REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

INFORMATION AND COMMUNICATION TECHNOLOGY OPERATOR

KNQF LEVEL 4
CYCLE 3

PROGRAMME ISCED CODE: 061 2354A

TVET CDACC
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FOREWORD

Provision of quality education and training is fundamental to the Government's overall strategy for socio-economic development. Quality education and training contribute to achievement focused on Kenya's development blueprint and sustainable development goals.

Reforms in the education and training sector are necessary for achievement of Kenya Vision 2030 and meeting the provisions the Constitution of Kenya. The education sector had to be aligned to the Constitution and this resulted in formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 1 of 2019). A key feature of this policy is the change in the design and delivery of TVET training. The reforms include making TVET competency-based, developing the occupation standards in collaboration with industry, certifying learners based on demonstrated competence, and allowing multiple entry and exit points in TVET programmes.

These reforms emphasize the role of industry as key collaborators in occupation standards development to ensure it aligns with their competence needs. It is against this background that this occupation standard has been developed.

It is my conviction that this occupation standard will play a great role towards development of competent human resource for the ICT sector's growth and sustainable development.

PRINCIPAL SECRETARY
STATE DEPARTMENT FOR TVET
MINISTRY OF EDUCATION

PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, middle-income country providing high quality life to all its citizens by the year 2030. Kenya intends to create a globally competitive and adaptive human resource base to meet requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and worker behaviour necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and the Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

This occupational standard has been developed in adherence to the Kenya National Qualification Framework and CBETA standards and guidelines. The curriculum is designed and organized into Units of Learning with Learning Outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee's achievement. The occupation standard is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, ICT NSSC, expert workers and all those who participated in the development of this occupation standard.

CHAIRPERSON, TVET CDACC

ACRONYMS

HTTP	Hypertext Transfer Protocol
ICT	Information Communication Technology
IT	Information Technology
TCP/IP	Transmission Control Protocol/Internet Protocol
TVET	Technical Vocational Education and Training
IEEE	Institute of Electrical and Electronics Engineers
KNQF	Kenya National Qualification Framework
ISCED	International Standard Classification of Education

KEY TO ISCED UNIT CODE
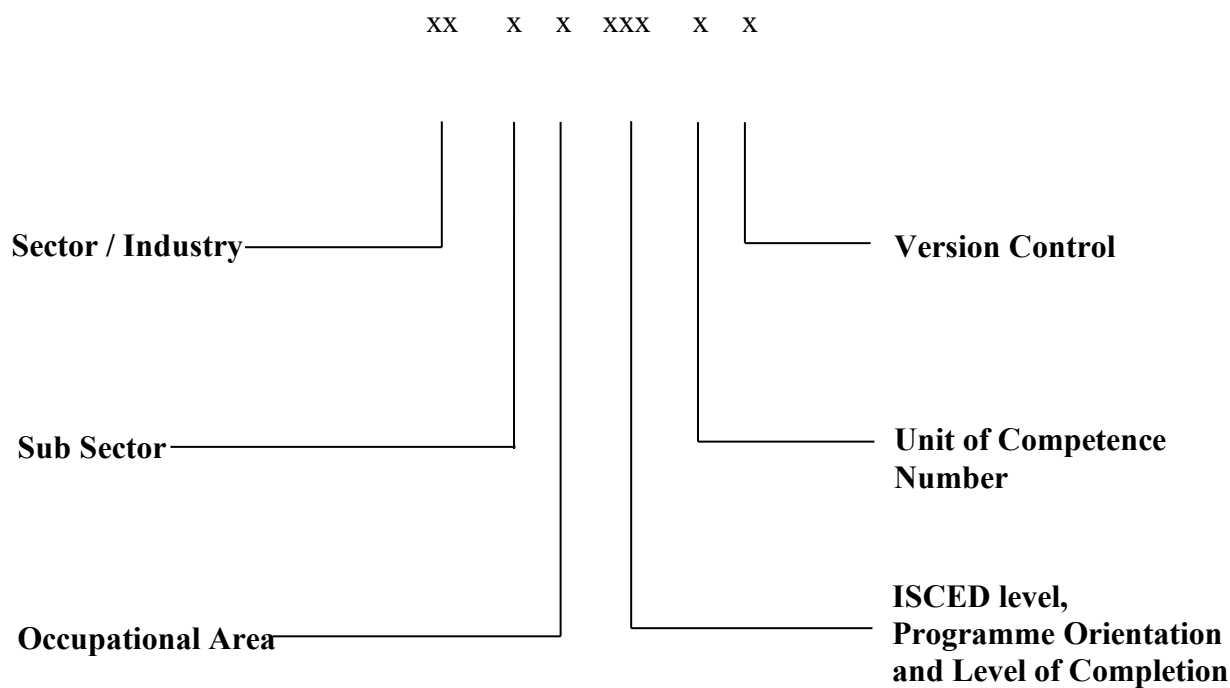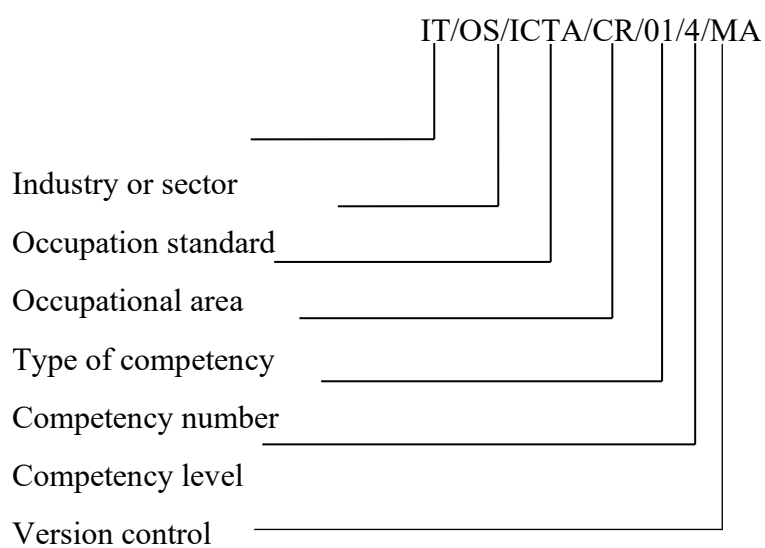
xx   x   x   xxx   x   x

Sector / Industry

Sub Sector

Occupational Area

Version Control

Unit of Competence Number

ISCED level, Programme Orientation and Level of Completion

KEY TO TVET CDACC UNIT CODE

IT/OS/ICTA/CR/01/4/MA

Industry or sector

Occupation standard

Occupational area

Type of competency

Competency number

Competency level

Version control

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OCCUPATION STANDARD OVERVIEW

The ICT Operator Level 4 occupational standard is designed to equip learners with comprehensive skills and knowledge essential in supporting or enabling the use of ICT equipment and applications. The program focuses on key competencies, including perform computer essentials, perform computer operations, perform computer network setup and perform computer repair and maintenance.

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SUMMARY OF UNITS OF COMPETENCE

CORE UNITS OF COMPETENCY		
ISCED UNIT CODE	**TVET CDACC UNIT CODE**	**UNITS TITLE**
0611 351 01A	IT/OS/ICTA/CR/01/4/MA	Perform Computer Essentials
0611 351 02A	IT/OS/ICTA/CR/02/4/MA	Perform Computer Operations
0612 351 03A	IT/OS/ICTA/CR/03/4/MA	Perform Computer Network Setup
0714 351 04A	IT/OS/ICTA/CR/04/4/MA	Perform Computer Repair and Maintenance

CORE UNITS OF COMPETENCY

PERFORM COMPUTER ESSENTIALS

ISCED UNIT CODE: 0611 351 01A
TVET CDACC UNIT CODE: IT/OS/ICTA/CR/01/4/MA

UNIT DESCRIPTION

This unit covers the competencies required in performing computer essentials. It involves managing computer devices, managing desktop settings, performing file management, managing computer software and performing online jobs.

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. *Bold and italicized terms are elaborated in the Range*
1. Manage computer devices	1.1 *Computer Hardware* devices are selected as per user requirement.
	1.2 Computer Hardware devices are disassembled as per user requirement.
	1.3 *Computer Hardware* devices are assembled as per user requirement.
	1.4 Computer booting process is performed as per Unified Extensible Firmware Interface (UEFI) standards.
	1.5 *Computer Peripheral* devices are connected as per user manual.
2. Manage desktop settings	2.1 Desktop icons are customized as per user manual.
	2.2 Desktop date and time are set as per user manual.
	2.3 Desktop configuration settings are performed as per user manual.
3. Perform file management	3.1 Files and folders are created per work specifications
	3.2 Files and folders are transferred between various media as per user requirements

	3.3 File protection is performed as per work specifications
4. Manage computer software	4.1 Data backup media is selected as per work requirements.
	4.2 Data backup is performed as per work requirements
	4.3 *Computer software* is installed as per work requirements
	4.4 Computer software is optimized as per software standards
5. Perform online jobs	5.1 *Online job platforms* are identified as per the job requirements.
	5.2 Online accounts and profiles are created in accordance with the work requirements.
	5.3 Online jobs are identified according to the bidder's skillset.
	5.4 Online digital identity is managed according to industry best practices.
	5.5 Online job bidding is done as per the specific job requirements.
	5.6 Online tasks are executed according to the job requirements.
	5.7 Personal online payment account is managed in accordance with financial regulations.

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. Computer hardware may include but not limited to:	Collection of physical parts of a computer system such as; • Computer case, monitor, keyboard, and mouse • All the parts inside the computer case, such as the hard disk drive, motherboard and video card

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2. Computer Peripherals may include but not limited to:	Collection of hardware devices connected to the system unit • Printer • Speaker • Mouse • Keyboard • Projector
3. Computer software may include but not limited to:	A collection of instructions or computer tools that enable the user to interact with a *computer*, its hardware, or perform tasks. • Applications • Operating systems • Device drivers • Browsers • Utility programs
4. Online job platforms may include but are not limited to:	● Remotask ● Data annotation.tech ● Cloudworker ● Upwork ● Oneforma ● Appen

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:

- Communication skills
- Evaluation skills
- Problem solving skills
- Time management
- Data protection laws
- E waste disposal

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Required Knowledge

The individual needs to demonstrate knowledge of:

- Computer settings
- Computer hardware selection
- Computer hardware assembly and disassembly
- Software installation
- File handling
- Software reviews forums

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 Selected Computer Hardware devices
	1.2 Assembled computer hardware
	1.3 Disassembled computer hardware
	1.4 Desktop settings were customized
	1.5 Installed computer software
	1.6 Optimized Computer software
	1.7 Files and folders are transferred between various media as per user requirements
	1.8 Executes online tasks according to the job requirements.
	1.9 Online accounts and profiles are created in accordance with the work requirements.
	1.10 Online digital identity is managed according to industry best practices.
	1.11 Online tasks are executed according to the job requirements.
2. Resource Implications	The following resources should be provided:
	2.1 Appropriately simulated environment where assessment can take place.
	2.2 Access to relevant work environment.
	2.3 Resources relevant to the proposed activities or tasks.
3. Methods of assessment	Competency may be assessed through:
	3.1 Practical

		3.2 Projects
		3.3 Third Party Reports
		3.4 Portfolio of evidence
		3.5 Written tests
4.	Context of assessment	Competency may be assessed:
		4.1 On-the-job
		4.2 In a simulated work environment
5.	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM COMPUTER OPERATIONS

ISCED UNIT CODE: 0611 351 02A

TVET CDACC UNIT CODE: IT/OS/ICTA/CR/02/4/MA

UNIT DESCRIPTION

This unit covers the competencies required to perform computer operations. It involves processing computerized word documents, manipulating computerized spread sheets, maintaining computerized databases, prepare Power point presentation, manipulating graphic application and performing online collaboration.

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. *Bold and italicized terms are elaborated in the Range*
1. Process computerized word document	1.1 Ergonomics risk factors observed as per work place procedures
	1.2 Word document is created as per work requirements
	1.3 Tables are created and manipulated as per work requirements
	1.4 Mail merging is performed as per work requirements
	1.5 *Word processing Objects* are inserted as per user requirements
	1.6 List of figures and table of content are generated as per user requirements
	1.7 Computerized Word documents are printed as per workplace procedure.
2. Manipulate computerized spread	2.1 Spreadsheet workbook is created as per work requirements

sheet	2.2 Cell referencing is performed as per task requirements
	2.3 Formula and *functions* are applied as per work requirements
	2.4 Charts are generated as per work requirements
3. Maintain computerized database	3.1 Computerized database user requirements are collected as per work requirements.
	3.2 Computerized database schemas are designed as per task requirements.
	3.3 Creation of Computerized database objects as per task requirements.
	3.4 Data manipulation is performed as per task requirements.
4. Prepare Power point presentation	4.1 PowerPoint Presentation requirements are collected as per work requirements
	4.2 PowerPoint slides are created as per work requirement
	4.3 Presentation views are exhibited as per work requirements.
	4.4 Animations and transitions are performed as per work requirements
	4.5 PowerPoint slides are manipulated as per work requirements
	4.6 PowerPoint slides are printed as per work requirements
5. Manipulate graphic application	5.1 Identifying graphic design requirements
	5.2 Graphic design created as per task requirements
	5.3 Graphic design published as per the task requirements

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6. Perform document production	6.1 Document is printed as per user specifications
	6.2 Documents are scanned as per user specifications
	6.3 Documents are duplicated as per user specifications
7. Perform Online Collaboration	7.1 Identification of Online collaboration tools as per the task requirements
	7.2 Prepare online collaboration as per the task requirements.
	7.3 Apply online collaborative tools as per the task requirements.
	7.4 Demonstrating Mobile collaborations as per task 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. Word Processing Objects may include but are not limited to:	• Picture • Shapes • Table • Charts
2. Functions may include but are not limited to:	• Sum • Count • Average • Max • Min • Rank
3. Presentation views may include but are not limited to:	These are the methods used to show the presentation to the audience. • Outline

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	• Normal
	• Slide sorter
	• Notes page
	• Reading view
4. Online document processing may include but is not limited to:	Is the use of web-based applications or platforms to create, edit, store, share and collaborate on various types of documents? • Online data entry • File conversion • Google documents • E- tasks
5. Online collaboration: This may include but not limited to:	These are the online web-based tools and services performed • Video conferencing • Chatting • Cloud computing • Social media • Online calendar • Mailing

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:

- Communication skills
- Evaluation skills
- Problem solving skills
- Time management

Required Knowledge

The individual needs to demonstrate knowledge of:

- Social media
- Online storage
- Online meetings
- Online data entry

- E-tasks

EVIDENCE GUIDE

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

Critical Aspects of Competency	Assessment requires evidence that the candidate:
	1.1 Created a word document
	1.2 Inserted objects
	1.3 Performed mail merging
	1.4 Created a table of contents
	1.5 Created a workbook
	1.6 Performed cell referencing
	1.7 Created formula and functions
	1.8 Generated charts
	1.9 Performed Data manipulation
	1.10 Made a presentation
	1.11 Created animations and transitions
	1.12 Printed a document
	1.13 Scanned a document
	1.14 Duplicated a document
	1.15 Transferred a file online
	1.16 Processed a document online
	1.17 Performed online collaboration
Resource Implications	The following resources should be provided:
	2.1 Access to relevant workplace where assessment can take place
	2.2 Appropriately simulated environment where assessment can take place
Methods of Assessment	Competency may be assessed through:
	3.1 Demonstration
	3.2 Practical assignment
	3.3 Oral Questioning
	3.4 Written Test

| Context of Assessment | Competency may be assessed:

4.1 On-the-job

4.2 In a simulated work environment |
|---|---|
| Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

SETUP COMPUTER NETWORK

ISCED UNIT CODE: 0612 351 03A

TVET CDACC UNIT CODE: IT/OS/ICTA/CR/03/4/MA

UNIT DESCRIPTION

This unit covers the competencies required in setup computer network. It involves terminating network cables, connecting network cables and performing computer network maintenance.

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. *Bold and italicized terms are elaborated in the Range*
1. Terminate Computer network cables	1.1 Network devices are selected as per technical requirements
	1.2 Network Cable trunking is performed as per work requirements
	1.3 Network *Cable termination* is performed as per work requirements
2. Connect Computer network cables	2.1 *Safety measures* are observed as per workplace procedure.
	2.2 Setting up *Network devices* is performed as per work requirements
	2.3 Network Cable testing is performed as per work requirements
	2.4 Network Cable connection performed as per *networking standards*
	2.5 Network connection is established as per networking standards
	2.6 Network testing is performed as per work requirements

3. Perform Computer Network Maintenance	3.1 Computer network is monitored as per work requirement
	3.2 Computer network troubleshooting is performed as per networking standards
	3.3 Computer network is optimized as per networking standards.

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. Cable termination may include but is not limited to:	Is the enabling the physical and electrical interconnection of two cable ends, or a cable and a terminal equipment. • Cable stripping • Colour coding • Cable crimping
2. Safety measures may include but are not limited to:	Personal Protective Equipment: • Overall/apron/dust coat • Gloves • Safety boots • Ergonomics • First AID kit
3. Network devices may include but not limited to:	Are electronic devices which are required for communication and interaction between devices on a computer network Computer • Router • Switch • Bridge • Hub • Patch panels • Access point

4. Network standards may include but are not limited to;	Rules for data communications that are needed for interoperability of networking technologies and processes • HTTP • IEEE 802.1 • TCP/IP

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
- Troubleshooting skill
- Communication
- Basic ICT skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Networking concepts
- Networking policies and standards
- Technology underlying cyber-attacks and networks
- Computer crimes
- Laws governing protection of ICT
- Emerging trends and issues in ICT;
    - Cyber security
    - Network automation
    - Cloud migration
    - Artificial intelligence
    - Internet of Things

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 Performed cable trunking

		1.2 Terminated network cable
		1.3 Performed cable testing
		1.4 Set up network devices
		1.5 Established network connection
		1.6 Performed network troubleshooting.
		1.7 Created a network report
2.	Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place
3.	Methods of Assessment	Competency may be assessed through: 3.1 Demonstration 3.2 Practical assignment 3.3 Oral Questioning 3.4 Demonstration 3.5 Written Test
4.	Context of Assessment	Competency may be assessed: 4.1 On-the-job 4.2 In a simulated work environment
5.	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM COMPUTER REPAIR AND MAINTENANCE

ISCED UNIT CODE: 0714 351 04A

TVET CDACC UNIT CODE: IT/OS/ICTA/CR/04/4/MA

UNIT DESCRIPTION:

This unit covers the competencies required for performing computer repair and maintenance. It involves performing computer troubleshooting, repairing faulty components, testing computer component functionality and performing computer maintenance.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace functions	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. ***(Bold and italicized terms are elaborated in the range)***
1. Perform computer troubleshooting	1.1 User data is assessed as per workplace procedures.
	1.2 Computer problems are identified as per the assessed user data.
	1.3 Solution to the problem is determined as per workplace procedure.
2. Repair faulty components.	2.1 ***Computer components*** for replacement are selected as per the workplace procedure.
	2.2 ***Tools* for repairing or replacing** are assembled as per the workplace procedure.
	2.3 ***Safety procedures*** are observed as per workplace procedures.

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ELEMENT These describe the key outcomes which make up workplace functions	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. *(Bold and italicized terms are elaborated in the range)*
	2.4 Faulty computer components are repaired or replaced as per the manufacturer's manual.
	2.5 Obsolete or faulty computer components are *disposed* as per workplace procedures.
3. Test computer component functionality	3.1 Computer is switched on for POST test as per workplace procedure.
	3.2 Computer component test is performed as per workplace procedure.
	3.3 Computer component's functionality report is generated as per workplace procedure.
4 Perform computer maintenance	4.1 Computer maintenance is scheduled as per the workplace procedure.
	4.2 Computer maintenance is performed as per the workplace procedure.
	4.3 Computer maintenance report is generated as per workplace procedure.

RANGE

Variable	Range
1. Computer components may include but are	● Input components.

Variable	Range
not limited to:	• Output components. • Storage components • Processing components • Communication components
2. Safety procedures may include but are not limited to:	Personal Protective Equipment: • Overall/apron/dust coat • Antiglare screens • Dust mask • Gloves • Safety boots • Antistatic equipment • Antistatic wrist strap • Antistatic mat • Antistatic gloves • Ergonomics • First AID kit
3. Tools for repairing or replacing may include but are not limited to:	• Straight-head screwdriver, large and small • Phillips-head screwdriver, large and small • Tweezers or part retriever • Needle-nosed pliers • Wire cutters • Chip extractor • Hex wrench set • Torx screwdriver
4. Disposed may include but are not limited	• E- waste

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Variable	Range
to:	● Pollution ● Hazards ● Disposal methods

REQUIRED KNOWLEDGE AND SKILLS

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

Required knowledge

The individual needs to demonstrate knowledge of:

● Troubleshooting techniques

● Procedures and techniques for reassembling

● Component testing techniques

● Computer systems and their components

● The manufacturer's warranty requirements relating to activities for the computer and related components.

● Types of Computer/component testing

● Types of Maintenance techniques

Required skills

The individual needs to demonstrate the following skills:

● Communications skills

● Proficient in ICT

● Time management

● Faults troubleshooting

● Problem solving

● Planning

● First aid

● Critical thinking

EVIDENCE GUIDE

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

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified computer problems as per the assessed user data. 1.2 Determined solution to the problem as per workplace procedure. 1.3 Selected computer components for replacement as per the workplace procedure. 1.4 Assembled tools for repairing or replacing as per the workplace procedure. 1.5 Repaired or replaced faulty computer components as per the manufacturer's manual. 1.6 Performed computer component test as per workplace procedure. 1.7 Performed computer maintenance as per the workplace procedure.
2. Resource implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place. 2.2 Access to relevant work environment. 2.3 Resources relevant to the proposed activities or tasks.
3. Methods of assessment	Competency may be assessed through: 3.1 Practical 3.2 Projects 3.3 Third Party Reports 3.4 Portfolio of evidence 3.5 Written tests
4. Context of	Competency may be assessed in a workplace or in a simulated

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