



THE REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

PLUMBING TECHNICIAN

LEVEL 5

PROGRAMME CODE: 0732 454A



THE KITALE NATIONAL POLYTECHNIC

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FOREWORD

Kenya's development agenda is set out in Vision 2030, Sustainable Development goals, Kenya Medium Term Plans (MTPs) and the Bottom - up Economic Transformation Agenda (BETA). The overall vision is to make Kenya a globally competitive and prosperous country by transforming it into an industrialised middle-income nation, providing high quality of life for all her citizens by the year 2030.

Quality TVET skills are vital for the day to day running of industrial activities and operations. The Kenyan Government has placed a lot of emphasis on quality skilled manpower and as such has established various Technical and Vocational Polytechnics and Colleges to train and produce skilled manpower required by industries to achieve economic and development goals.

TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift towards embracing Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya, emphasised the need to reform curriculum development, assessment and certification. This is being actualised in the Government's Bottom - up Economic Transformation Agenda (BETA) which advocates for a learner centred, flexible, demand driven and industry led TVET curricula for all training institutions.

The Government of Kenya requires industry to take a leading role in the process of development of a well thought out CBET curriculum that contemplates future industry needs. This will narrow the gap on competency requirements, and create immense job opportunities for our TVET graduates.

I have confidence that the application of this Occupational Standard and Curriculum will play a critical role in the development of competent human capital in construction sector.

Dr. Esther Thaara Mworira, PhD

Principal Secretary,

State Department for Vocational and Technical Training,

Ministry of Education

PREFACE

Kitale National Polytechnic has positioned itself as a premier institution located in the North Rift of Kenya. We excel at training highly skilled technical and innovative graduates with sufficient and relevant entrepreneurial skills to enable them play an effective role in the country's development.

In our quest to align our vision and legal mandate as a Qualifications Awarding Institution to the National strategy for social economic development and provision of Quality education and training, we have come up with a well-researched Occupational Standard in plumbing technician level 5, developed with engagement of Industry.

We are alive to the fact that TVET has the potential to positively impact the livelihoods of the youth in our county and beyond. We bear the responsibility now more than ever, to craft and shape their future by equipping them with skills for the ever changing job market. This is our priority.

In this regard, we have made a big shift in our training by moving away from knowledge based to competency based training by embracing the CBET curriculum to meet the demands of a technologically complex and skills starved job market. Certification of this curriculum will be based on demonstration of competence and mode of delivery will allow for multiple entry and exit in our TVET programme

This Occupational Standard is designed and organized with clear performance criteria for each element of competency, and is divided into three parts; basic, common and core units. The Standard also outlines the required knowledge and skills for one to be declared competent in their respective field and level.

It is my deep conviction that the application of plumbing technician level 5 Curriculum will play a great role towards development of a competent human resource base in construction sector and also chart the way for development of several other curricula to meet the dynamic needs of industry.

DR PAUL KIBIRECH KORIR

GOVERNING COUNCIL CHAIR

ACKNOWLEDGMENT

This was developed through the combined effort of various stakeholders from private and public organisations. I am thankful to the management of these organisations for allowing their staff to participate in this cause. I wish to acknowledge the invaluable contribution of the industry experts who provided input towards the development of these Standards and Curricula.

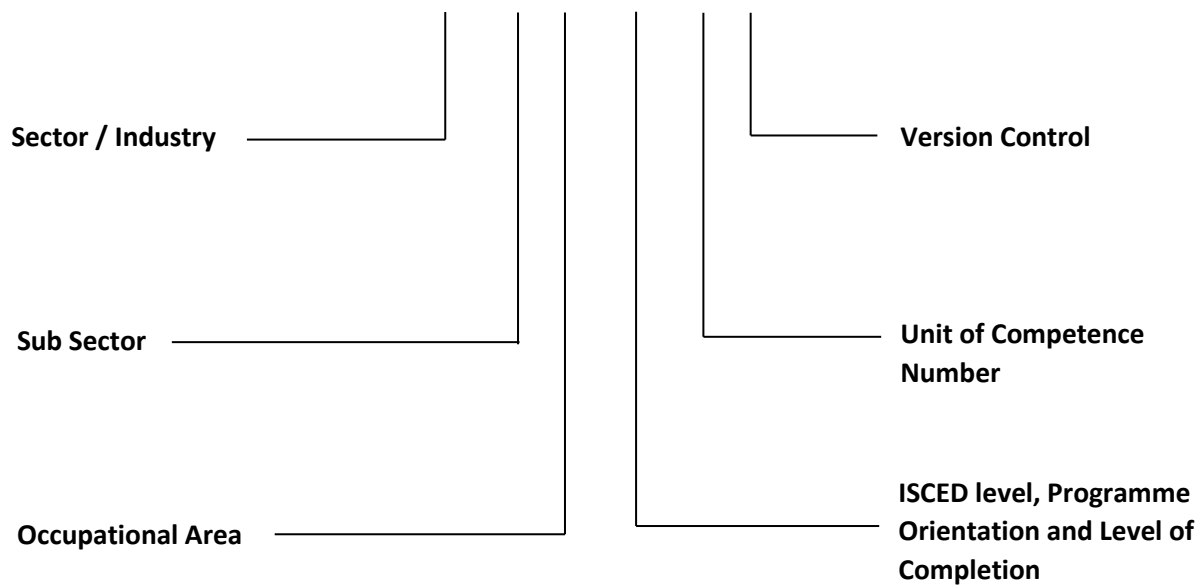
I thank Kitale National Polytechnic trainers for the development of this curriculum. Special thanks to TVETA Standards Development Team for their guidance and KNQA for registration of KNP as a Qualifications Awarding Institution.

I acknowledge all other individuals and organisations who participated in the development of these Standards and Curricula

OTIENO JOHN AKOLA
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KEY TO UNIT CODE

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ABBREVIATION AND ACRONYMS

2D	2 Dimensional
3D	3 Dimensional
KNP	Kitale National Polytechnic
BC	Basic Competency
CBET	Competency Based Education and Training
EMCA	Environmental Management and Coordination Act
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualifications Authority
MoE	Ministry of Education
OS	Occupational Standards
OSHA	Occupation Safety and Health Act
PPE	Personal Protective Equipment
TVET	Technical and Vocational Education and Training

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OVERVIEW

Plumbing technician Level 5 qualification consists of competencies that an individual must achieve to enable him/her offer plumbing services comprising of installing water supply and storage system, rainwater harvesting goods and disposal, sanitary appliances and drainage system, gas supply, solar water heating system. It also involves performing arc and gas welding and maintaining plumbing systems

The units of competency comprising this qualification include the following basic, common and core competencies:

SUMMARY OF UNITS OF COMPETENCY

BASIC UNITS OF COMPETENCY	
UNIT CODE	UNIT TITLE
0031 441 01A	APPLY COMMUNICATION SKILLS
0611 451 02A	APPLY DIGITAL LITERACY SKILLS
0413 441 03A	APPLY ENTREPRENEURIAL SKILLS
0031 441 04A	APPLY EMPLOYABILITY SKILLS
0712 441 05A	APPLY ENVIRONMENTAL LITERACY SKILLS
1022 441 06A	APPLY OCCUPATIONAL SAFETY AND HEALTH PRACTICES
COMMON UNITS OF COMPETENCY	
0541 451 07A	APPLY ENGINEERING MATHEMATICS
0732 451 08A	APPLY TECHNICAL DRAWING
0533 441 09A	APPLY PHYSICS PRINCIPLES
CORE UNITS OF COMPETENCY	
0732 451 10A	INSTALL WATER SUPPLY AND STORAGE SYSTEMS
0732 451 11A	INSTALL RAIN WATER HARVESTING GOODS AND DISPOSAL SYSTEM
0732 451 12A	INSTALL SANITARY APPLIANCES AND DRAINAGE SYSTEM
0732 451 13A	INSTALL GAS SUPPLY SYSTEM
0732 451 14A	PERFORM ARC AND GAS WELDING
0732 451 15A	INSTALL SOLAR WATER HEATING SYSTEM
0732 451 16A	MAINTAIN PLUMBING SYSTEM

BASIC UNITS OF COMPETENCY

APPLY COMMUNICATION SKILLS

UNIT CODE: 0031 441 01A

UNIT DESCRIPTION

This unit covers the competencies required to use specialized communication skills to meet specific needs of internal and external clients, conduct interviews, facilitate discussion with groups and contribute to the development of communication strategies.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace Function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Meet communication needs of clients and colleagues	1.1 <i>Communication objectives</i> are determined according to organisation needs 1.2 <i>Media of communication</i> are identified according to target audience 1.3 <i>Communication channels</i> are determined based on those engaged in communication 1.4 <i>Types of communication</i> determined based on communication strategies 1.5 Barriers of communication are managed according to principles of communication 1.6 Communication is effectively carried out according <i>to principles of communication</i>
2. Conduct interviews	2.1 <i>Type of interviews</i> is determined based on organisational needs 2.2 Requirements for interview are identified according to interview specification 2.3 Interviewees are invited according to interview schedules 2.4 Interview is conducted according to set procedures

	2.5 Interview report is written based on Interview findings
3. Facilitate group discussions	<p>3.1 <i>Types of groups</i> are identified according to group goals</p> <p>3.2 Meetings are prepared according to meeting procedures</p> <p>3.3 Duties are assigned in accordance to roles within the meeting</p> <p>3.4 Meetings are conducted based on meeting program</p> <p>3.5 Minutes are written in accordance to proceedings and resolutions</p>
4. Document information	<p>4.1 <i>Correspondences</i> are prepared based on target audience</p> <p>4.2 <i>Forms</i> are filled according to specified requirements</p> <p>4.3 Reports are written based on organisation needs</p>
5. Represent the organization	<p>5.1 <i>Public relation activities</i> are carried out according to organisational procedures</p> <p>5.2 <i>Customer care activities</i> are carried out according to organisational procedures</p> <p>5.3 Diplomacy etiquette and protocol are observed based on organisation procedure</p>

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1.Communication objectives may include but not limited to:	1.1 Creating understanding 1.2 Building awareness 1.3 Providing information 1.4 Motivation 1.5 Coordination 1.6 Marketing 1.7 Building relationships 1.8 Advice 1.9 Warning 1.10 Negotiation
2.Media of communication may include but not limited to:	2.1 Oral 2.2 Written 2.3 Use of signs
3.Communication channels may include but not limited to:	3.1 Upward 3.2 Downward 3.3 Diagonal
4.Types of communication may include but not limited to:	4.1 Internal 4.2 External 4.3 Formal 4.4 informal
5.Barriers of communication may include but not limited to:	5.1 Physical 5.2 Psychological 5.3 Interpersonal 5.4 Language

	5.5 Cultural
6. Type of interviews may include but not limited to:	6.1 Panel Interview 6.2 Structured Interview 6.3 Unstructured Interview 6.4 Stress Interview 6.5 Case Interview 6.6 Off-site Interview 6.7 Informational Interview
7. Types of groups includes but not limited to:	7.1 Formal 7.2 Informal 7.3 Committees
8. Public relation activities include but not limited to:	8.1 Hosting press conferences 8.2 Placing clients in media training 8.3 Advertisement 8.4 Corporate social responsibility 8.5 Lobbying 8.6 Promotion 8.7 Publicity
9. Customer care activities include but not limited to:	<ul style="list-style-type: none"> • Answering questions • resolving issues • handling customer complaints • customer feedback • processing orders • providing proactive customer outreach

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Effective communication process
- Active listening
- Giving/receiving feedback
- Interpretation of information
- Role boundaries setting
- Negotiation
- Establishing empathy
- Openness and flexibility in communication
- Communication skills required to fulfill job roles as specified by the organization

Required Knowledge

The individual needs to demonstrate knowledge of:

- Communication process
- Communication skills relevant to client groups
- Dynamics of groups and different styles of group leadership
- Flexibility in communication
- Communication skills relevant to client groups

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Communicated according to principles of communication 1.2 Conducted Interview according to set procedures 1.3 Prepared correspondences based on target audience 1.4 Wrote reports based on organisation needs 1.5 Carried out customer care activities according to organisational procedures
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2. Resource Implications	<p>The following resources should be provided:</p> <p>1. 1 Access to relevant workplace or appropriately simulated environment where assessment can take place</p> <p>1. 2 Materials relevant to the proposed activity or tasks</p>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>1.1 Direct Observation/Demonstration with Oral Assessment</p> <p>1.2 Written Examination</p>
4. Context of Assessment	<p>Competency may be assessed individually in the actual workplace or through simulated workplace</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

APPLY BASIC DIGITAL LITERACY SKILLS

UNIT CODE: 0611 451 02A

UNIT DESCRIPTION

This unit covers the competencies required to effectively using digital devices such as smart phones, tablets, laptops and desktop PCs. It entails identifying and using digital devices such as smart phones, tablets, laptops and desktop PCs for purposes of communication, work performance and management at the work place.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace functions.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify appropriate computer software and hardware.	1.1 Concepts of ICT are determined in accordance with computer equipment. 1.2 Classifications of computers are determined in accordance with manufacturer's specification. 1.3 <i>Appropriate computer software</i> is identified according to manufacturer's specification. 1.4 <i>Appropriate computer hardware</i> is identified according to manufacturer's specification. 1.5 Functions and commands of operating system are determined in accordance with manufacturer's specification.
2. Apply security measures to data, hardware, and software in automated environment.	2.1 <i>Data security and privacy are classified</i> in accordance with the prevailing technology. 2.2 <i>Security threats</i> are identified <i>and control measures</i> are applied in accordance with laws governing protection of ICT. 2.3 Computer threats and crimes are detected. 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT.

ELEMENT	PERFORMANCE CRITERIA
<p>These describe the key outcomes which make up workplace functions.</p>	<p>These are assessable statements which specify the required level of performance for each of the elements.</p> <p><i>Bold and italicized terms are elaborated in the Range</i></p>
<p>3. Create digital content</p>	<p>3.1 <i>Digital content</i> is created in alignment to workplace requirements:</p> <p>3.2 Digital content creation tools are identified as per work requirements.</p> <p>3.3 Digital content platforms are selected as per workplace requirements.</p> <p>3.4 Multimedia content created and customized as per selected digital platforms' requirement</p> <p>3.5 Digital content effectiveness is measured as per analytics and metrics of web traffic and conversation rates</p> <p>3.6 Digital content is distributed across different platforms, as per workplace requirement.</p> <p>3.7 <i>Digital content Legal and ethical considerations</i> are identified as per existing national and international digital content laws</p>
<p>4. Apply computer software in solving tasks</p>	<p>4.1 <i>Word processing concepts</i> are applied in resolving workplace tasks, report writing and documentation.</p> <p>4.2 <i>Word processing utilities</i> are applied in accordance with workplace procedures.</p> <p>4.3 Worksheet layout is prepared in accordance with work procedures.</p> <p>4.4 Worksheets are built and data manipulated in the worksheets in accordance with workplace procedures.</p> <p>4.5 Continuous data manipulated on worksheet is undertaken in accordance with work requirements</p> <p>4.6 Database design and manipulation is undertaken in accordance with office procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace functions.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
	4.7 Data sorting, indexing, storage, retrieval and security is provided in accordance with workplace procedures.
5. Apply internet and email in communication at workplace.	5.1 Electronic mail addresses are opened and applied in workplace communication in accordance with office policy. 5.2 Office internet functions are defined and executed in accordance with office procedures. 5.3 <i>Network configuration</i> is determined in accordance with office operations procedures. 5.4 Official World Wide Web is installed and managed according to workplace procedures.
6. Apply Desktop publishing in official assignments.	6.1 Desktop publishing functions and tools are identified in accordance with manufactures specifications. 6.2 Desktop publishing tools are developed in accordance with work requirements. 6.3 Desktop publishing tools are applied in accordance with workplace requirements. 6.4 Typeset work is enhanced in accordance with workplace standards.
7. Prepare presentation packages.	7.1 Types of presentation packages are identified in accordance with office requirements. 7.2 Slides are created and formulated in accordance with workplace procedures. 7.3 Slides are edited and run in accordance with work procedures. 7.4 Slides and hand-outs are printed according to work requirements.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1.Appropriate computer software may include but not limited to:	1. Collection of instructions or computer tools that enable the user to interact with a computer, its hardware, or perform tasks.
2.Appropriate computer hardware may include but not limited to:	Collection of physical parts of a computer system such as; 2.1 Computer case, monitor, keyboard, and mouse 2.2 All the parts inside the computer case, such as the hard disk drive, motherboard and video card.
3.Data security and privacy may include but not limited to:	3.1 Confidentiality of data. 3.2 Cloud computing. 3.3 Integrity-but-curious data surfing.
4.Security and control measures may include but not limited to:	4.1 Counter measures against cyber terrorism. 4.2 Risk reduction. 4.3 Cyber threat issues. 4.4 Risk management. 4.5 Pass-wording.
5.Security threats may include but not limited to:	5.1 Cyber terrorism. 5.2 Hacking.
6.Digital content strategy	How to create a content strategy that aligns with business goals and meets the needs of the target audience.
7.Word processing concepts may include but not limited to:	Using a special program to create, edit and print documents.
8.Network configuration may include but not limited to:	Organizing and maintaining information on the components of a computer network.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills.
- Interpretation.
- Typing.
- Communication.
- Computing applying arithmetic operations.
- Basic ICT skills.

Required Knowledge

The individual needs to demonstrate knowledge of:

- Functions of computer software and hardware.
- Data security and privacy.
- Computer security threats and control measures.
- Technology underlying cyber-attacks and networks.
- Cyber terrorism and computer crimes.
- Detection and protection of computer crimes.
- Laws governing protection of ICT.
- Functions and concepts of word processing.
 - Documents and tables creation and manipulations.
- Mail merging.
- Word processing utilities.
- Spread sheets;
 - Meaning, formulae, function and charts, uses and layout.
 - Data formulation, manipulation and application to cells.
- Database;
- Desktop publishing;
- Presentation Packages;
- Networking and Internet;
- Emerging trends and issues in ICT;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency.</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Identified and controlled security threats. 1.2 Detected and protected computer crimes. 1.3 Applied word processing in office tasks. 1.4 Designed, prepared work sheet and applied data to the cells in accordance to workplace procedures. 1.5 Opened electronic mail for office communication as per workplace procedure. 1.6 Installed internet and World Wide Web for office tasks in accordance with office procedures. 1.7 Integrated emerging issues in computer ICT applications. 1.8 Applied laws governing protection of ICT.
<p>2. Resource Implications.</p>	<ul style="list-style-type: none"> 2.1 Tablets. 2.2 Laptops. 2.3 Desktop PCs. 2.4 Desktop computer. 2.5 Calculator. 2.6 Internet. 2.7 Smart phone. 2.8 Operations Manuals.
<p>3. Methods of Assessment.</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Written Test. 3.2 Demonstration. 3.3 Practical assignment. 3.4 Interview/Oral Assessment. 3.5 Demonstration.
<p>4. Context of Assessment.</p>	<p>Competency may be assessed in</p> <ul style="list-style-type: none"> 4.1 On job setting.

	4.2 simulated workplace
5. Guidance information for assessment.	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY ENTREPRENEURIAL SKILLS

UNIT CODE : 0413 441 03A

UNIT DESCRIPTION

This unit covers the outcomes required to build and develop the enterprise to be more competitive within a changing business environment, specifically responding to consumer demands while maintaining product quality and accessibility, building a customer base and employee motivation.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Develop business strategies	<p>1.1 Purpose of business strategy is identified as per objectives of the business</p> <p>1.2 Strengths, weaknesses, opportunities and threats are identified per business objectives</p> <p>1.3 value for customers is created based on SWOT analysis</p> <p>1.4 value for suppliers is created based on SWOT analysis</p> <p>1.5 value for employees is created based on SWOT analysis</p>
2. Design business plan	<p>2.1 Executive summary is drafted as per business objectives</p> <p>2.2 management and organization structure is constructed based on nature of business</p> <p>2.3 Customer segmentation is determined based on market demand.</p> <p>2.4 Logistics and operations plan is provided as per nature of business.</p> <p>2.5 Financial plan is drafted as per business objectives</p>
3. Develop product/service	<p>3.1 Research on business product/service is carried out as per business idea</p> <p>3.2 Product/service version is drafted as per standard operating procedures (SOPs)</p> <p>3.3 Product/service is developed based on SOPs</p> <p>3.4 Product/service is tested as per SOPs</p> <p>3.5 product/service is sold as per client's needs</p>
4. Motivate staff/workers	<p>4.1 Measurable goals are set as per business objectives</p> <p>4.2 Open Communication is fostered as per business objectives</p> <p>4.3 Agile Work Environment is created as per nature of business</p>

ELEMENT	PERFORMANCE CRITERIA
	4.4 Workplace is incentivized based on business income 4.5 Great work is recognized as per achievement of business objectives 4.6 Teamwork is encouraged based on business objectives
5. Expand employed capital base	5.1 Operating Cycles are shortened as per business transactions 5.2 Credit Checks are performed based on new Customers 5.3 Outstanding Invoices Collected based on time 5.4 Operational Expenses are minimized as per business objectives 5.5 Sales Revenue is increased based on business transactions 5.6 Inventory Management is improved based on nature of business 5.7 Debts are managed well based on business objectives
6. Undertake business expansion	6.1 Goals are identified based on the new target market 6.2 A new target market is identified as per business objectives/goals 6.3 Research is carried out based on the new target market 6.4 Plan is created to enter the new target market based on business objectives

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. value for customers include but not limited to:	1.1 Quality 1.2 Price 1.3 Service 1.4 Branding 1.5 Social Influence
2. value for suppliers include but not limited to:	2.1 Timely payments. 2.2 Flexibility. 2.3 Critical information.

Variable	Range
3. value for employees include but not limited to:	3.1 compensation packages 3.2 work life balance 3.3 recognition program 3.4 professional development 3.5 pulse survey
4. Customer segmentation	4.1 Demographic Segmentation. 4.2 Behavioral Segmentation. 4.3 Psychographic Segmentation. 4.4 Geographic Segmentation. 4.5 Technographic Segmentation. 4.6 Firmographic Segmentation. 4.7 Needs-Based Segmentation. 4.8 Value-Based Segmentation.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Business management skills.
- Teamwork and leadership skills.
- Communication and listening.
- Customer service skills.
- Financial skills.
- Analytical and problem-solving skills.
- Critical thinking skills.
- Strategic thinking and planning skills.

Required Knowledge

The individual needs to demonstrate knowledge of:

- Accounting
- Financial management
- Marketing
- Management
- Procurement
- Insurance

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 created value for customers based on SWOT analysis 1.2 created value for suppliers based on SWOT analysis 1.3 created value for employees based on SWOT analysis 1.4 Designed a business plan based on business objectives 1.5 Developed a product/service and sold based on market demand
2. Resource Implications	The following resources should be provided: 2.1 Laptop 2.2 Computer 2.3 Rulers 2.4 Pencil 2.5 Rubbers 2.6 Biro pens 2.7 Calculator 2.8 Projector
3. Methods of Assessment	3.1 Case problems 3.2 Written tests 3.3 Interview 3.4 Third party reports
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY EMPLOYABILITY SKILLS

UNIT CODE: 0031 441 04A

UNIT DESCRIPTION

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading small teams, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and workplace ethics.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Conduct self-management	<ul style="list-style-type: none">1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives.1.2 Individual performance is evaluated and monitored according to the agreed targets.1.3 Assertiveness is developed and maintained as per workplace policy.1.4 Time management, attendance and punctuality are observed as per the organization policy.1.5 Goals are managed as per the organization's objective1.6 Self-strengths and weaknesses are identified as per <i>personal objectives</i>1.7 Critics are managed as per personal objectives
2. Apply interpersonal communication at the workplace	<ul style="list-style-type: none">2.1 Needs of audience are written as per communication policy2.2 <i>Forms of communication</i> are applied as per communication policy2.3 Communication is done empathetically as per communication standards2.4 Internal and external customers' needs are identified and interpreted as per communication policy2.5 Communication is done persuasively as per communication standards.2.6 Communication networks are established as per SOPs2.7 Information is shared as per communication structure
3. Conduct critical safe work	<ul style="list-style-type: none">3.1 Stress is managed in according to workplace

ELEMENT	PERFORMANCE CRITERIA
habits	<p>procedures.</p> <p>3.2 Punctuality and time consciousness is demonstrated as per workplace policy.</p> <p>3.3 Personal objectives are integrated with organization goals based on organization's strategic plan.</p> <p>3.4 Work priorities are set according to workplace procedures.</p> <p>3.5 Work breaks are taken during work as per organization policy.</p> <p>3.6 Drug and substance abuse is abstained from as per workplace policy.</p> <p>3.7 Safety precautions at the workplace are adhered based on organization safety policy.</p>
4.Perform leadership	<p>4.1 Performance expectations for the teams are set as per the organization objectives</p> <p>4.2 Tasks are assigned according to workplace requirements.</p> <p>4.3 Team performance indicators are identified according to set rules and regulations.</p> <p>4.4 Forms of communication in a team are established according to office policy.</p> <p>4.5 Communication is carried out as per workplace place policy.</p> <p>4.6 Feedback on performance is determined and analysed based on workplace policy.</p> <p>4.7 Gender mainstreaming is trained according to set regulations.</p>
5.Plan and organize work	<p>5.1 Task requirements are identified as per workplace objectives</p> <p>5.2 Task is interpreted according to safety environmental requirements and quality requirements</p> <p>5.3 Work activity is organized with other involved personnel as per the SOPs</p> <p>5.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables as per SOPs.</p> <p>5.5 Work activities are monitored and evaluated as per organization procedures.</p> <p>5.6 Job planning is documented according to workplace requirements.</p>

ELEMENT	PERFORMANCE CRITERIA
	5.7 Time management is monitored as per workplace set goals and objectives.
6. Maintain professional growth and development	<p>6.1 Personal training needs are identified and assessed as per work place requirements</p> <p>6.2 Training and career opportunities are identified based on job requirements.</p> <p>6.3 Licenses and certifications are obtained as per work requirement</p> <p>6.4 Work priorities are identified based on requirement of the job and workplace policy.</p>
7. Demonstrate workplace learning	<p>7.1 Learning opportunities are identified based on organization policy.</p> <p>7.2 Contribution of learning to community is carried out as per workplace requirements.</p> <p>7.3 Range of media for learning are identified as per the training need.</p> <p>7.4 Application of learning is applied in both technical and non-technical aspects based on requirements of the job</p> <p>7.5 Opportunities for performance improvement are identified as per workplace need.</p>
8. Demonstrate problem solving skills	<p>8.1 Problems are identified as per context of data and circumstances</p> <p>8.2 Problem solutions are identified based on problem</p> <p>8.3 Team problems are solved as per workplace guidelines</p> <p>8.4 Problem solving strategies are applied as per workplace guidelines</p>
9. Demonstrate workplace ethics	<p>9.1 Policies and guidelines are observed and implemented as per workplace requirements</p> <p>9.2 Self-worth and profession is exercised as per personal goals and organizational policies</p> <p>9.3 Code of conduct is observed as per workplace requirements</p> <p>9.4 Personal and professional integrity is demonstrated as per personal goals</p> <p>9.5 Commitment to jurisdictional laws is demonstrated as per workplace requirements</p>

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Personal objectives may include but not limited to:	1.1 Connect with co-workers 1.2 Solve problems 1.3 Career independence 1.4 Team player
2. Forms of communication may include but not limited to:	2.1 Verbal communication 2.2 Non-verbal communication 2.3 Written communication 2.4 Visual communication 2.5 Audio-visual communication
3. Drugs and substance abuse may include but not limited to:	3.1 Medicinal drugs 3.2 Soft drugs 3.3 Hard drugs
4. Emerging issue may include but not limited to:	4.1 Workplace diversity 4.2 Litigation 4.3 Trade unions 4.4 Remote work and flexibility 4.5 Digital usage
5. feedback may include but not limited to:	5.1 Negative feedback 5.2 Positive feedback 5.3 Affirming feedback 5.4 Corrective feedback
6. Gender mainstreaming may include but not limited to:	6.1 Gender equality 6.2 Gender sensitive language
7. Training and career opportunities may include but not limited to:	7.1 Knowledge based 7.2 Skills based 7.3 Entrepreneur based 7.4 Freelance
8. Gender mainstreaming may include but not limited to:	8.1 Print media 8.2 Non-print media

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Training
- Presentation
- Decision making
- Critical thinking
- Analytical
- Diagnostic skills
- Communication
- Interpersonal skills
- Monitoring
- Evaluation
- Problem solving
- Observation
- First Aid

Required Knowledge

The individual needs to demonstrate knowledge of:

- Principle of management
- Essential drugs and supplies
- Training tools and materials
- Research methods
- Monitoring and evaluation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1 Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Conducted self-management at the workplace based on organization safety policy. 1.2 Applied interpersonal communication at the workplace according to set regulations. 1.3 Conducted critical safe work habits as per workplace set goals and objectives 1.4 Performed leadership skills based on requirement of job and workplace policy 1.5 Planned and organized work as per workplace needs. 1.6 Maintained professional growth and development as per workplace guidelines 1.7 Identified workplace learning as per workplace requirements
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	<p>1.8 Applied problem solving skills based on work place policies</p> <p>1.9 Practiced workplace ethics based on work place policies.</p>
2	<p>The following resources should be provided:</p> <p>1.1 Workstation</p> <p>1.2 Stationery</p> <p>1.3 Computer</p> <p>1.4 Training manuals</p> <p>1.5 First aid kits</p> <p>1.6 Projector</p>
3 Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>1.1 Observation</p> <p>1.2 Written assessment</p> <p>1.3 Oral assessment</p>
4 Context of Assessment	<p>Competency may be assessed on the job or in simulated workplace</p>
5 Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

APPLY ENVIRONMENTAL LITERACY SKILLS

UNIT CODE: 0712 441 05A

UNIT DESCRIPTION

This unit specifies the competencies required to follow procedures for environmental hazard control, follow procedures for environmental pollution control, use resources sustainably, implement environmental programs and monitor and evaluate activities on Environmental protection/Programs

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Control environmental hazard	1.1 Identify hazards in the environment. 1.2 Collect and eliminate the hazards according to environmental regulations and OSHS. 1.3 <i>Storage methods</i> for environmentally hazardous materials are strictly followed according to environmental regulations and OSHS. 1.4 <i>Disposal methods</i> of hazardous wastes are followed at all times according to environmental regulations and OSHS. 1.5 <i>PPE</i> is used according to OSHS.
2. Control environmental Pollution	2.1 Identify environmental pollutants. 2.2 Collect and eliminate environmental pollutants according to environmental regulations and OSHS. 2.3 Environmental pollution <i>control measures</i> are applied following standard protocol. 2.4 <i>Waste management</i> is carried out according to Environmental Management and Coordination Act 1999
3. Use resources sustainably	3.1 Resource consuming processes are identified as per the organizational structure 3.2 Develop resource conservation plans as per the organizational environmental policy 3.3 <i>Implement resource usage</i> as per the organizational environmental policy 3.4 <i>Monitor resource usage</i> as per the organizational

	<p>environmental policy</p> <p>3.5 <i>Evaluate resource usage</i> as per the organizational environmental policy</p> <p>3.6 Report resource usage as per the organizational environmental policy</p> <p>3.7 Wastes are classified for possible source of resources as per the organizational environmental policy</p> <p>.</p>
4. Implement environmental programs	<p>4.1 Stakeholders are consulted based on company guidelines</p> <p>4.2 Programs/Activities are identified according to organizations policies and guidelines.</p> <p>4.3 Individual roles/responsibilities are determined and performed based on the activities identified.</p> <p>4.4 Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines</p> <p>4.5 Environmental program implementation report is prepared as per organizations policies and guidelines.</p>
5. Monitor and evaluate activities on Environmental protection/Programs	<p>5.1 Develop monitoring and evaluation tools as per organizational policy and environmental program requirement</p> <p>5.2 Feedback from stakeholders is gathered periodically and considered in Proposing enhancements to the program based on consultations</p> <p>5.3 Data gathered are analyzed based on Evaluation requirements</p> <p>5.4 Recommendations are submitted based on the findings</p> <p>5.5 Management support systems are set/established to sustain and enhance the program</p> <p>5.6 Environmental incidents are monitored and reported to concerned/proper authorities</p>

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
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1.PPE May include but are not limited to	<ul style="list-style-type: none"> 1.1 overall 1.2 safety hat 1.3 goggles 1.4 gloves 1.5 mask 1.6 Hearing protector
2.Environmental pollution control measures may include but are not limited to:	<ul style="list-style-type: none"> 2.1 Methods for minimizing or stopping spread and ingestion of airborne particles 2.2 Methods for minimizing or stopping spread and ingestion of gases and fumes 2.3 Methods for minimizing or stopping spread and ingestion of liquid wastes
3.Wastes may include but are not limited to:	<ul style="list-style-type: none"> 3.1 Recyclable 3.2 Non-recyclable
4.Waste management Procedures may include but are not limited to:	<ul style="list-style-type: none"> 4.1 Sorting 4.2 Storing of items 4.3 Recycling of items 4.4 Disposal of items
5.Resources may include but are not limited to:	<ul style="list-style-type: none"> 5.1 Electric 5.2 Water 5.3 Fuel 5.4 Telecommunications 5.5 Supplies 5.6 Materials
6.Implement resource usage may include but are not limited to:	<ul style="list-style-type: none"> 6.1 Methods for minimizing wastage are complied as per the organizational structure. 6.2 Solid waste management procedures are employed following principles of 3Rs (Reduce, Reuse, Recycle) 6.3 Methods for economizing or reducing resource consumption are practiced as per organizational policy.
7.Monitor resource usage may include but are not limited to:	<ul style="list-style-type: none"> 7.1 Quantity and nature of Resource consumed is determined 7.2 Resource flow is analyzed through different parts of the process.

8.Evaluate resource usage may include but are not limited to:	8.1 Causes of low efficiency of use of resources are determined based on industry protocol. 8.2 Efficiency of use/conversion of resources is determined following industry protocol. 8.3 Plans for increasing the efficiency of resource use are developed based on findings.
9.Workplace environmental hazards may include but are not limited to:	9.1 Biological hazards 9.2 Chemical and dust hazards 9.3 Physical hazards
10.Organizational systems and procedures may include but are not limited to:	10.1 Supply chain, procurement and purchasing 10.2 Quality assurance 10.3 Making recommendations and seeking approvals
11.Legislations/Conventions may include but are not limited to:	11.1 EMCA 1999 11.2 Montreal Protocol 11.3 Kyoto Protocol
12.Environmental aspects/impacts may include but are not limited to:	12.1 Air pollution 12.2 Water pollution 12.3 Noise pollution 12.4 Solid waste 12.5 Flood control 12.6 Deforestation/Denudation 12.7 Radiation/Nuclear /Radio Frequency/ Microwaves 12.8 Situation 12.9 Soil erosion (e.g. Quarrying, Mining, etc.)
13.Industrial standards / Environmental practices may include but are not limited to:	13.1 ISO standards 13.2 Company environmental management systems (EMS)
14.Periodic may include but are not limited to:	14.1 Hourly 14.2 daily 14.3 weekly 14.4 monthly 14.5 quarterly 14.6 yearly

15. Programs/Activities may include but are not limited to:	15.1 Waste disposal (on-site and off-site) 15.2 Repair and maintenance of equipment 15.3 Treatment and disposal operations 15.4 Clean-up activities 15.5 Laboratory and analytical test 15.6 Monitoring and evaluation 15.7 Environmental advocacy programs
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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Using PPE
- Complying environmental pollution control
- Employing waste management procedures
- Assessing procedures for assessing compliance
- Collecting information on environmental and resource efficiency systems and procedures, and Providing information to the work group
- Measuring and recording current resource usage
- Analysing and recording current purchasing strategies.
- Determining efficiency of use/conversion of resources
- Developing plans for increasing the efficiency of resource use
- Complying to regulations/licensing requirements

Required Knowledge

The individual needs to demonstrate knowledge of:

- Usage of PPE Environmental regulations
- OSHS
- Environmental pollution control measures
- Waste management procedures
- Economizing of resource consumption
- Techniques in measuring current usage of resources
- Environmental regulations.
- Regulations/licensing requirements
- Benefit/costs for different alternatives
- Components of proposals
- Regulatory requirements
- Implementation of resource efficiency plans

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Controlled environmental hazard and pollution 1.2 Demonstrated sustainable resource use 1.3 Evaluated current practices in relation to resource usage 1.4 Developed monitoring and evaluation tools as per organizational policy and environmental program requirement 1.5 Implemented and monitored environmental practices on a periodic basis as per company guidelines 1.6 Data gathered are analyzed based on Evaluation requirements 1.7 Recommendations are submitted based on the findings 1.8 Established management support systems to sustain and enhance the program 1.9 Monitored and reported environmental incidents to concerned/proper authorities
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Workplace with storage facilities 2.2 Tools, materials and equipment relevant to the tasks (e.g. Cleaning tools, cleaning materials, trash bags) 2.3 PPE, manuals and references 2.4 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.5 Case studies/scenarios relating to environmental Protection
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Demonstration 3.2 Oral assessment 3.3 Written examination 3.4 Interview/Third Party Reports 3.5 Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad)
<p>4. Context of Assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 4.1 on the job 4.2 simulated workplace environment.
<p>5. Guidance information for assessment</p>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

APPLY OCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: 1022 441 06A

UNIT DESCRIPTION

This unit specifies the competencies required to lead the implementation of workplace's safety and health program, procedures and policies/guidelines.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify workplace hazards and risk	1.1 Hazards and indicators are identified as per OSH Act 2007 1.2 OSH issues and concerns raised by workers are recorded in accordance with workplace policy 1.3 Hazards and risks report is written as per work place policy
2. Prevent hazards and risk in workplace	2.1 Workplace is organized in accordance with workplace procedures 2.2 Personal Protective Equipment are worn as per work requirement 2.3 Work standards and procedures are followed when performing workplace activities 2.4 Waste materials are disposed as per the workplace policy
3. Implement OSH programs, procedures and policies	3.1 Information to work team about company OSH program, procedures and policies are provided 3.2 Team members are trained and advised on OSH standards and procedures as per OSH act 2007 3.3 Procedures for maintaining OSH-related records are implemented as per workplace policy
4. Assess Occupational safety and health risks	4.1 Health and occupational safety risks and hazards at work place are identified as per workplace policy 4.2 Data on health and occupational safety risks and hazards at work place are obtained as per

	<p>workplace policy</p> <p>4.3 Health and occupational safety risks and hazards at work place are analyzed as per workplace policy</p> <p>4.4 Health and occupational safety risks and hazards at work place are tabulated and reported as per workplace policy</p> <p>4.5 Create and promote awareness of health and safety practices in the workplace as per workplace policy</p>
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Hazards may include but are not limited to:	<p>1.1 Physical hazards – impact, illumination, pressure, noise, vibration, extreme temperature, radiation</p> <p>1.2 Biological hazards- bacteria, viruses, plants, parasites, mites, fungi, insects</p> <p>1.3 Chemical hazards – dusts, mists, fumes, smoke, gasses, vapours</p> <p>1.4 Ergonomics</p> <p>1.5 Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles</p> <p>1.6 Physiological factors – monotony, personal, relationship, work out cycle</p> <p>1.7 Safety hazards (unsafe workplace condition) – confined space, excavations, falling objects, gas leaks, electrical, poor storage of materials and waste, spillage, waste and debris</p> <p>1.8 Unsafe workers’ act (Smoking in off-limited areas, Substance and alcohol abuse at work)</p>
2. Indicators may include but are not limited to:	<p>2.1 Increased of incidents of accidents, injuries</p> <p>2.2 Increased occurrence of sickness or health complaints/ symptoms</p> <p>2.3 Common complaints of workers related to OSH</p> <p>2.4 High absenteeism for work-related reasons</p>

<p>3. Evaluation and/or work environment measurements may include but are not limited to:</p>	<p>3.1 Health Audit 3.2 Safety Audit 3.3 Work Safety and Health Evaluation 3.4 Work Environment Measurements of Physical and Chemical Hazards</p>
<p>4. OSH issues and/or concerns may include but are not limited to:</p>	<p>4.1 Workers' experience/observance on presence of work hazards 4.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks) 4.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines</p>
<p>5. Prevention and control measures may include but are not limited to:</p>	<p>5.1 Eliminate the hazard (i.e., get rid of the dangerous machine) 5.2 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 5.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 5.4 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signage, rotation/shifting work schedule) 5.5 Use engineering controls to reduce the risk (i.e. use safety guards to machine) 5.6 Use personal protective equipment 5.7 Safety, Health and Work Environment Evaluation 5.8 Periodic and/or special medical examinations of workers</p>
<p>6. Safety gears /PPE (Personal Protective Equipment's) may include but are not limited to:</p>	<p>6.1 Arm/Hand guard, gloves 6.2 Eye protection (goggles, shield) 6.3 Hearing protection (ear muffs, ear plugs) 6.4 Hair Net/cap/bonnet 6.5 Hard hat 6.6 Face protection (mask, shield) 6.7 Apron/Gown/coverall/jump suit 6.8 Anti-static suits 6.9 High-visibility reflective vest</p>

<p>7.Appropriate risk controls</p>	<p>Appropriate risk controls in order of impact are as follows:</p> <p>7.1 Eliminate the hazard altogether (i.e., get rid of the dangerous machine)</p> <p>7.2 Isolate the hazard from anyone who could be harmed (i.e., keep the machine in a closed room and operate it remotely; barricade an unsafe area off)</p> <p>7.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one)</p> <p>7.4 Use administrative controls to reduce the risk (i.e., train workers how to use equipment safely; train workers about the risks of harassment; issue signage)</p> <p>7.5 Use engineering controls to reduce the risk (i.e., attach guards to the machine to protect users)</p> <p>7.6 Use personal protective equipment (i.e., wear gloves and goggles when using the machine)</p>
<p>8.Contingency measures may include but are not limited to:</p>	<p>8.1 Evacuation</p> <p>8.2 Isolation</p> <p>8.3 Decontamination</p> <p>8.4 (Calling designed) emergency personnel</p>
<p>9.Emergency procedures may include but are not limited to:</p>	<p>9.1 Fire drill</p> <p>9.2 Earthquake drill</p> <p>9.3 Basic life support/CPR</p> <p>9.4 First aid</p> <p>9.5 Spillage control</p> <p>9.6 Decontamination of chemical and toxic</p> <p>9.7 Disaster preparedness/management</p> <p>9.8 Use of fire-extinguisher</p>
<p>10.Incidents and emergencies may include but are not limited to:</p>	<p>10.1 Chemical spills</p> <p>10.2 Equipment/vehicle accidents</p> <p>10.3 Explosion</p> <p>10.4 Fire</p> <p>10.5 Gas leak</p> <p>10.6 Injury to personnel</p> <p>10.7 Structural collapse</p> <p>10.8 Toxic and/or flammable vapours emission.</p>

11.OSH-related Records may include but are not limited to:	11.1 Medical/Health records 11.2 Incident/accident reports 11.3 Sickness notifications/sick leave application 11.4 OSH-related trainings obtained
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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Skills on preliminary identification of workplace hazards/risks
- Knowledge management
- Critical thinking skills
- Observation skills
- Coordinating skills
- Communication skills
- Interpersonal skills
- Troubleshooting skills
- Presentation skills
- Training skills

Required Knowledge

The individual needs to demonstrate knowledge of:

1. General OSH Principles
2. Occupational hazards/risks recognition
3. OSH organizations providing services on OSH evaluation and/or work environment measurements (WEM)
4. National OSH regulations; company OSH policies and protocols
5. Systematic gathering of OSH issues and concerns
6. General OSH principles
7. National OSH regulations
8. Company OSH and recording protocols, procedures and policies/guidelines

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: <ol style="list-style-type: none"> 1.1. Identified hazards and risks in the workplace and its indicators 1.2. Requested for evaluation of OSH hazards and risk in the workplace
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	<ul style="list-style-type: none"> 1.3. Collected OSH issues and concerns raised by workers 1.4. Arranged work area and items in accordance with workplace procedures requirements 1.5. Followed work standards and procedures based on workplace policy 1.6. Applied Prevention and control measures based on instructions 1.7. Undertook orientations on OSH requirements and regulations in line with workplace policy. 1.8. Provided feedback on occupational health and safety as per workplace policy. 1.9. Followed workplace procedures for reporting hazards, incidents, injuries and sickness to as per workplace policy. 1.10. Identified and proposes OSH-related training needs as per workplace policy.
2. Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Workplace or assessment location 2.2 OSH personal records 2.3 PPE 2.4 Health records
3. Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Portfolio Assessment 3.2 Interview 3.3 Case Study/Situation 3.4 Observation
4. Context of Assessment	<p>Competency may be assessed</p> <ul style="list-style-type: none"> 4.1 on the job, 4. simulated workplace environment.
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

COMMON UNITS OF COMPETENCY

APPLY ENGINEERING MATHEMATICS

UNIT CODE: 0541 451 07A

UNIT DESCRIPTION

This unit describes the competencies required in applying basic: algebra, trigonometry statistics, indices and logarithms and ratio. It also involves performing geometrical calculations, business calculations, carrying out basic mensuration and plotting simple graphs.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Apply basic algebra	1.1 Calculations involving Indices are performed based on the mathematical concept 1.2 Linear equations are represented based on the mathematical concept 1.3 Simultaneous equations are performed based on mathematical rules 1.4 Simple algebraic equations are formed based on the c mathematical concept 1.5 Simple algebraic equations are solved based on the mathematical concept
2. Apply basic trigonometry	2.1 Trigonometric ratios are derived based on mathematical concept 2.2 Graphs are drawn based on trigonometric rules 2.3 Solved trigonometric equations using trigonometric rules
3. Perform geometrical calculations	3.1 Areas of regular figures are calculated based on the given formulae 3.2 Areas of irregular figures are calculated based on mathematical concept 3.3 Apply Pythagoras' theorem based on

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicized terms are elaborated in the Range)</i>
	mathematical concept
4. Carry out basic mensuration	4.1 Various <i>units of measurements</i> are identified based on the course requirements 4.2 Perimeter and areas of regular <i>figures</i> are obtained based on known formulae 4.3 Area of irregular figures are obtained based on given formulae 4.4 Volume and Surface area of solids are obtained based on given formulae
5. Apply basic statistics	5.1 Grouped and ungrouped data is identified and interpreted based on given sample 5.2 Ungrouped data is organized based on mathematical the concept 5.3 Data is represented in frequency tables based on the concept 5.4 The median, mode and mean of grouped and ungrouped data is calculated based on the mathematical concept 5.5 Data is presented in a chart form based on the mathematical concept
6. Plot simple graphs	6.1 A <i>graph</i> is plotted for given set of data based on given data 6.2 Solved quadratic equations using graph 6.3 Information from a given graph is interpreted based on given data

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicized terms are elaborated in the Range)</i>
7. Apply ratios, indices and logarithms	7.1 Expressed ratios as percentages based on mathematical concept 7.2 Applied direct and inverse proportions based on mathematical concept 7.3 Converted numbers from one base to another based on mathematical concept 7.4 solved exponential equations based on law of indices 7.5 solved logarithmic equations based on laws of logarithms
8. Perform business calculations	8.1 Converted one currency to another based on given data 8.2 Calculated exchange rates based on mathematical concept 8.3 Calculated income based on given data 8.4 Calculated of taxes based on given data 8.5 Calculated average sales based on given data

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range <i>May include but not limited to:</i>
1. Units of measurement	1.1. Millimetres 1.2. Centimetres 1.3. Metres 1.4. Kilometres
2. Figures	2.1. square 2.2. rectangle 2.3. triangle

	2.4. polygons 2.5. circles
3. <i>graphs</i>	3.1. linear graphs 3.2. bar graphs 3.3. pie chart 3.4. pictograph

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Logical thinking
- Problem solving
- interpersonal
- Drawing
- sketching
- measuring skills

Required knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions
- Types of angles
- Types of tables and graphs
- Presentation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills, knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: <ul style="list-style-type: none"> 1.1 Solved trigonometric equations based on trigonometric rules 1.2 Carried out mensuration based on mathematical concept 1.3 Applied basic algebra based on mathematical concept
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	<p>1.4 Performed geometrical calculations based on mathematical concept</p> <p>1.5 Calculated measures of central tendency based on given statistical data</p> <p>1.6 Plotted simple graphs based given on data</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>2.1 Access to relevant or appropriately simulated environment where assessment can take place</p> <p>2.2 Measuring equipment</p> <p>2.3 Scientific calculator</p> <p>2.4 Mathematical tables</p>
3.Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1 Written tests</p> <p>3.2 Direct Observation</p> <p>3.3 Oral Assessment</p>
Context of Assessment	<p>Assessment may be done:</p> <p>4.1 On-the-job</p> <p>4.2 Workplace simulation</p>
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

APPLY TECHNICAL DRAWING

UNIT CODE: 0732 451 08A

UNIT DESCRIPTION

This unit covers the competencies required to prepare and apply technical drawing. It involves competencies to select, use and maintains drawing equipment and materials, develop plane geometry drawings, solid geometry drawings, pictorial and orthographic drawings.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Select, use and maintain drawing equipment and materials	1.1 Drawing equipment are identified and gathered according to task requirements 1.2 Drawing equipment are used and maintained as per manufacturer's instructions 1.3 Drawing materials are used as per standard drawing conventions
2. Develop plane geometry drawings	2.1 Freehand sketching of different types of geometric forms and diagrams is conducted 2.2 lines used in drawing and their meanings are identified according to standard drawing conventions 2.3 geometric forms are constructed according to standard conventions 2.4 angles are constructed, measured and bisected according to principles of trigonometry
3. Develop solid geometry drawings	3.1 Pattern drawings are interpreted according to standard drawing conventions 3.2 solid geometry drawings are constructed according to given plane geometry 3.3 isometric drawings are constructed based on technical drawing standard conventions

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
4. Develop orthographic and pictorial drawings	4.1 Symbols and abbreviations are identified and interpreted according to standard drawing conventions 4.2 First and third angle orthographic drawings are interpreted and developed in accordance with the standard conventions 4.3 Orthographic elevations are dimensioned in accordance with standard conventions 4.4 Isometric drawings are interpreted and developed in accordance with standard conventions 4.5 Oblique drawings are interpreted and developed in accordance to standard conventions

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range <i>May include but is not limited to:</i>
1. Drawing equipment	1.1 Drawing boards 1.2 T squares 1.3 Set squares 1.4 drawing sets
2. Drawing materials	2.1 Drawing paper 2.2 Pencils 2.3 Erasers 2.4 masking tapes 2.5 paper clips
3. Standard conventions	3.1 Anatomy of engineering drawing (title block, coordinate grid system, revision block, notes and legends) 3.2 Drawing scale (paper size and drawing symbols) 3.3 International drawing standards
4. Geometric forms	4.1 Circles 4.2 Triangles

Variable	Range <i>May include but is not limited to:</i>
	4.3 rectangles 4.4 parallelogram 4.5 polygons 4.6 pyramids 4.7 conic sections 4.8 prisms

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Critical thinking
- Drawing
- Sketching
- Interpretation
- Communication
- Inter personal
- **Required knowledge**

The individual needs to demonstrate knowledge of:

- Drawing equipment and materials
- Freehand sketching
- Lettering
- Geometrical constructions
- Types of drawings
- Types of lines
- Isometric drawing conventions, features, characteristics, components
- Orthographic drawing conventions, features, characteristics, components
- Sketches and drawings of simple patterns

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Selected, used and maintained drawing equipment as per manufacturers' manual 1.2 Developed plain geometry drawings as per working drawing 1.3 Developed solid geometry drawings as per working drawing 1.4 Developed pictorial isometric and orthographic drawings as per working drawing
2. Resource Implications	The following resources should be provided: 2.1 Drawing room 2.2 Drawing equipment and materials 2.3 Computers with appropriate program
3. Methods of Assessment	Competency may be assessed through: 3.1 written tests 3.2 Observation 3.3 portfolio
4. Context of Assessment	Assessment may be done: 4.3 On-the-job 4.4 Workplace simulation
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY PHYSICS PRINCIPLES

UNIT CODE: 0533 441 09A

UNIT DESCRIPTION

This unit describes the competence in applying scientific principles. it involves applying principles of: units of measurements, force, work, energy and power, friction, heat, acoustics, pressure in fluids, mechanical properties of materials and electrical principles

ELEMENTS AND PERFORMANCE CRITERIA

element	performance criteria <i>(Bold and italicized terms are elaborated in the range)</i>
1 apply units of measurements	1.1 units of measurements are identified based on task given 1.2 units are converted based on standard convention 1.3 volumes of irregular objects are determined using archimedes principles
2 apply concepts of force, work, energy and power	2.1 forms of energy are determined based on the state of the matter 2.2 simple calculations on work, energy, power and friction are solved based on the task requirements 2.3 simple problems on friction are solved based on task requirements
3 apply principles of heat	3.1 <i>sources of heat</i> are identified for hot water supply system 3.2 effects of heat on matter are defined based on scientific principles 3.3 <i>methods of heat transfer</i> are determined and interpreted based on scientific principles
4 apply principles of pressure in fluids	4.1 density and variation of pressure are determined based on laws of flotation 4.2 water pressure is determined based on scientific principles 4.3 simple calculations on pressure in liquids are performed based on pressure flow equations
5 classify engineering materials	5.1 <i>properties</i> are identified and classified based on hooke's law 5.2 materials are classified based on their mechanical properties 5.3 materials are tested based on type of material.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range <i>May include but is not limited to:</i>
1. Classification of matter	1.1 Solids 1.2 Liquids 1.3 Gases
2. Sources of heat	2.1 Solar 2.2 Biomass 2.3 Geothermal 2.4 Fuel 2.5 Electric
3. Methods of heat transfer	4.1 Conduction 4.2 Convection 4.3 Radiation
4. Laws	5.1 Law of floatation 5.2 Archimedes principles
5. Mechanical properties	6.1 Malleability 6.2 Strength 6.3 Hardness 6.4 Brittleness 6.5 Elasticity 6.6 Toughness 6.7 Ductility 6.8 Electrical conductivity

REQUIRED KNOWLEDGE

- Construction materials
- Mechanical properties
- Friction
- Force, work, energy and power
- Principles of heat
- Pressure in fluids

SKILLS

- Solving problems
- Analytical
- Interpretation
- Interpersonal
- Computational skills
- Critical thinking

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 units of measurements were applied based on SI units 1.2 Applied Force, work, energy and power based on newton laws of forces. 1.3 Applied principles of Friction based on scientific principles 1.4 Applied principles of heat based on scientific principles 1.5 Applied pressure in fluids Archimedes principles 1.6 Applied mechanical properties of materials based on Hooke's law
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Samples of construction materials 2.2 Material Testing Laboratories 2.3 Safety equipment 2.4 Computers 2.5 Calculators 2.6 Materials testing tools and equipment
<p>3. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Written Assessment 3.2 portfolio 3.3 Observation
<p>4. Context of Assessment</p>	<p>Assessment may be done:</p> <ul style="list-style-type: none"> 4.1 On-the-job 4.2 Workplace simulation
<p>5. Guidance information for assessment</p>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

CORE UNITS OF COMPETENCY

INSTALL WATER SUPPLY AND STORAGE SYSTEM

UNIT CODE: 0732 451 10A

UNIT DESCRIPTION

This unit specifies the competencies required to install water supply and storage system. It involves preparing working drawings, install water supply system, water storage tank, water meter, water pumps, water sprinklers and water fountains. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare working drawings	1.1 measurements are converted based on SI units 1.2 Symbols are identified based on technical drawing standards 1.3 Reference points are identified on the ground based on working drawings. 1.4 Sketches of water supply System are developed based on the working drawing. 1.5 Material schedule is developed as per working drawing
2. Install water supply system	2.1 <i>Materials, Tools and equipment</i> required for installation of water supply system are selected identified based on job requirements 2.2 Positions of pipes are set out and marked based on working drawings 2.3 Pipes are <i>joined</i> based on water supply and system design 2.4 Water supply system is installed based on working drawing 2.5 <i>Personal Protective Equipment</i> is used in line with occupational safety and health regulations. 2.6 <i>Housekeeping</i> is conducted on work area based on work place procedure
3. Install water storage tank	3.1 Tools and equipment required for water storage tank installation are selected based on working drawings 3.2 Positioning of water storage tank is determined based on working drawing 3.3 Support for water storage tank is constructed based on working drawings

	<p>3.4 Water storage tank is mounted based on water supply system and storage design</p> <p>3.5 Personal Protective Equipment is used in line with occupational safety and health regulations.</p> <p>3.6 Housekeeping is conducted on work area based on work place procedure</p>
<p>4. Install water meter and water pumps</p>	<p>4.1 Tools and equipment required for installing water meters and water pumps are identified based on the job requirements</p> <p>4.2 Water pump is selected based on job requirements</p> <p>4.3 Pipes are jointed as per construction standards</p> <p>4.4 Water Pumps and meters are installed according to the manufacturer’s manual</p> <p>4.5 Air locks and leakages are corrected as per system requirements</p> <p>4.6 water pumps and meters maintenance are carried out as per system requirements</p>
<p>5. Install water sprinklers and water fountains</p>	<p>5.1 Tools, equipment and materials required for piping are identified as per job requirements</p> <p>5.2 Materials required for installation of water sprinklers and fountains are assembled based on work specifications.</p> <p>5.3 Positions of pipes are set out and marked based on working drawings</p> <p>5.4 Pipes are cut based on required sizes and angles.</p> <p>5.5 Pipes are joined as per job requirements.</p> <p>5.6 Sprinkler zone valves are installed in accordance to manufacturer’s manual</p> <p>5.7 Pipes are connected at the sprinkler valve box as per job requirements</p> <p>5.8 Sprinklers are installed based on design specifications</p> <p>5.9 water fountain pump is installed in accordance to manufacturer’s manual</p> <p>5.10 Pedestal fountain is installed in accordance to manufacturer’s manual</p>
<p>6. Install firefighting system</p>	<p>6.1 Fire control materials, tools and equipment are identified based on requirements of the job.</p> <p>6.2 Fittings for fire control systems are identified based on the standards.</p> <p>6.3 Fire control materials are assembled based on best practice</p> <p>6.4 A schedule of fire control materials is developed based on architectural drawings</p> <p>6.5 Positions of fire control pipes are set out and marked</p>

	<p>based on working drawings.</p> <p>6.6 Pipes are fitted as per job requirements.</p> <p>6.7 Sprinkler and Hose reel system are connected to water storage tank based on job requirements</p> <p>6.8 Fire Hydrants are fitted as per manufacturer's specifications</p>
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1.Pipes May include but not limited to:	1.1 PPR 1.2 PVC 1.3 CPVC 1.4 GI 1.5 UPVC 1.6 HDPE
2.Materials May include but not limited to:	2.1 Various types of pipes 2.2 Various types and sizes of fittings 2.3 Caulking supplies 2.4 Various types of pipe support 2.5 Threading oil 2.6 Thread tape 2.7 Electric heater 2.8 Cisterns 2.9 Pumps 2.10 Solar water heater 2.11 Various types of valves
3.Specifications May include but not limited to:	3.1 Gradient 3.2 Level 3.3 Plumpness
4.House keeping May include but not limited to:	4.1 Protecting existing works and sanitary appliances 4.2 Clearing work area 4.3 Cleaning work area 4.4 Keeping work area tidy
5.Personal protective	5.1 Helmets 5.2 Gloves

equipment May include but not limited to:	5.3 Safety boots overall
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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Numeracy skills
- Cutting skills
- Threading skills
- Bending and forming skills
- Communication skills
- Sketching skills
- Interpretation skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Materials
- Piping tools and equipment's
- Jointing of pipes
- Bending methods
- Piping systems
- Water sources

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Converted pipe measurements based on SI units 1.2 Developed sketches of water supply system based on the working drawing 1.3 Used piping tools and equipment as per manufactures' manual 1.4 Obtained required materials as per working drawing 1.5 Fitted water supply pipes as per working drawing 1.6 Installed water supply system as per water supply system design 1.7 Installed water storage tank as per water storage tank design 1.8 Produced functional pipe work as per working drawing 1.9 Conducted housekeeping of work area as per workplace procedure 1.10 Observed safety and health practices as per occupational safety and health regulations
<p>2. Resource Implications</p>	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 2.1 A functional workshop with cutting tools, measuring tools, forming tools, welding tools, threading tools, drop head die stock, pipe bender materials and supplies. 2.2 References and manuals including construction working drawings 2.3 Personal protective equipment
<p>3. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Observation 3.2 Oral assessment 3.3 Written tests 3.4 Portfolio
<p>4. Context of Assessment</p>	<p>Assessment may be done:</p> <ul style="list-style-type: none"> 4.1 On-the-job 4.2 Workplace simulation
<p>5. Guidance information for assessment</p>	<p>The unit may be assessed alone or together with other related units.</p>

INSTALL RAINWATER HARVESTING AND DISPOSAL SYSTEMS

UNIT CODE: 0732 451 11A

UNIT DESCRIPTION

This unit specifies the competencies required to install rainwater harvesting goods and disposal system. It involves preparing working drawings, obtaining rainwater goods and materials, fabricate sheet metal goods, install rainwater goods, install rainwater storage and disposal system. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare working drawing	1.1 <i>Rainwater goods</i> measurements are converted based on SI units 1.2 Rainwater harvesting goods symbols are identified as per working drawing 1.3 Simple working sketches are prepared as per rainwater harvesting goods design 1.4 <i>Tools, equipment, materials</i> required for rain water goods installation are selected based on rainwater goods design 1.5 Materials schedule is developed as per working drawing
2.Fabricate sheet metal joints	2.1 Rainwater goods are identified based on working drawing 2.2 Measurements are taken and marking is carried out on sheet metal based on working drawing 2.3 Sheet metals are cut based on working drawings. 2.4 Pieces are jointed based on design specifications 2.5 Personal Protective Equipment is used in line with occupational safety and health regulations. 2.6 Housekeeping is conducted on work area based on work place procedure

3.Install rain water goods	3.1 Positions of rain water harvesting goods are set out and marked based on working drawings 3.2 Fittings are assembled as per job requirements 3.3 Rain water goods are installed as per job requirements 3.4 Personal Protective Equipment is used in line with occupational safety and health regulations. 3.5 Housekeeping is conducted on work area based on work place procedure
4.Install rainwater storage system	4.1 Positions of rain water goods are set out and marked based on work drawings 4.2 Fittings are assembled based on working drawings 4.3 Rain water storage tanks are installed as per the job requirements
5.Install rainwater disposal system	5.1 Open channels are designed based on <i>Manning's</i> and <i>Chezy's formula</i> 5.2 Positions of rain water disposal systems are set out and marked based on working drawings 5.3 Rain water disposal system is constructed based on approval by the local authority

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1.Rainwater goods May include but not limited to:	1.1 Down pipes 1.2 Gutters 1.3 Brackets 1.4 Hopper head 1.5 Rainwater shoe
2.Materials May include but not limited to:	2.1 Pipes 2.2 Gutters 2.3 Pipe fittings 2.4 Accessory 2.5 Adhesives 2.6 Sealant
3.tools and equipment May include but not limited to:	3.1 Measuring tools 3.2 Forming tools 3.3 Cutting tools 3.4 Welding equipment 3.5 Soldering bit

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Interpersonal skills
- Communication skills
- Sketching skills
- Interpretation skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills
- Interpersonal Relationship skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Materials and supplies
- Rainwater goods tools and equipment's
- Methods of jointing
- Bending methods
- Mensuration
- Faults in rainwater goods

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Interpreted the working drawing according to standard drawing conventions 1.2 Used rainwater goods tools and equipment as per manufactures' manual 1.3 Obtained rainwater goods as per working drawings 1.4 Fabricated sheet metal joints as per working drawing 1.5 Installed rainwater goods as per working drawing 1.6 Conducted housekeeping on work area as per workplace procedure 1.7 Observed safety and health practises in accordance with occupational safety and health standards
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	1.8 Tested rainwater goods as per system functionality
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with measuring, cutting, forming, joining, soldering, marking and welding tools, oxy-acetylene gas cylinders, 2.2 References and manuals including construction working drawings 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral 3.3 Written 3.4 Third party report 3.5 Portfolio
4. Context of Assessment	Assessment may be done: 4.1 On-the-job 4.2 Workplace simulation
5. Guidance information for assessment	The unit may be assessed alone or together with other related units.

INSTALL SANITARY APPLIANCES AND DRAINAGE SYSTEM

UNIT CODE: 0732 451 12A

UNIT DESCRIPTION

This unit specifies the competencies required to install sanitary drainage systems. It involves quantifying and cost materials, using drainage tools and equipment setting out drainage systems, install above ground drainage system, drainage materials and installing below ground drainage system and testing. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare Sanitary Appliances and drainage drawings	1.1 Measurements are converted based on SI units 1.2 Symbols are identified based on based on working drawing. 1.3 drainage system and <i>sanitary appliances</i> are selected based on working drawings 1.4 material schedule is developed based on working drawing
2. Install sanitary appliances	2.1 Tools and equipment needed for sanitary appliances installation are selected as per working drawing 2.2 Sanitary appliances positioning is determined as per work drawings. 2.3 Supports for sanitary appliances are constructed as per job requirements. 2.4 Sanitary appliances are installed as per job requirement 2.5 Personal Protective Equipment is used in line with occupational safety and health regulations. 2.6 Housekeeping is conducted on work area based on work place procedure

<p>3. Install drainage systems</p>	<p>3.1 Tools and equipment for drainage system installation are identified as per job requirements</p> <p>3.2 <i>Drainage materials</i> are assembled as per job requirements</p> <p>3.3 A schedule of drainage system materials is developed based on job requirements.</p> <p>3.4 Positions of drainage system are set out and marked based on job requirements</p> <p>3.5 Pipes are laid based on taken levels</p> <p>3.6 Inspection chambers, man holes and traps are constructed according to design specifications</p> <p>3.7 <i>Personal Protective Equipment</i> is used in line with occupational safety and health regulations.</p> <p>3.8 Housekeeping is conducted on work area based on work place procedure</p>
<p>4. Install waste disposal system</p>	<p>4.1 Waste disposal systems are designed as per BS standards</p> <p>4.2 Positions of waste water disposal systems are set out and marked based on working drawings</p> <p>4.3 waste water disposal systems are constructed based on approved design</p>

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
<p>1.Drainage materials May include but not limited to:</p>	<p>1.1 Various types and sizes of fittings</p> <p>1.2 Caulking materials</p> <p>1.3 types of pipe supports</p> <p>1.4 Clay pipes</p> <p>1.5 UPVC</p> <p>1.6 Cast iron</p> <p>1.7 Concrete</p>
<p>2.Types of sanitary appliances May include but not limited to:</p>	<p>2.1 Wash hand basin</p> <p>2.2 Water closet</p> <p>2.3 Bath tub</p> <p>2.4 Urinal</p> <p>2.5 Bidet</p> <p>2.6 Kitchen sink</p>

	2.7 Jacuzzi 2.8 Shower head
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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Measuring skills
- Cutting skills
- Threading skills
- Bending skills
- Communication skills
- Sketching skills
- Interpretation skills
- Interpersonal Relationship skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Levelling
- Drainage materials and supplies
- Drainage tools and equipment
- Types of pipes
- Materials and supplies
- Joining and jointing
- Mensuration
- Drainage systems

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Interpreted the working drawings according to standard drawing conventions</p> <p>1.2 Installed sanitary appliances as per working drawing</p> <p>1.3 Used drainage tools and equipment as per manufactures' manual</p> <p>1.4 Set out drainage system as per drainage system design</p> <p>1.5 Installed above ground drainage system as per working drawing</p> <p>1.6 Installed below ground drainage system as per working drawing</p> <p>1.7 Conducted housekeeping on work area as per workplace</p>
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	procedures
2. Resource Implications	<p>The following resources must be provided:</p> <p>2.1 A functional workshop with measuring, cutting, forming, joining, marking tools and materials</p> <p>2.2 References and manuals including construction working drawings</p> <p>2.3 Personal protective equipment</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Observation</p> <p>3.2 Portfolio</p> <p>3.3 Administration of written tests</p> <p>3.4 Oral assessment</p> <p>3.5 Administration of Practical Tests</p>
4. Context of Assessment	<p>Assessment may be done:</p> <p>4.1 On-the-job,</p> <p>4.2 Simulated workplace</p>
5. Guidance information for assessment	The unit may be assessed alone or together with other related units.

INSTALL GAS SUPPLY SYSTEM

UNIT CODE: 0732 451 13A

UNIT DESCRIPTION

This unit specifies the competencies required to install gas supply system. It involves Interpreting gas supply drawings, obtaining materials and installing gas supply system. It applies in the construction industry.

ELEMENTS	PERFORMANCE CRITERIA
1. prepare gas supply drawings	1.1 Symbols are identified based on technical drawing standard 1.2 Reference points are identified on the ground as per the site drawing. 1.3 Sketches of gas supply system are developed as per the drawing.
2. Obtain materials for gas supply	2.1 Piping <i>materials</i> and fittings required for piping are identified as per job requirements 2.2 Materials and fittings are assembled as per job requirements 2.3 Materials are organized as per the work schedule
3. Install gas supply	3.1 Positions of pipes are set out and marked as per working drawings 3.2 Gas supply pipes are flared based on standards and specifications. 3.3 Pipes are fitted as per drawing specifications. 3.4 Gas supply system is installed as per working drawings 3.9 Gas supply system is tested for functionality as per job requirements

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1.Materials	May include but not limited to: 1.1 Screws 1.2 Adhesives 1.3 Copper pipes 1.4 Pipes 1.5 silicon 1.6 Teflon tapes 1.7 Fittings 1.8 valves
2.Tools and equipment	May include but not limited to: 2.1 Pipe wrench 2.2 Pipe wheel cutter 2.3 Hacksaw 2.4 Pipe Threading Equipment 2.5 Bench Vice 2.6 Flaring tools 2.7 Taps 2.8 Files 2.9 Screwdrivers 2.10 Mason chisel 2.11 PPR machine / Heat Fusion equipment 2.12 Pipe bender 2.13 copper wheel cutter 2.14 vent

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Drawing skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Trouble shooting process
- Preventive maintenance of all systems
- Corrective maintenance of all systems
- Plumbing systems
- Types of fitting and appliances
- Maintenance of each type of fitting and appliance

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Interpreted gas supply drawings as per design drawings 1.2 Obtained materials for gas supply as per design drawings 1.3 Used piping tools and equipment as per manufactures; manual 1.4 Installed gas supply system as per working drawings
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with measuring, cutting, forming, joining, soldering, marking and welding tools, oxy-acetylene gas cylinders, 2.2 Reference and maintenance manuals 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Portfolio 3.3 Administration of written tests 3.4 Oral assessment 3.5 Administration of Practical Tests
4. Context of Assessment	4.1 On-the-job 4.2 Workplace simulation
5. Guidance information for assessment	Unit may be assessed alone or with other related units.

PERFORM ARC AND GAS WELDING

UNIT CODE: 0732 451 14A

UNIT DESCRIPTION

This unit specifies the competencies to perform arc and gas welding. It involves obtaining welding materials and performing arc and gas welding. It applies in the construction industry.

ELEMENTS These describe the key outcomes which make up workplace function	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Obtain materials for arc and gas welding	1.1 <i>Working drawings</i> are interpreted based on technical drawing standards. 1.2 Sketches of welded joints are developed as per working drawing. 1.3 <i>materials</i> , tools and equipment for the specific job are obtained as per job requirements 1.4 Equipment setting up checklist is prepared as per job requirement 1.5 Work pieces are set up as per the job requirements. 1.6 oxy-acetylene welding is performed as per job requirements.
2. Perform arc welding	2.1 Work pieces are measured as per the job requirements 2.2 Work pieces are marked out and cut as per job requirements. 2.3 Work pieces are prepared as per job requirements 2.4 Work pieces are welded as per job requirements
3. Perform gas welding	3.1 Oxy-acetylene equipment is set up according to manufacturer's specification and job requirement 3.2 Work pieces are measured as per the job requirements 3.3 Work pieces are marked out and cut as per working drawings. 3.4 Work pieces are prepared as per working drawings 3.5 Work pieces are welded as per job requirements

4.Repair defects in welding	4.1 Weld is dressed as per job requirements 4.2 Defects are identified according to acceptance criteria. 4.3 Weld <i>defects</i> are repaired as per job requirements
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1.Working drawing May include but not limited to:	1.1 Pictorial 1.2 Line drawing 1.3 Freehand sketching 1.4 Scale drawings
2.Materials May include but not limited to:	2.1 Adhesive 2.2 Pipes 2.3 Various types and sizes of fittings 2.4 Various types of pipe supports 2.5 Caulking supplies 2.6 Thread tape 2.7 Threading oil 2.8 Valves 2.9 Taps 2.10 Water filters 2.11 Storage cistern 2.12 Hose pipes
3.Defects May include but not limited to:	3.1 Porosity 3.2 Slug inclusion 3.3 Lack of fusion 3.4 Undercut 3.5 cracking

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Drawing and interpretation skills
- Problem-solving skills
- Critical-thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills
- Joining and jointing skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Conversion of units
- Measurement
- Joining and jointing
- Mensuration
- Materials
- Drawing and drawing interpretation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 interpreted working drawings as per standard drawing conventions 1.2 Prepared wok pieces as per working drawings 1.3 Performed arc welding as per working drawings 1.4 Performed gas welding as per working drawings 1.5 Repaired weld defects as per design standards
2. Resource implications	The following resources must be provided: 2.1A functional workshop with cutting tools, measuring tools, arc welding equipment, gas oxyacetylene cylinders 2.2Reference and welding manuals 2.3Personal protective equipment

3. Methods of Assessment	Competency may be assessed through: 3.1 portfolio 3.2 Administration of written tests 3.3 Oral assessment 3.4 observation
4. Context of Assessment	4.1 On-the-job 4.2 Simulated workplace
5. Guidance information for assessment	Unit may be assessed alone or with other related units.

INSTALL SOLAR HEATING SYSTEM

UNIT CODE: 0732 451 15A

UNIT DESCRIPTION

This unit specifies the competencies required to interpret solar drawings, assemble solar materials, and install solar heating systems. It applies in the construction industry.

ELEMENTS These describe the key outcomes which make up workplace function	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. prepare solar drawings	1.1 Reference points are identified according to working drawing 1.2 Symbols are identified based on technical drawing standard 1.3 Sketches are developed based on working drawing.
2. obtain solar materials	2.1 Piping <i>materials tools and equipment</i> are identified as per working drawing 2.2 Piping materials are assembled as per work specifications. 2.3 Materials are assembled as per work schedule
3. Install solar heating system	3.1 Positions of solar panels are set out and marked based on working drawings 3.2 Pipes are jointed as per working drawings 3.3 Solar panels and heater cylinders are installed as per working drawings 3.4 Water solar heating system is tested for functionality as per job requirements

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Tools and equipment May include but not limited to:	1.1 Pipe wrench 1.2 Pipe cutter 1.3 Hacksaw 1.4 Pipe Threading Equipment

	1.5 Tap and Punch 1.6 Files 1.7 Screwdrivers 1.8 Ball hammer 1.9 Masonry chisel 1.10 PPR machine / Heat Fusion equipment 1.11 Pipe bender
2.Materials May include but not limited to:	2.1 Adhesive 2.2 Pipes 2.3 Various types and sizes of fittings 2.4 Various types of pipe supports 2.5 Caulking supplies 2.6 Thread tape 2.7 Threading oil 2.8 Valves 2.9 Taps 2.10 Water filters 2.11 Solar panel 2.12 Storage cistern 2.13 Hose pipes

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Drawing and interpretation skills
- Cutting skills
- Threading skills
- Bending skills
- Joining and jointing skills
- Problem-solving skills
- Critical-thinking skills
- Organizing skills
- Measuring skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Joining
- Mensuration
- Materials

- Drawing and drawing interpretation
- Storage systems
- Pumping systems
- Support system for elevated storage
- Solar water heating system

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Interpreted working drawings as per standard drawing conventions 1.2 Obtained solar water heaters materials as per solar water heaters' design 1.3 Installed solar water heaters as per working drawing 1.4 Conducted housekeeping on work area as per workplace procedures 1.5 Tested solar water heater to functionality.
2.Resource implications	The following resources must be provided: 2.1 1A functional workshop with cutting tools, measuring tools, racking equipment, forming tools, fastening tools and materials 2.2 Reference manuals 2.3 Personal protective equipment
3.Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Portfolio 3.3 Administration of written tests 3.4 Oral assessment
4.Context of Assessment	4.1 On-the-job 4.2 Simulated workplace
5.Guidance information for assessment	Unit may be assessed alone or with other related units.

MAINTAIN PLUMBING SYSTEMS

UNIT CODE: 0732 451 16A

UNIT DESCRIPTION

This unit specifies the competencies required to maintain plumbing systems. It involves detecting faults in plumbing systems, obtaining materials for repair, fixing plumbing system faults and testing plumbing system. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Test water plumbing system functionality	1.1 <i>Functionality</i> of the plumbing system is tested based on expected outcome. 1.2 Repair work area is returned to initial condition as per workplace policy 1.3 Normal system function is reinstated as per the design
2. Repair water installation system	2.1 Faulty components of water installation system are identified as per work requirements 2.2 <i>Materials, tools and equipment</i> for repair of faulty components are identified based on job requirements. 2.3 Notice for maintenance operation is issued as per workplace policy 2.4 Area under water installation repair is isolated as per fault repair plan 2.5 Faulty area is dis-assembled as per standard operating procedure. 2.6 Fault is repaired as per fault repair plan 2.7 Work area is cleared as per standard operating procedure
3. Unclog drainage system	3.1 Tools and equipment are identified based on job requirements. 3.2 <i>Personal Protective Equipment</i> is worn in line with occupational safety and health regulations. 3.3 Blockage point is located as per system requirements

	<p>3.4 Blockage area is cleared as per repair plan</p> <p>3.5 Drainage system is realigned according to its functionality</p>
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
<p>1.Materials May include but not limited to:</p>	<p>1.1 Screws 1.2 Adhesives 1.3 Cement 1.4 Sand 1.5 Pipes 1.6 Traps 1.7 Electric cables 1.8 Caulking material 1.9 Fittings</p>
<p>Tools and equipment May include but not limited to:</p>	<p>2.1 Pipe wrench 2.2 Pipe cutter 2.3 Hacksaw 2.4 Pipe Threading Equipment 2.5 Bench Vice 2.6 Taps 2.7 Punch 2.8 Files 2.9 Screwdrivers 2.10 Drill with various sizes of bits 2.11 Portable drill 2.12 PPR machine / Heat Fusion equipment 2.13 Pipe bender 2.14 Trowel 2.15 De-clogging wire / de-clogging machine 2.16 Toilet pump</p>
<p>3.Personal Protective Equipment May include but not limited to:</p>	<p>3.1 Helmet 3.2 Gloves 3.3 Dustcoat 3.4 Dust mask 3.5 safety boots</p>

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Drawing skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Trouble shooting process
- Preventive maintenance of all systems
- Corrective maintenance of all systems
- Plumbing systems
- Types of fitting and appliances
- Maintenance of each type of fitting and appliance

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Troubleshoot plumbing systems faults 1.2 Quantified requirements for repair 1.3 Fixed plumbing faults 1.4 Tested functionality of plumbing systems
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with measuring, cutting, forming, joining, marking tools and materials 2.2 Reference and maintenance manuals 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Portfolio 3.3 written tests 3.4 Oral assessment 3.5 Practical Tests

4. Context of Assessment	4.1 On-the-job 4.2 Simulated work place
5. Guidance information for assessment	Unit may be assessed alone or with other related units.