Performing pump tests	**Brainstorm:** Guide the students to: define pump tests, and identify steps to follow when performing pump test, and safety precautions while performing pump tests. **Demonstration:** Demonstrate to the students how to perform pump test correctly. **Practical Activity:** Organize the students in manageable groups to perform pump test in a constructed well.	**The student should be able to:** • Interpret working drawings • Identify tools • Conduct pump test • Identify the leakage • Clean tools. • Store tools	Pump tests performed as per technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing pump tests. **Principles:** The student should explain the principle of: - Performing pump tests. **Theories:** The student should explain: - • Pump testing • Water pollution • Well maintenance and rehabilitation **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing pump tests • Environmental requirements • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Shovel • Pump • Hoe • Trowel • Pickaxe. • Wooden float • Bucket • Pipe wrenches. • Adjustable spanners • Safety boots • Groves • Helmet • Overall	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria: Process Assessment	Assessment Criteria: Services Assessment	Assessment Criteria: Knowledge Assessment	Training Requirements/ Suggested Resources	Number of Periods per Unit
3.0 Managing workshop	3.1 Planning layout and workshop	(a) Planning layout of machines	**Brainstorm:** Guide the students to: define machine layout, and identify steps to follow when performing machine layout, and factors affecting machine layout **Demonstration:** Demonstrate to the students how to layout machines available in plumbing workshop correctly. **Practical Activity:** Organize the students in manageable groups to plan and layout machine in plumbing workshop.	**The student should be able to:** • Interpret working drawings • Take measurements. • Draw walk ways • Fix machines • Clean workplace and tools • Store tools in a safe place.	Machine layout planned tests per as per technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Planning layout of machines **Principles:** The student should explain the principle of: - • Planning layout of machines **Theories:** The student should explain: - • Importance of machine layout planning • Factors affecting the machine layout in the workshop • Importance of entrance and exit doors. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing planning and layout machines • First aid • Environmental	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Power cutting machine. • Thread cutting machine. • Safety boots • Folding machine • Rolling machine • Shearing machine • Folding and Bending machine • Pedestal drill machine • Grooving machine • Hydraulic pipe bending machine • Gloves • Overall • Painting brush • Tape measure • Square	68

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Planning bench layout	**Brainstorm:** Guide the students to: define bench layout, and identify steps to follow when performing bench layout, and factors affecting bench layout **Demonstration:** Demonstrate to students how to layout bench available in plumbing workshop correctly. **Practical Activity:** Organize the students in manageable groups to plan and layout bench in plumbing workshop.	**The student should be able to:** • Interpret working drawing. • Take measurements. • Draw walk ways. • Fix machines • Clean workplace and tools. • Store tools in a safe place	Bench layout planned as per technical specifications	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Planning layout of bench. **Principles:** The student should explain the principle of: - Planning layout of bench **Theories:** The student should explain: - • Importance of bench layout planning • Emergency door • Importance of walkway • Importance of allocating postures **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while performing planning and layout of benches in workshop • First aid • Environmental	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Power cutting machine. • Thread cutting machine. • Safety boots • Folding machine. • Rolling machine • Shearing machine. • Folding and Bending machine • Pedestal drill machine • Grooving machine • Hydraulic pipe bending machine • Gloves • Overall. • Painting brush • Tape measure • Square	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.2 Managing tools, equipment, machines and materials	(a) Managing store and issue	**Brainstorm:** Guide the students to: define storing and issuing, and identify procedures of managing store and issue. **Demonstration:** Demonstrate to the students how to store tools and materials in plumbing workshop **Practical Activity:** Organize the students in manageable groups to store and issue tools and materials in plumbing workshop.	**The student should be able to:** • Categorize tools. • Storing tools/equipment • Keep records • Issue	Store and issue performed as per desired standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing storing/issuing. **Principles:** The student should explain the principle of: - Performing storing/issuing **Theories:** The student should explain: - • Uses of ledger book • Types of recording cards • Types of location. • Types of stock taking **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while managing storing and issuing tools, equipment and materials. • Environmental requirements	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Power cutting machine • Thread cutting machine • Safety boots • Folding machine. • Rolling machine • Shearing machine • Folding and Bending machine • Pedestal drill machine • Grooving machine • Hydraulic pipe bending machine • Gloves • Overall • Painting brush • Tape measure • Square	68

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Managing purchases/ procurements	**Brainstorm:** Guide the students to: define purchasing, procurements, and identify procedures of managing purchasing and procurements **Demonstration:** Demonstrate to the students how to purchase tools and materials in plumbing workshop. **Practical Activity:** Organize the students in manageable groups to purchase tools and materials in plumbing workshop.	**The student should be able to:** • Categorize tools. • Keep records • Purchase	Store and issue performed as per desired standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: Purchasing. **Principles:** The student should explain the principle of: - Purchasing. **Theories:** The student should explain: - • Function of purchasing. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while managing purchases/procurements of tools, equipment and materials • Environmental requirement	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Bin cards. • Ledger books. • Inventory • Log book • Bench cabinet • Tool kit • Coin • Safety boots • Gloves • Overall	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	3.3 Supervising subordinates in a workshop	(a) Performing leadership style	**Brainstorm:** Guide the students to: define leadership, leadership style, and identify types of leadership, importance of performing leadership style. **Group assignment:** Organize the students in manageable groups to identify type of leadership style used by school.	**The student should be able to:** • Prepare legal documents • Prepare workshop layout plan • Prepare organization chart • Prepare work schedules. • Prepare consumable and non-consumable ledger • Follow organization rules and regulations. • Keep records • Reward creative and innovative workers. • Prepare maintenance schedule	Leadership style performed correctly	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing leadership style. **Principles:** The student should explain the principle of: - Performing leadership style. **Theories:** The student should explain: - • Leadership styles. • Types of management. • The differences between a leader and a boss • Why keeping employee's attendance register • The importance of establishing routine meetings. **Circumstantial knowledge:** Detailed knowledge about: • Code of ethics • Industrial psychology • Industrial establishment act • Employment Act • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • By laws • Ordinance • Organization policy • Work rules and regulations • Job cards • Work schedule sheets. • Displinary form • Physical resources. • Personal protective equipment • Safety gears • Machines • Working tools • Record sheet	68

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing delegation work	**Brainstorm:** Guide the students to: define delegation, importance of performing delegation work. **Demonstration:** Demonstrate to the students how to delegate work correctly. **Practical Activity:** Organize the students in manageable groups to perform delegation of work in class.	**The student should be able to:** • Prepare legal documents • Prepare workshop layout plan • Prepare organization chart. • Prepare organization chart • Prepare work schedules • Prepare purchasing and procurement procedure document. • Prepare inventor list of tools and equipment • Prepare consumable and non-consumable ledger • Prepare attendance register • Delegate work • Follow organization rules and regulation • Reward creative and innovative workers	Delegation of work performed correctly	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing delegation work. **Principles:** The student should explain the principle of: - Performing delegation work. **Theories:** The student should explain: - • Importance of delegation. • The differences between authority and responsibility. **Circumstantial knowledge:** Detailed knowledge about: • Code of ethics • Industrial psychology. • Industrial establishment act. • Employment Act. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • By laws • Ordinance • Organization policy. • Work rules and regulations. • Job cards • Work schedule sheets. • Displinary forms. • Physical resources. • Personal protective equipment • Safety gears. • Machines • Working tools • Record sheet	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
4.0 Managing safe work environment	4.1 Managing hazards	(a) Controlling mechanical hazard.	**Brainstorm:** Guide the students to: define mechanical hazard, and identify ways to of controlling mechanicals hazard. **Demonstration:** Demonstrate to the students how to control mechanical hazard safely. **Practical Activity:** Organize the students in manageable groups to identify mechanical hazards in school premises and how to control.	**The student should be able to:** • Interpret service manuals • Select tools and equipment • Use OSHA rules and regulations • Prepare workshop inspection report • Identify any mechanical hazard materials • Handle physical mechanical material • Prepare preventive maintenance schedule • Monitor safety environment • Manage uses of safety gears • Cleaning tools and equipment • Storing tools and equipment	Mechanical hazards controlled safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Controlling mechanical hazards **Principles:** The student should explain the principle of: - • Controlling mechanical hazards **Theories:** The student should explain: - • Handling of mechanical hazards. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while controlling mechanical hazards. • Environmental requirements. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to beare to be available: • Mechanical equipment • Power machines • Measuring tools • First aid kit • Fire extinguishers • Service manuals • OSHA rules and regulations • Helmet • Gloves • Ear plug • Mask • Gloves	100

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Controlling chemical hazard.	**Brainstorm:** Guide the students to: define chemical hazard, and identify ways to of controlling chemical hazard. **Demonstration:** Demonstrate to the student how to control chemical hazard safely. **Practical Activity:** Organize the students in manageable groups to identify chemical hazard in school premises and how to control.	**The student should be able to:** • Interpret service manuals • Select tools and equipment • Use OSHA rules and regulations • Prepare workshop inspection report • Identify any chemical hazard materials • Handle physical chemical material • Prepare preventive maintenance schedule • Monitor safety environment • Manage uses of safety gears • Cleaning tools and equipment • Storing tools and equipment	Chemical hazards controlled safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Controlling chemical hazards **Principles:** The student should explain the principle of: - • Controlling chemical hazards **Theories:** The student should explain: - • Handling of chemical hazards. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while controlling mechanical. • Environmental requirements. • First aid	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • Chemicals • Power machines • Measuring tools • First aid kit • Fire extinguishers • Service manuals • OSHA rules and regulations • Helmet • Gloves • Ear plug • Mask • Gloves	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Controlling physical hazard.	**Brainstorm:** Guide the students to: define physical hazard, and identify ways to of controlling physical hazard. **Demonstration:** Demonstrate to the students how to control physical hazard safely **Practical Activity:** Organize the students in manageable groups to identify physical hazards in school premises and how to control.	**The student should be able to:** • Interpret service manuals • Select tools and equipment • Use OSHA rules and regulations • Prepare workshop inspection report • Identify any physical hazard materials • Handle physical hazards material • Prepare preventive maintenance schedule • Monitor safety environment • Manage uses of safety gears • Cleaning tools and equipment • Storing tools and equipment	Physical hazards controlled safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Controlling physical hazards **Principles:** The student should explain the principle of: - • Controlling physical hazards **Theories:** The student should explain: - • Handling of physical hazards **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions to be observed while controlling physical hazards. • Environmental requirements. • First aid	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Physical things • Measuring tools • First aid kit • Fire extinguishers • Service manuals • OSHA rules and regulations • Helmet • Gloves • Ear plug • Mask • Gloves	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	4.2 Carrying out risk assessment	(a) Controlling risks	**Brainstorm:** Guide the students to: define risk, identify types of risks, and control measures of risks. **Demonstration:** Demonstrate to the student on how to handle workshop safely **Practical Activity:** Organize the students in manageable groups to identify risk in plumbing workshop.	**The student should be able to:** • Interpret service manuals • Select tools and equipment • Supervise practice safe workshop practices to protect yourself, other and properties • Conduct safety training • Identify any safety hazard material • Handle hazard material correctly • Make out and file safe report • Be aware of the dangerous of compressed air • Ensure availability of personal protective equipment • Supervise compressed air rules • Monitor good environmental practices • Clean tools and equipment • Store tools and equipment	Risks controlled safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Control risks **Principles:** The student should explain the principle of: - • Controlling risks. **Theories:** The student should explain: - • Carryout risk assessment • Conducting safety training • Handling Hazard material correctly **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while carrying out risk management • Safe handling of tools and equipment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Service manuals • OSHA regulations • Workshop rules • Camera • Risk assessment sheet • Mask • Ear plug • Gloves • Overall • Safety boots • Safety clear glasses	64

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Managing safety gears	**Brainstorm:** Guide the students to: define safety gears, identify maintenance procedures of safety gears. **Demonstration:** Demonstrate to the students how to handle safety gears in plumbing workshop safely. **Practical Activity:** Organize the students in manageable groups to identify safety gears by type and number available in plumbing workshop.	**The student should be able to:** • Interpret service manuals • Select tools and equipment • Supervise practice safe workshop practices to protect yourself, other and properties • Conduct safety training • Ensure availability of personal protective equipment • Monitor good environmental practices • Clean tools and equipment • Store tools and equipment	Safety gears managed safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Manage safety gears **Principles:** The student should explain the principle of: - • Managing safety gears **Theories:** The student should explain: - • Inspecting workshop areas tools and equipment. **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while managing safety gears • Safe handling of tools and equipment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Service manuals • OSHA regulations • Workshop rules • Camera • Risk assessment sheet • Mask • Ear plug • Gloves • Overall • Safety gears	

<table>
<tr><th rowspan="2">Module Title (Main Competence)</th><th rowspan="2">Unit Title (Specific Competences)</th><th rowspan="2">Elements (Learning Activities)</th><th rowspan="2">Suggested Teaching and Learning Methods</th><th colspan="3">Assessment Criteria</th><th rowspan="2">Training Requirements/ Suggested Resources</th><th rowspan="2">Number of Periods per Unit</th></tr>
<tr><th>Process Assessment</th><th>Services Assessment</th><th>Knowledge Assessment</th></tr>
<tr><td></td><td>4.3 Managing environment</td><td>(a) Managing air pollution</td><td>Brainstorm:
Guide the students to: define air pollution, identify causes of air pollution, control measures of air pollution.
Demonstration:
Demonstrate to the students how to manage air pollution in school campus safely.
Practical Activity:
Organize the students in manageable groups to manage air pollution in school premises.</td><td>The student should be able to:
Select relevant safety gears
Prepare preventive maintenance schedule
Control air pollution
Control tools, equipment and safety gears
Conduct safety awareness training to subordinates
Clean tools and equipment
Store tools and equipment</td><td>Air pollution managed safely</td><td>Knowledge evidence:
Detailed knowledge of:
Method used: The student should explain how to
Manage air pollution
Principles: The student should explain the principle of: -
Managing air pollution
Theories: The student should explain: -
Student should explain importance of safe work environment
Advantages of monitoring air pollution
Importance of control different types of wastes that cause air pollution
Circumstantial knowledge:
Detailed knowledge about:
Safety knowledge while managing air pollution
Safe handling of tools and equipment
Waste disposal</td><td>This element can be achieved at school workshop and the following material, tools, and equipment are to be available:
Safety boots
Gloves
Overalls
Cleaning materials
Hoe
Broom
Brush
Safety gears
Dust covers
Dust mask
Dust bin
Wheel barrow</td><td>102</td></tr>
</table>

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Managing water pollution	**Brainstorm:** Guide the students to: define water pollution, identify causes of water pollution, and control measures of water pollution. **Demonstration:** Demonstrate to the students how to manage water pollution in school campus safely. **Practical Activity:** Organize the students in manageable groups to manage water pollution in school premises.	**The student should be able to:** • Select relevant safety gears • Prepare preventive maintenance schedule • Control water pollution • Control tools, equipment and safety gears • Control different types of wastes as per OSHA • Conduct safety awareness training to subordinates • Clean tools and equipment • Store tools and equipment	Water pollution managed safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Manage water pollution **Principles:** The student should explain the principle of: - • Managing water pollution **Theories:** The student should explain: - • Advantages of monitoring water pollution • Importance of control different types of wastes that cause water pollution **Circumstantial knowledge:** Detailed knowledge about: • Safety knowledge while managing water pollution • Safe handling of tools and equipment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Safety boots • Gloves • Overalls • Cleaning materials • Hoe • Broom • Brush • Safety gears • Dust covers • Dust mask • Dust bin • Wheel barrow	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Managing land pollution	**Brainstorm:** Guide the students to: define land pollution, identify causes of land pollution, and control measures of land pollution. **Demonstration:** Demonstrate to the students how to manage land pollution in school campus safely. **Practical Activity:** Organize the students in manageable groups to manage land pollution in school premises.	**The student should be able to:** • Select relevant safety gears • Prepare preventive maintenance schedule • Control land pollution • Maintaining safety environment • Control tools, equipment and safety gears • Control different types of wastes as per OSHA • Conduct safety awareness training to subordinates • Clean tools and equipment • Store tools and equipment	Land pollution managed safely	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Manage land pollution **Principles:** The student should explain the principle of: - • Managing land pollution **Theories:** The student should explain: - • Advantages of monitoring land pollution • Importance of control different types of wastes that cause land pollution **Circumstantial knowledge:** Detailed knowledge about: • Safety knowledge while managing land pollution • Safe handling of tools and equipment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • Safety boots • Gloves • Overalls • Cleaning materials • Hoe • Broom • Brush • Safety gears • Dust covers • Dust mask • Dust bin • Wheel barrow	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
5.0 Managing preventive maintenance	5.1 Planning preventive maintenance	(a) Prepare schedules of preventive maintenance of tools, machines and equipment	**Brainstorm:** Guide the students to: define maintenance, identify types of maintenance, importance of preparing preventive maintenance schedule of tools, equipment and machine. **Demonstration:** Demonstrate to students how to prepare schedules used to maintain tools, equipment and machine in workshop safely. **Practical Activity:** Organize the students in manageable groups to prepare schedules used to maintain tools, equipment and machine in workshop.	**The student should be able to:** • Interpret service manuals • Read and apply workshop rules and regulations • Select tools and equipment • Prepare workshop preventive maintenance schedule of tools equipment and machine • Plan and Prepare workshop inventory • Clean tools and equipment • Store tools and equipment	Preventive maintenance schedule of tools, equipment and machine prepared as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Prepare schedules of maintaining tools, equipment and machines **Principles:** The student should explain the principle of: - • Preparing schedules of maintaining tools, equipment and machines **Theories:** The student should explain: - • Importance of Cleaning and storing tools and equipment **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while planning preventive maintenance • Safe handling of tools and equipment • Safe Waste disposal	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • General hand tool kit • Workshop tools, equipment and machines • Service manuals • Workshop rules and regulations • Gloves • Overall • Safety boots • Safety glasses • Helmet • Mask • Ear plug	102

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Preparing inspection checklist of tools, equipment and machines	**Brainstorm:** Guide the students to: define inspection report, identify, importance of preparing inspection checklist of tools, equipment and machine. **Demonstration:** Demonstrate to the student how to prepare inspection checklist of tools, equipment and machine in workshop safely. **Practical Activity:** Organize the students in manageable groups to prepare inspection checklists of tools, equipment and machine in workshop.	**The student should be able to:** • Interpret service manuals • Read and apply workshop rules and regulations • Select tools and equipment • Prepare inspection checklist of tools, equipment and machine • Clean tools and equipment • Store tools and equipment	Inspection checklist of tools, equipment and machine prepared as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Prepare inspection checklists of tools, equipment and machines **Principles:** The student should explain the principle of: - • Prepare inspection checklists of tools, equipment and machines **Theories:** The student should explain: - • Importance of preparing workshop inspection checklists **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while planning preventive maintenance • Safe handling of tools and equipment • Safe Waste disposal	This element can be achieved at school workshop and the following material, tools, and equipment are to be available: • General hand tool kit • Workshop tools, equipment and machines • Service manuals • Workshop rules and regulations • Gloves • Overall • Safety boots • Safety glasses • Helmet • Mask • Ear plug	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(c) Preparing schedules of preventive maintenance of buildings	**Brainstorm:** Guide the students to: define buildings, identify types of buildings, importance of preparing preventive maintenance schedule of buildings. **Demonstration:** Demonstrate to the student how to prepare schedules used to maintain buildings in school campus safely. **Practical Activity:** Organize the students in manageable groups to prepare schedules used to maintain buildings in school campus	**The student should be able to:** • Interpret service manuals • Read and apply workshop rules and regulations • Prepare workshop preventive maintenance schedule of building • Clean tools and equipment • Store tools and equipment	Preventive maintenance schedule of buildings prepared as per specification	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain how to • Prepare schedules of preventive maintenance of buildings **Principles:** The student should explain the principle of: - • Preparing schedules of preventive maintenance of buildings **Theories:** The student should explain: - • Importance of preparing buildings maintenance schedule **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while planning preventive maintenance • Safe handling of tools and equipment • Safe Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • General hand tool kit • Workshop tools, equipment and machines • Service manuals • Workshop rules and regulations • Gloves • Overall • Safety boots • Safety glasses • Helmet • Mask • Ear plug	

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
	5.2 Supervising preventive maintenance	(a) Performing preventive maintenance of tools, equipment and machines.	**Brainstorm:** Guide the students to: identify steps to follow when performing preventive maintenance of tools, equipment and machines, and safety precautions while performing preventive maintenance of tools, equipment and machines **Demonstration:** Demonstrate to students how to handle tools, equipment and machine in a workshop safely. **Practical Activity:** Organize the students in manageable groups to perform preventive maintenance of tools, equipment and machine available in plumbing workshop.	**The student should be able to:** • Interpret service manuals • Read and apply rules and regulations • Prepare and apply workshop inspection report • Prepare and use safety signs and color code • Prepare and apply workshop preventive maintenance schedule • Plan and conduct preventive maintenance training • Practice correct hand tools and equipment safety • Clean tools and equipment • Store tools and equipment	Preventive maintenance of tools, equipment and machine performed conforms to standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing preventive maintenance of tools, equipment and machine. **Principles:** The student should explain the principle of: - • Performing preventive maintenance of tools, equipment and machine. **Theories:** The student should explain: - • Importance of preparing, planning and conducting preventive maintenance training • Importance of Preparing and use safety signs and color code. **Circumstantial knowledge:** Detailed knowledge about: • Safe handling of tools and equipment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • General hand foot kit • Workshop tools, equipment and machines • Service manuals • Workshop rules and regulations • Gloves • Overall • Safety boots • Safety clear glasses • Helmet • Mask • Ear plug	66

Module Title (Main Competence)	Unit Title (Specific Competences)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
				Process Assessment	Services Assessment	Knowledge Assessment		
		(b) Performing preventive maintenance of working environment	**Brainstorm:** Guide the students to: identify steps to follow when performing preventive maintenance of working environment, and safety precautions while performing preventive maintenance of working environment. **Demonstration:** Demonstrate to student how to handle working environment safely **Practical Activity:** Organize the students in manageable groups to perform preventive maintenance of working environment in school campus	**The student should be able to:** • Interpret service manuals • Read and apply rules and regulations • Prepare and apply workshop inspection report • Prepare and use safety signs and color code • Prepare and apply workshop preventive maintenance schedule • Plan and conduct preventive maintenance training • Practice correct hand tools and equipment safety • Clean tools and equipment • Store tools and equipment	Preventive maintenance of working environment performed conforms to standards	**Knowledge evidence:** **Detailed knowledge of:** **Method used:** The student should explain procedures of: • Performing preventive maintenance working environment. **Principles:** The student should explain the principle of: - • Performing preventive maintenance of working environment. **Theories:** The student should explain: - • Importance of follow good environmental practices **Circumstantial knowledge:** Detailed knowledge about: • Safety precautions while planning preventive maintenance of working environment • Waste disposal	This element can be achieved at school workshop and the following material, tools and equipment are to be available: • General hand foot kit • Workshop rules and regulations • Gloves • Overall • Safety boots • Safety clear glasses • Helmet • Mask • Ear plug	
6.0 Projects	6.1 Project	(a) Project						

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