



**L-Università
ta' Malta**

**MATSEC
Examinations Board**



SEAC 05 Syllabus

Information Technology

2024

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SEAC05 Information Technology

Syllabus Addendum

Updates for the 2024 MATSEC Examinations Session

Changes in Subject Content	Content of Unit 3 K7 , C3 and A4 may not be covered.
Changes in Coursework	All criteria in Unit 3 (including those highlighted for the Controlled assessment), except for K7 , C3 and A4 , will be assessed in Assignment 1 and Assignment 2.
Changes in Exam Paper(s)	The Unit 3 Controlled assessment (Assignment 3) will not be carried out. K7 , C3 and A4 will not be assessed and these will be prorated at the end of the unit based on the combined performance in knowledge and comprehension criteria, and application criteria respectively, within the same unit.

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Introduction

The aim of this learning and assessment programme is to assist secondary schools to manage applied vocational programmes, specifically in the planning and implementation of the programme delivery.

This learning and assessment programme is structured in two parts, namely:

Part A: General Policies

Part B: Unit Specifications

In Part A, the Learning Outcomes of the programme are explained. Important terms used in the Learning and Assessment Programme (LAP) are defined.

In Part B, the content to be covered in each unit is provided. The learning outcomes together with a brief description are also specified. The assessment criteria together with the scheme of assessment are presented in this part of the document.

In order to ensure effective implementation of the programme, adequate standards, quality assurance processes and procedures have to be adopted. Additionally, policies, guidelines and strategies related to assessment practices are documented in the SEAC Vocational Subjects Policy Document. Standard templates will also be provided and will be structured as follows:

List of Templates
Teacher's Timeframe
Assignment Brief Front Sheet
Record of Internal Verification – Assignment Brief
Record of Internal Verification – Assessment Decision
External Verification Report Template
Unit Tracking Sheet Template

Part A: General Policies

Introduction

The aim of the vocational programme in Information Technology (IT) is to provide candidates with the underpinning knowledge related to the IT industry. By the end of the programme, candidates are expected to have gained sufficient skills and knowledge and be able to apply them.

Programme Learning Outcomes

At the end of the programme, I can:

- Choose computer systems and peripheral devices for specific use.
- Follow good Health and Safety practices when in a workshop environment.
- Identify suitable internal hardware components and justify a system replacement/installation/upgrade (RIU).
- Carry out, test and document a system replacement/installation/upgrade (RIU) following good working practices.
- Troubleshoot a hardware problem.
- Solder a computer component using appropriate techniques.
- Install an operating system.
- Setup local and online user accounts.
- Demonstrate an understanding of networks and network-related terminology.
- Distinguish different types of data transmission media.
- Design a network plan for an architectural design.
- Build the network wall trunking and connect it to a network cabinet.
- Setup a wired/wireless local area network through the use of a switch.
- Assign appropriate IP addressing to subnet an IPv4 network.
- Share data and devices amongst different users.
- Protect a wired/wireless network from threats by devising appropriate security solutions.
- Justify appropriate computer game genres and platforms for various situations.
- Plan and present a computer game idea.
- Create basic game elements for a computer game.
- Draw flowcharts to represent a game script.
- Develop, test and document a multi-level computer game.

Unit Learning Outcomes

Unit 1: Computer Hardware Installation

At the end of the unit, I can:

- LO 1.** Demonstrate an understanding of computer system and peripheral devices.
- LO 2.** Install (RIU) internal hardware components and the necessary software.
- LO 3.** Install an Operating System.
- LO 4.** Set up user accounts.

Unit 2: Networking

At the end of the unit, I can:

- LO 1.** Setup the infrastructure for a small-scale network.
- LO 2.** Configure networking protocols.
- LO 3.** Share data and resources on a network.
- LO 4.** Secure a network from possible threats.

Unit 3: Game Development

At the end of the unit, I can:

- LO 1.** Plan a computer game idea.
- LO 2.** Create digital graphics, sounds and sprites for a computer game.
- LO 3.** Develop a computer game.
- LO 4.** Document a computer game which has been tested for functionality.

Programme Descriptors

Programme descriptors are understood as outcome statements of what a candidate is expected to have achieved by the end of the programme. These are an adaptation of MQF level descriptors for the specific programme.

Overview

MQF Level 1	MQF Level 2	MQF Level 3
<p>Basic general IT related knowledge.</p> <ol style="list-style-type: none"> 1. Acquires basic general knowledge related to the immediate IT environment and expressed through a variety of simple tools and context as an entry point to lifelong learning; 2. Knows and understands the steps needed to complete simple tasks and activities in an IT environment; 3. Is aware and understands basic IT tasks and instructions; 4. Understands basic IT textbooks and instruction guides. 	<p>Basic factual knowledge of the IT fields of work or study.</p> <ol style="list-style-type: none"> 1. Possess good knowledge of the IT field of work or study; 2. Is aware and interprets IT related information and ideas; 3. Understands facts and procedures in the application of basic IT related tasks and instructions; <p>Selects and uses relevant IT knowledge to accomplish specific actions for self and others.</p>	<p>Knowledge of facts, principles, processes and general concepts in the IT field of work or study.</p> <ol style="list-style-type: none"> 1. Understands the relevancy of theoretical knowledge and information related to the IT field of work or study; 2. Assesses, evaluates and interprets facts, establishing basic principles and concepts in the IT field of work or study; 3. Understands facts and procedures in the application of more complex IT tasks and instructions; 4. Selects and uses relevant IT knowledge acquired on one's own initiative to accomplish specific actions for self and others.

MQF Level 1	MQF Level 2	MQF Level 3
<p>Basic skills required to carry out simple IT related tasks.</p> <ol style="list-style-type: none"> 1. Has the ability to apply basic IT knowledge and carry out a limited range of simple tasks; 2. Has basic repetitive communication skills to complete well defined IT routine tasks and identifies whether actions have been accomplished; 3. Follows instructions and be aware of consequences of basic actions for self and others. 	<p>Basic cognitive and practical skills required to use relevant IT information in order to carry out tasks and to solve IT related routine problems using simple rules and tools.</p> <ol style="list-style-type: none"> 1. Has the ability to demonstrate a range of skills by carrying out a range of complex IT related tasks within the IT field of work or study; 2. Communicates basic IT related information; 3. Ensures IT related tasks are carried out effectively. 	<p>A range of cognitive and practical skills required to accomplish IT related tasks and solve IT related problems by selecting and applying basic methods, tools, materials and information.</p> <ol style="list-style-type: none"> 1. Demonstrates a range of developed IT skills to carry out more than one complex IT related task effectively and in unfamiliar and unpredictable IT contexts; 2. Communicates more complex IT information; 3. Solves basic IT related problems by applying basic methods, tools, materials and information given in a restricted learning environment.
<p>Work out or study under direct supervision in a structured IT context.</p> <ol style="list-style-type: none"> 1. Applies basic IT knowledge and skills to do simple, repetitive and familiar tasks; 2. Participates in and takes basic responsibility for the action of simple IT tasks; 3. Activities are carried out under guidance and within simple defined timeframes; 4. Acquires and applies basic IT key competences at this level. 	<p>Work or study under supervision with some autonomy.</p> <ol style="list-style-type: none"> 1. Applies factual IT knowledge and practical skills to do some structured tasks; 2. Ensures one acts pro-actively; 3. Carries out IT related activities under limited supervision and with limited responsibility in a quality controlled IT context; 4. Acquires and applies basic IT key competences at this level. 	<p>Take responsibility for completion of IT related tasks in work or study and adapt own behaviour to circumstances in solving IT problems.</p> <ol style="list-style-type: none"> 1. Applies IT knowledge and skills to do some IT tasks systematically; 2. Adapts own behaviour to circumstances in solving IT related problems by participating pro-actively in structured IT learning environments; 3. Uses own initiative with established responsibility and autonomy, but is supervised in quality controlled learning environments, normally in an IT environment; 4. Acquires IT key competences at this level as a basis for lifelong learning.

Definitions/Terminology

Term	Definition
Assessment Criteria	A description of what a candidate is expected to do in order to demonstrate that a learning outcome has been achieved.
Assessor	The person responsible to grade the candidate's work, issue a mark and determine the candidate's final grade.
Competences	Each competence is defined as a combination of knowledge and skills and is associated with the level of autonomy and responsibility that the person is expected to have at that level.
Controlled Assessment	An assessment set by MATSEC which may include written and/or practical tasks as specified in the syllabus. This may be a take-home assessment or carried out under controlled conditions.
Coursework	A number of assignments set by teachers and given to the candidate during the course as specified in the syllabus.
Knowledge	Knowledge refers to the understanding of basic, factual and theoretical information, which is traditionally associated with formal learning but can also be acquired from informal and non-formal learning.
Learning Outcome	Learning Outcomes are statements which describe what a qualification represents in terms of knowledge, skills and competences. The Malta Qualifications Framework (MQF) defines a learning outcome as what the candidate understands and is capable of doing at the end of the learning process.
Malta Qualification Framework	The Malta Qualifications Framework (MQF) provides an indication of the level of difficulty as a benchmark for a qualification, which needs to be assigned a level and mapped to the framework. The MQF has level descriptors from Level 1 to 8. The level descriptors are useful for education and training providers as they describe the Knowledge, Skills and Competences and a set of Learning Outcomes, which indicate to the candidate the end of a learning process.
Quality Assurance	A continuous process to assure the standards and quality of the learning assessment programme.
Sample of Work	A sample of work is a percentage of the candidate's work gathered as a representative sample for the internal or external verifier.
Skills	Skills imply the application of acquired knowledge and understanding in different contexts. A skill may be the result of formal learning or of repetitive work in an informal setting.
Synoptic Assessment	An assessment in the form of a written examination and conducted under controlled conditions covering all learning outcomes and the majority of Knowledge and Comprehension assessment criteria in a given unit.
Unit Content	The unit content is the content required to be communicated and given to the candidate per learning outcome. Each learning outcome must have content related to it, which content must be delivered to provide the candidate with the tools necessary to achieve that outcome.

Assessment Scope

Assessment is an important element in any learning process. This should inform candidates about their achievements and at the same time it should meet important conditions of reliability, validity and fairness. Thus, important rules and procedures must be adhered-to. In particular, the assessment regulations and procedures that are explained in this section will ensure that assessments are:

- Of the required standard, quality and level;
- Fair for all candidates;
- Valid and reliable.

Each unit will be assessed through three assignments. The assessment mode/type, criteria to be assessed and the distribution of marks are explained in Part B of the programme as part of the unit specifications.

Quality Assurance

An important aspect of this programme is the quality assurance process that must be conducted throughout the implementation of the programme. Three main processes are to be conducted as stipulated in the table below.

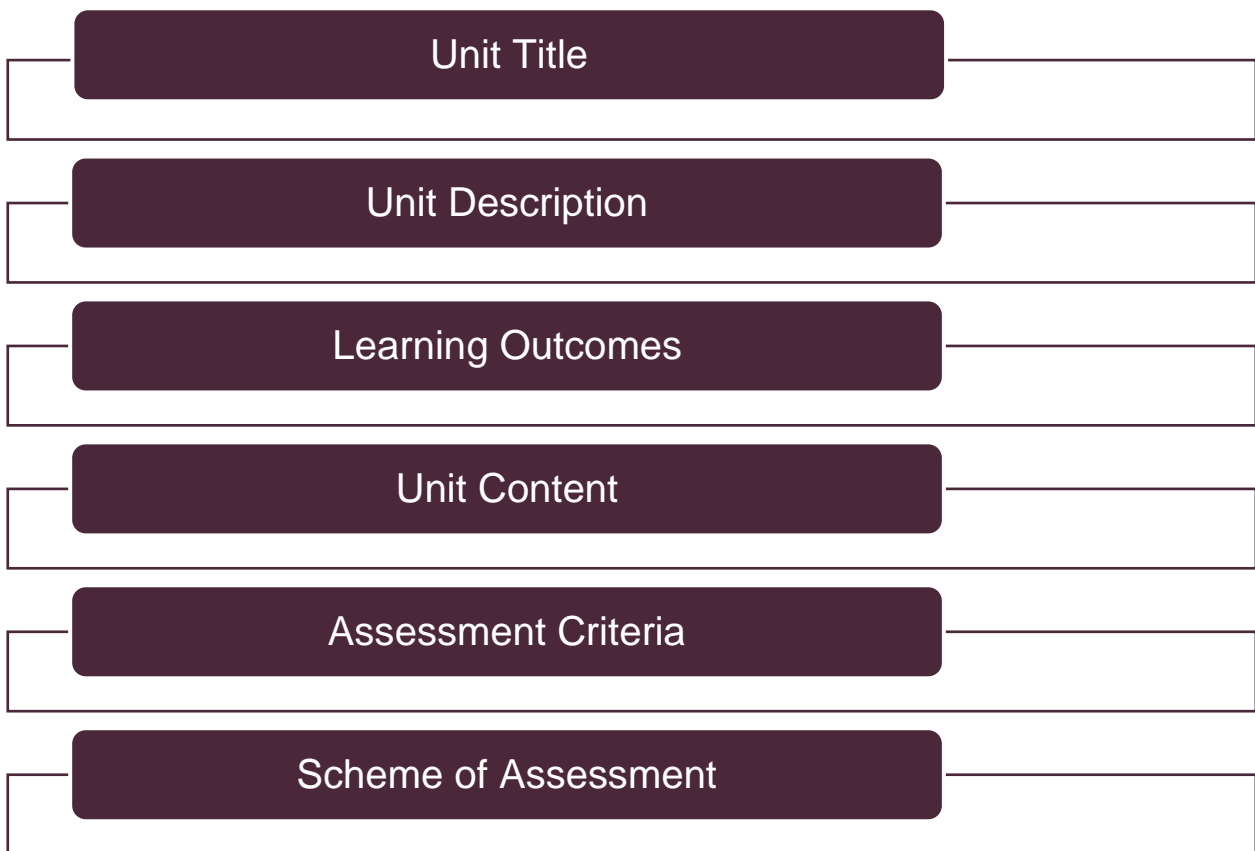
Internal Verification of Assessment Briefs	All assessment briefs are to be internally verified before being issued to the candidates. Within this process, important checks relating to learning outcomes, criteria to be assessed, validity and reliability are to be performed.
Internal Verification of Assessment Decisions	Once candidates complete their work, and their assessments have been corrected, a representative sample of candidates' work is to be internally verified.
External Verification	The process of external verification will ensure that programme quality and standards are met.

Part B: Unit Specifications

Introduction

This part of the programme guide provides detailed specification for each of the 3 units that are to be implemented for the successful completion of the programme. The curriculum design adopted for the development of the units of study is based on the learning outcomes approach. The latter can be defined as “written statements of what a candidate should be able to do/know/apply by the end of the learning process.”¹

The structure of the unit specifications is presented below:



Interpreting the Unit Specifications

The syllabus is written in a way whereby the knowledge criteria at MQF level 3 build upon the knowledge criteria at MQF level 2 and in the same manner the knowledge criteria at MQF level 2 build upon the knowledge criteria at MQF level 1. The same applies for the comprehension and application criteria. The comprehension criteria also build upon the knowledge criteria and the application criteria build upon the knowledge and the comprehension criteria.

¹ http://www.cedefop.europa.eu/files/4156_en.pdf

The document is an assessment syllabus; therefore any other examples or information apart from those written in the unit content should be taught so that candidates will enjoy the learning process and get a general overview of the subject. Under each grading criterion, only the **minimum** content that has to be covered is listed. The material covered in class must at least reflect **both** the unit content and grading criteria.

Examples (e.g.), commas, semi-colons, bullets, or, and N.B. are used in the Learning and Assessment Programme. When semi-colons are used the candidates should be assessed on all the content prescribed. However, when the list is headed with example (e.g.), all the content is to be covered but candidates are to be assessed on more than 50% of the content prescribed for that grading criterion. Where bullets are present, marks allocated for the criterion should be equally distributed. Where 'or' is present, only one of the listed items should be assessed. Where an 'N.B.' is present, important information regarding the assessment is given.

Where the plural is used in grading criteria (e.g. types, aspects, etc.), at least two answers are expected. Unless indicated otherwise in the unit content, when assignments are written, the criteria assessed should build on each other.

In each grading criterion there is a command verb which determines the type of answers expected by the student, such as list, identify, outline, describe, explain, etc... These verbs are defined in the glossary of verbs available on the MATSEC website. It is of vital importance that the command verbs specified in the grading criteria remain unchanged in the assignment brief.

Unit 1: Computer Hardware Installation

Unit 1	Computer Hardware Installation
<p>Unit Description</p>	<p>In this unit candidates will learn about various types of computer systems along with the different components which make up a computer system, including input, output and secondary storage devices, and their use.</p> <p>Moreover, since by time computer systems need to be upgraded or maintained, candidates will be able to recognise when a computer system needs to be maintained, identify the problem and determine a way to solve such problem. Hence, they will acquire the necessary skills to choose compatible components, carry out the replacement and/or installation and/or upgrade (RIU) of the internal hardware components while following good Health and Safety practices, test the installed components and computer system to ensure that they all work together and finally document the RIU.</p> <p>In addition, computer systems will be enhanced through the use of customised input devices soldered on purpose. Hence, candidates will learn the necessary soldering techniques to be able to build such devices while ensuring the functionality and reliability of the device.</p> <p>Given that a computer needs software to work, candidates will learn how to install an operating system. They will also learn about the importance of having different accounts for different users, while be able to setup such user accounts and customise them according to the user needs.</p>

Learning Outcomes

At the end of the unit, I can:

- LO 1.** Demonstrate an understanding of computer system and peripheral devices.
- LO 2.** Install (RIU) internal hardware components and the necessary software.
- LO 3.** Install an Operating System.
- LO 4.** Set up user accounts.

Unit Content

Subject Focus	Computer systems
LO 1.	Demonstrate an understanding of computer system and peripheral devices.
K-1.	<p>Computer systems: e.g. server, desktop computer, laptop, tablet, e-book reader, gaming rig, smartphone, embedded device, wearable.</p> <p>Input devices and output devices:</p> <ul style="list-style-type: none"> • Input device: mouse or trackball or scanner or touchpad or keyboard or Braille keyboard or eye-tracking system or puff-suck switch or joystick or joypad or microphone or 3D-scanner or buttons or dedicated sensors or dedicated control panel or Optical Mark Reader (OMR) or Magnetic Ink Character Reader (MICR) or graphics tablet or barcode reader; • Output device: monitor or projector or 2D-printer or 3D-printer or plotter or speaker or headphones or VR headset. <p>Properties of secondary storage devices: e.g. storage technology (magnetic, optical, electronic), capacity, access speed, longevity of device, costs, portability.</p> <p>N.B. For assessment purposes, any ONE of the following secondary storage devices should be considered: hard disk or CD or DVD or Blu-ray or Solid-State Disk (SSD) or flash memory card or USB flash drive or magnetic tape.</p>
C-1.	<p>Justification of a computer system: e.g. cost, speed, portability.</p> <p>Justification of input and output devices: use and/or specifications and/or connectivity and/or cost and/or after-sales service.</p> <p>N.B. For assessment purposes, the justification should be based on TWO aspects for input devices and TWO aspects for output devices. The same aspect could be used for both input and output.</p> <p>Justification of storage requirements: e.g. storage technology (magnetic, optical, electronic), capacity, access speed, longevity of device, costs, portability.</p> <p>N.B. For assessment purposes, any ONE of the following secondary storage devices should be considered: hard disk or CD or DVD or Blu-ray or Solid-State Disk (SSD) or flash memory card or USB flash drive or magnetic tape.</p>

Subject Focus	Installation and testing of internal hardware components
LO 2.	Install (RIU) internal hardware components and the necessary software.
K-2.	Hazards: e.g. high voltage, high electrostatic energy, high magnetism, sharp objects, trailing cables, lifting heavy objects, precarious positioning of equipment.
	Risks: e.g. physical damage to equipment, electrostatic discharge, data loss, data corruption, human injuries, tripping, electrocution.
	Precautions: e.g. use antistatic equipment, use appropriate tools, ergonomics, no trailing cables, backups, wear adequate clothing, firefighting equipment and procedures.
K-3.	Internal hardware components: e.g. RAM, CPU, heat sink, hard disk, graphics card, sound card, network card, power supply unit.
	Reasons for upgrading a computer: user requirements; increase storage capacity; increase processing speed; increase hardware reliability (intermittent faults); cater for minimum software requirement.
	Implications of upgrading a computer: user re/training; hardware compatibility problems; software compatibility problems; decommissioning of hardware; migration of data.
K-4.	Issues causing unsuccessful RIU: e.g. loose or wrongly inserted connections, internally broken cables, dead-on-arrival (DOA) components.
	Ways to test an RIU: e.g. BIOS, device manager, third-party diagnostic tools.
	Solutions for unsuccessful RIU: e.g. secure cable connections, connect cable in appropriate port, place component in appropriate slot, replace damaged cable with a working one, replace DOA component with new one, consult with mainboard manual for solutions.
K-5.	RIU documentation sections: reason for the RIU; solution proposed; actual implementation; testing; signatories and date.
	Importance of documentation: record keeping of work done; warranties of any components; completed test plan; reference point for troubleshooting.
K-6.	Equipment needed for soldering: e.g. soldering iron and soldering stand, solder, wet cleaning sponge, side cutter, safety glasses, desoldering pump, desoldering braid (wick), third-hand tool, digital multimeter.
	Precautions when soldering: e.g. never touch the heated end of the soldering iron, always place the soldering iron on its stand when not in use due to its long-term heating after use, always wear safety glasses due to spills, use resin-free and lead-free solders, always wash hands with soap and water after soldering, use filter extract systems during soldering, use soldering in a well-ventilated area.
	Procedures: <ul style="list-style-type: none"> • Soldering a solder joint: secure component on the circuit board; touch the tip of the soldering iron to both the pad and the solder simultaneously and let them heat up; apply the solder to cover the pad; remove the solder and soldering iron and let the solder cool; remove any excess solder from the printed circuit board; • Desoldering: locate the joint to be removed; use a wet sponge to clean the soldering iron as it heats; push down on the desoldering pump; apply heat to the joint to be removed and vacuum up the melted solder; remove the soldering iron and empty the desoldering pump into the trash.

C-2.	Components: RAM; CPU with heat sink; secondary storage devices; expansion cards; Power Supply Unit (PSU).
	Justification based on: compatibility and specifications in relation to use.
	Differences in technologies: types of RAM (dynamic [DDR-x]) or types of CPU (integrated, socket type, generation) or types of heat sink (active, passive) or types of secondary storage interface (SATA, PATA, M.2) or types of expansion slots (AGP, PCI, PCIe, M.2).
C-3.	<p>Boot-up error report hardware problems: power-related or CPU-related or mainboard-related or adapter card related.</p> <p>N.B. For assessment purposes, boot-up error reports should take into consideration beep codes and/or POST test readouts.</p>
A-1.	Health and Safety procedures while installing hardware: wear appropriate clothing; switch off power; disconnect plug; remove power cable; disconnect remaining computer cables from computer; ensure workplace is large enough; place components on antistatic mat; open case carefully; look out for sharp edges; wear antistatic wrist strap; be organised; handle tools safely.
	Preparation to carry out hardware RIU: tools; anti-static and cleaning equipment; hardware components; software; check component compatibility; recording of serial numbers.
	<p>Installation of components: clean hardware components; install hardware component one*; install hardware component two*; reassemble computer; install any necessary software**.</p> <p>*N.B. For assessment purposes, the installation of hardware may require a replacement of a component.</p> <p>**N.B. For assessment purposes, software installation and configuration may not necessarily be linked to a driver but to other software used to test hardware functionality.</p>
A-2.	<p>Test plan for RIU components based on: e.g. BIOS, system information, device manager, third-party diagnostic tools.</p> <p>N.B. For assessment purposes, candidates should specify what shall be tested through the tests (e.g. when installing a network card the device manager will be used to check whether it has been recognised).</p>
	<p>Testing RIU components: TWO tests for component 1; TWO tests for component 2; tests carried out according to test plan.</p> <p>N.B. For assessment purposes, tests carried out should include a variety of ways which can be used for testing a replaced/installed/upgraded hardware component, based on the test plan.</p>
	Documentation of upgrade: reason/s for RIU; suggested RIU; actual implementation; log of serial numbers; results of the two tests for each component installed/upgraded/replaced.

A-3.	Tools and material for soldering: soldering iron and soldering stand; solder; wet cleaning sponge; side cutter; safety glasses; desoldering pump or desoldering braid (wick); third-hand tool; digital multimeter; printed circuit board; SIL connectors; micro-controller; sensor.
	<p>Soldering:</p> <ul style="list-style-type: none"> Soldering techniques: secure component on the printed circuit board; touch the tip of the soldering iron to both the pad and the solder simultaneously and let them heat up; apply the solder to cover the pad; remove the solder and soldering iron and let the solder cool; remove any excess solder from the printed circuit board; Health and Safety procedures: never touch the heated end of the soldering iron; always place the soldering iron on its stand when not in use due to its long-term heating after use; always wear safety glasses due to spills; always wash hands with soap and water after soldering; use filter extract systems during soldering.
	Testing a soldered computer component: inspecting for dry joints; inspecting for short circuits; using a digital multimeter to check continuity; connecting component to a computer to test functionality.

Subject Focus	Software
LO 3.	Install an Operating System.
K-7.	Types of software: system software; application software.
	<p>Examples of software:</p> <ul style="list-style-type: none"> System software: e.g. Windows, Linux, Mac OSX; Application software: e.g. word processor, medical software, image editor.
	Difference between types of software: system software; application software.
A-4.	Installation of an operating system: check operating system requirements (RAM; CPU; storage capacity; graphics card); setup boot-up sequence; select type of installation.
	Setting a restore point: open window to create a restore point; choose the create button; type a name for the restore point.
	<p>Disk partitioning: remove any present partitions; set the appropriate primary and second partition size; create TWO partitions*; format the second partition.</p> <p>N.B. For assessment purposes, disk partitioning should be carried out during the installation of the operating system.</p> <p>*N.B. For assessment purposes, all partitions should be 'allocated'.</p>

Subject Focus	User accounts
LO 4.	Set up user accounts.
K-8.	Local user accounts: e.g. administrator, standard, guest.
	Online user accounts: <ul style="list-style-type: none"> • Advantages: e.g. synchronisation between computer systems, online storage, access to files saved on other devices; • Disadvantages: e.g. privacy of information, security issues with Single Sign-On (SSO), dependency on internet connection.
A-5.	Creation of a local user account: access user account window; select appropriate account; set account name; create new account; create password.
	Customising a user profile: personalisation; accessibility features; control settings.
	Setting up an operating system online user account: log in Operating System using an Administrator account; open window to set up a Microsoft account; use e-mail address credentials to set up Microsoft account; log in Operating System using Microsoft account credentials.

Learning Outcomes and Assessment Criteria

Subject Focus:	Computer systems
Learning Outcome 1:	Demonstrate an understanding of computer systems and peripheral devices.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. List different types of computer systems.	K-1. Select appropriate input and output devices for a given situation.	K-1. Outline the properties of a storage device.	C-1. Justify the appropriate computer system for a given scenario.	C-1. Justify the appropriate input and output devices for a given scenario.	C-1. Justify the appropriate storage requirements for a given scenario.			

Subject Focus:	Installation of internal hardware components
Learning Outcome 2:	Install (RIU) internal hardware components and the necessary software.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-2. Identify hazards in an IT environment.	K-2. List risks that might arise from hazards in an IT environment.	K-2. Outline precautions to minimise potential risks.	C-2. Choose compatible components for a given mainboard and user requirements.	C-2. Justify the chosen components for a given mainboard and user requirements.	C-2. Discuss differences between alternative technologies for a given component.	A-1. Follow Health and Safety procedures while installing hardware.	A-1. Prepare the necessary tools and components to carry out the required hardware RIU.	A-1. Install the required components.
K-3. Label different internal hardware components.	K-3. List the reasons for which a computer upgrade may be required.	K-3. Outline the implications of upgrading a computer.				A-2. Create a test plan to test RIU components.	A-2. Carry out tests on every RIU component.	A-2. Document the upgrade.
K-4. List issues which can cause an RIU to be unsuccessful.	K-4. Describe ways which can be used to test an RIU.	K-4. Outline solutions for unsuccessful RIU.	C-3. Identify the hardware problem that has generated a given boot-up error report.	C-3. Describe possible causes that have generated a given boot-up error report.	C-3. Explain possible solutions to solve the generated boot-up error.	A-3. Select the adequate tools and material to solder a computer component.	A-3. Use appropriate techniques required to solder the computer component following Health and Safety procedures.	A-3. Test the soldered computer component.
K-5. Name the sections of an RIU documentation.	K-5. Outline the content of the various sections of an RIU documentation.	K-5. Describe the importance of documenting an RIU.						
K-6. Match the equipment needed for soldering with its use.	K-6. Outline precautions which should be taken to minimise risks when soldering.	K-6. Describe the procedure of soldering a solder joint and desoldering.						

Subject Focus:	Software
Learning Outcome 3:	Install an Operating System.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-7. Name different types of software.	K-7. List different examples of each type of software.	K-7. Differentiate between different types of software.				A-4. Install an operating system.	A-4. Set a restore point.	A-4. Apply disk partitioning.

Subject Focus:	User accounts
Learning Outcome 4:	Set up user accounts.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. List different local user accounts.	K-8. Describe the purpose of different local user accounts.	K-8. Outline the advantages and disadvantages of online user accounts.				A-5. Create a local user account.	A-5. Customise a user profile based on particular requirements.	A-5. Setup an operating system online user account.

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

Scheme of Assessment

Every assignment should include at least **ONE** knowledge criterion and **ONE** application criterion.

Assignment Number	Assignment Type	Percentage distribution
1	Coursework	24 – 42%
2	Coursework	24 – 42%
3	Controlled	24 – 42%

Distribution of Marks

Criteria	MQF Level 1 Marks	MQF Level 2 Marks	MQF Level 3 Marks	Totals
Knowledge	1	1	2	4
Comprehension	2	2	2	6
Application	3	3	4	10

Unit 2: Networking

Unit 2	Networking
<p>Unit Description</p>	<p>In this unit, candidates will become acquainted with basic networking terminology and how networks are used to share data and resources between computer systems. Such knowledge will be attained through the skills the candidates will acquire when setting up a network whereby data can be shared between computer systems over wired or wireless infrastructures. This entails that the candidates will learn to plan a network by choosing the appropriate network devices, build the necessary wall trunking including termination of wall ports, crimping CAT5/6 cables, as well as set up the wired and wireless network. Candidates will also learn how to organise and connect the necessary cables and devices in a network cabinet while ensuring network connectivity.</p> <p>Knowing that networks make use of rules when communicating with each other, candidates will become familiar with common networking protocols. Furthermore, they will acquire the necessary knowledge and skills in relation to internet protocol (IP) addresses and subnetting.</p> <p>Given that networks are all about sharing of data and resources, candidates will learn how to share files/folders and devices between different computer systems using appropriate sharing permissions. Moreover, ways to secure the network from possible network security threats will also be covered. To this end, candidates will learn how using third-party internet security suites, firewalls and router settings, the network can be protected from threats and unauthorised access.</p>

Learning Outcomes

At the end of the unit, I can:

- LO 1.** Setup the infrastructure for a small-scale network.
- LO 2.** Configure networking protocols.
- LO 3.** Share data and resources on a network.
- LO 4.** Secure a network from possible threats.

Unit Content

Subject Focus	Network infrastructure
LO 1.	Setup the infrastructure for a small-scale network.
K-1.	Network: group of devices; connected together.
	Advantages and disadvantages of networks: <ul style="list-style-type: none"> • Advantages: e.g. sharing of data, sharing of hardware devices, communication; • Disadvantages: e.g. security, robustness (network failures), costs.
	Difference between client-server and peer-to-peer architectures: e.g. cost, network management, security.
K-2.	Types of networks: e.g. PAN, CAN, HAN, LAN, MAN, WAN.
	Topologies: e.g. bus, ring, star, mesh, hybrid, tree.
K-3.	Pin out standards: T568A (white/green - green - white/orange - blue - white/blue - orange - white/brown - brown); T568B (white/orange - orange - white/green - blue - white/blue - green - white/brown - brown).
	Data transmission media categories: <ul style="list-style-type: none"> • Wired: e.g. twisted pair cable, coaxial cable, optical fibre cable; • Wireless: e.g. infrared, radio frequency (Bluetooth, Wi-Fi), microwave frequency.
	Data transmission limitations: based on distance or bandwidth or interference or bend radius. N.B. For assessment purposes, TWO data transmission media should be considered.
K-4.	Network devices: e.g. router, switch, host, modem, repeater, access point. N.B. For assessment purposes, <i>CISCO symbols should be used.</i>
	Specifications of network devices: e.g. number of ports, connectivity medium, power source (over Ethernet/transformer/direct electrical mains).
C-1.	Network devices: e.g. router, switch, host, modem, repeater, access point. N.B. For assessment purposes, the scenario presented should include FOUR network devices.
	Network plan: proper placement of network devices/symbols on architectural design plan; inclusion and labelling of proper data transmission media. Justification of network devices and data transmission media based on: choice of network devices and data transmission media; placement of network devices.

A-1.	<p>Cable crimping: cut cable to length; strip cable; untwist pairs; put cables in order according to standard; insert in connector and crimp; test cable.</p> <p>N.B. For assessment purposes, the types of cabling to be used should be male-to-male straight or male-to-male crossover.</p>
	<p>Network wall trunking: cut trunking to length; fix trunking in place; cut cable to length; pass cable through trunking; strip cable; untwist pairs; put cables in keystone according to standard; punch down cables to the slots of the keystone; place on the protective cover of the keystone; fix wall port.</p>
	<p>Connect network wall trunking to network cabinet: strip cable; untwist pairs; put cables in patch panel slots according to scheme; punch down cables to the slots; fix patch panel to the network cabinet; label patch panel ports; label cable and wall port; test connectivity.</p>
A-2.	<p>Installing a switch within a network cabinet: prepare the necessary resources; attach the L-brackets to the sides of the chassis; slide the chassis into the rack; secure chassis using screws; connect switch to power source; connect switch to the respective patch panel ports.</p>
	<p>Connecting two wired LANs via a router: connect network cables to router; connect router to power; physically connect end devices*; test network connectivity.</p> <p>*N.B. For assessment purposes, end devices and router interfaces should be pre-configured.</p>
	<p>Connect wireless access point to a LAN: configure IP address of access point; configure basic wireless settings of access point; connect access point to network; test network for data transfer.</p>

Subject Focus	Network protocols
LO 2.	Configure networking protocols.
K-5.	Secure and insecure protocols: <ul style="list-style-type: none"> • Secure protocols: e.g. HTTPS, SFTP, WPA2; • Insecure protocols: e.g. HTTP, FTP, POP3.
	Networking protocols use: e.g. web browsing, email, file transfer, wireless. N.B. For assessment purposes, students are to outline the use of the protocols assessed at MQF 1.
	DHCP: <ul style="list-style-type: none"> • Use: automatically configure IP addresses to hosts in a TCP/IP network; • Benefits: e.g. IP address management through leases, centralised network client configuration, large network support.
K-6.	IP address: string of numbers separated by full stops; identifies hosts on a network.
	Differences between IPv4 and IPv6 based on: e.g. address size, address format, number of addresses.
	Purposes of subnetting: e.g. to divide a network into smaller logical segments, improve network performance and speed, boost network security.
C-2.	IP addresses classes: Class A; Class B; Class C. N.B. For assessment purposes, students are to categorise FOUR IP addresses.
	Explanation why computers can or cannot communicate based on: IP addresses; subnet mask.
	Justification of subnet mask suitability: number of devices per subnet or number of subnets required.
A-3.	Testing network connectivity: ping; traceroute.
	DHCP server configuration: create a new DHCP pool of IP addresses; define a subnet which will be used to assign IP addresses to hosts; excluded IP addresses from being assigned by DHCP; define the default gateway; define the DNS server.
	Assigning appropriate IP addressing: calculate IP host range; calculate subnet mask; open window to access the network connection properties; access the TCP/IPv4 connection properties; enter the necessary details including IP address, subnet mask and default gateway.

Subject Focus	Sharing over a network
LO 3.	Share data and resources on a network.
K-7.	File and folder sharing permissions: e.g. read, write, read and execute, modify, full control, list folder contents. N.B. For assessment purposes both file and folder sharing permissions should be considered.
A-4.	Sharing a file/folder: enable sharing; share file/folder as per default permissions; access file/folder from another account set on a different computer system.
	Sharing a device: share device as per default permissions; add device to another account set on a different computer system; test that device has been successfully shared.
	Modifying sharing permissions: set appropriate file/folder sharing permissions; test file/folder sharing permissions from another account; set appropriate device sharing permissions; test device sharing permissions from another account.

Subject Focus	Network security
LO 4.	Secure a network from possible threats.
K-8.	Security threats: e.g. malware, botnet, hacking, denial of service attack, phishing, spam.
	Networked device protection measures: e.g. firewall, anti-malware, restore point, security updates, disk freezing, sand boxing, backups.
	Wireless network protection measures: e.g. WPA, WPA2, WEP, hide SSID, MAC address filtering, access point username and password, update access point firmware, turn off Wi-Fi Protected Setup (WPS).
C-3.	Repercussions of unsecured network: e.g. identity and personal information theft, criminal activity using your network, stealing of bandwidth, stealing of data, use of unauthorised hardware, deleting of data.
	Justification of protection measures to secure a network: e.g. effectiveness, ease of installation, reliability.
A-5.	Protection of device: install third-party internet security suite; check for software updates; run a quick system scan; remove threat from an external storage device.
	Firewall settings: <ul style="list-style-type: none"> Block a website: add website to block list; test that website has been blocked; Block a program from accessing the Internet: access firewall settings; add program to block list; test that program has been blocked.
	Protection of a wireless router from unauthorised access: change router admin username and password; change network name (SSID); activate wireless security (WEP/WPA/WPA2); filter by MAC address.

Learning Outcomes and Assessment Criteria

Subject Focus:	Network infrastructure
Learning Outcome 1:	Setup the infrastructure for a small-scale network.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. Define a network.	K-1. Outline the advantages and disadvantages of networks.	K-1. Differentiate between client-server and peer-to-peer architectures.	C-1. Choose the network devices necessary to setup a network for a given scenario.	C-1. Illustrate a network plan on a given architectural design for a given scenario.	C-1. Justify the network plan designed for a given architectural design for a given scenario.	A-1. Crimp a CAT5e/6 cable.	A-1. Build the necessary network wall trunking for a given scenario.	A-1. Connect the network wall trunking to a network cabinet.
K-2. Name different types of networks.	K-2. Outline different types of networks based on geographical area.	K-2. Describe different network topologies.						
K-3. Match CAT5e/6 pin outs to the correct standard.	K-3. Categorise data transmission media as wired or wireless.	K-3. Outline a limitation for data transmission media.				A-2. Install a switch within a network cabinet.	A-2. Connect two wired networks via a router using cables.	A-2. Configure a wireless access point to enable communication with a local area network.
K-4. Identify network devices symbols.	K-4. State the use of different network devices.	K-4. Outline specifications for a network device.						

Subject Focus:	Network protocols
Learning Outcome 2:	Configure networking protocols.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-5. Identify whether the selected protocols are secure or not.	K-5. Outline the use of different networking protocols.	K-5. Describe the use and benefits of DHCP.	C-2. Categorise IP addresses by class.	C-2. Explain why particular computers can communicate over a network and others cannot given their IP addresses and subnet mask.	C-2. Justify the suitability of the subnet mask for an IPv4 network in a given scenario.	A-3. Test network connectivity between computers.	A-3. Configure a DHCP server.	A-3. Assign the appropriate IP addressing based on a custom subnet mask for a given scenario.
K-6. Define an IP address.	K-6. Differentiate between IPv4 and IPv6.	K-6. Describe the purpose of subnetting.						

Subject Focus:	Sharing over a network
Learning Outcome 3:	Share data and resources on a network.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-7. List different types of file and folder sharing permissions.	K-7. Outline file and folder sharing permissions.	K-7. Describe situations where particular file and folder sharing permissions should be assigned.				A-4. Implement file/folder sharing between computers on a network.	A-4. Implement device sharing between computers on a network.	A-4. Modify file/folder and device sharing permissions ensuring correct implementation for a given scenario.

Subject Focus:	Network security
Learning Outcome 4:	Secure a network from possible threats.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. List network security threats.	K-8. State protection measures for a networked device.	K-8. Outline protection measures for a wireless network.	C-3. State different repercussions of an unsecured network for a given scenario.	C-3. Explain different repercussions of an unsecured network for a given scenario.	C-3. Justify protection measures to secure a network for a given scenario.	A-5. Protect a device using a third-party internet security suite.	A-5. Modify firewall settings to block a website and a program.	A-5. Protect a wireless router from unauthorised access.

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

Scheme of Assessment

Every assignment should include at least **ONE** knowledge criterion and **ONE** application criterion.

Assignment Number	Assignment Type	Percentage distribution
1	Coursework	24 – 42%
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Knowledge	1	1	2	4
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Application	3	3	4	10

Unit 3: Game Development

Unit 3	Game Development
<p>Unit Description</p>	<p>In this unit, candidates will become aware of the different genres of computer games and the various computer game platforms, along with the steps involved in developing a computer game. Part of this process entails the acquisition of the skills necessary to propose a computer game idea, plan the elements of such game and present a computer game idea to an audience prior to developing the actual game.</p> <p>Since computer games include digital graphics and sound, candidates will acquire the necessary skills which will help them create and manipulate the graphic and sound elements necessary for the game being developed. Furthermore, candidates will become aware of the importance of drawing flowcharts to plan the game prior to implementing the actual code. Following this, candidates will learn how to use an iconic programming language to develop the computer game.</p> <p>Additionally, candidates will acquire the necessary skills to design a test plan, which they will then use to test the functionality of a computer game. Given the necessity of documenting a computer game, candidates will obtain an understanding of the different types of documentation and finally prepare the necessary documentation.</p>

Learning Outcomes

At the end of the unit, I can:

- LO 1.** Plan a computer game idea.
- LO 2.** Create digital graphics, sounds and sprites for a computer game.
- LO 3.** Develop a computer game.
- LO 4.** Document a computer game which has been tested for functionality.

Unit Content

Subject Focus	Elements of a game environment
LO 1.	Plan a computer game idea.
K-1.	Computer games genres: e.g. platform, action, adventure, action-adventure, simulation, strategy, sports, educational.
	Computer game platforms: e.g. personal computers, video game consoles, mobile gaming platforms.
K-2.	Elements of a computer game: sprite; sound; backdrop; script.
	Characteristics of a good computer game: e.g. high-quality graphics, responsive controls, multi-player, re-playability, open-ended worlds, story-telling.
C-1.	Justification of game genres: purpose.
	Justification of the game platform: e.g. user requirements, platform specification, costs.
	<p>Justification of input and output devices to be used when playing a game:</p> <ul style="list-style-type: none"> • Input devices: joystick and/or steering wheel and/or 3D mouse and/or hybrid controller and/or gamepad and/or microphone and/or keyboard and/or touch screen; • Output devices: gaming monitor and/or dual monitors and/or surround speakers and/or VR headset and/or headphones and/or touchscreen. <p>N.B. For assessment purposes, students should justify FOUR devices in all from the above list.</p>
A-1.	Proposing a game idea: user requirements; use of the game; target audience.
	Planning a game: design of game level interface; design of sprites; sounds.
	Presentation of a game idea: use of appropriate technology; tone of voice; non-verbal communication; verbal communication.

Subject Focus	Animating sprites
LO 2.	Create digital graphics, sounds and sprites for a computer game.
K-3.	Formats: <ul style="list-style-type: none"> • Image formats: e.g. bmp, jpeg, png; • Sound formats: e.g. flac, wav, mp3.
	Characteristics: <ul style="list-style-type: none"> • Image characteristics: e.g. compression (uncompressed/lossy/lossless), colour depth, resolution (ppi); • Sound formats: bitrate; compression (uncompressed/lossy/lossless).
K-4.	Flowchart symbols: terminal; input/output; process; decision.
	Control structures: e.g. sequence, selection, iteration. N.B. For assessment purposes, the flowchart should not be based on a script.
K-5.	Block categories of code blocks: e.g. motion, looks, sound, events, control, sensing.
	Use of blocks: e.g. move x blocks, switch costume to, play sound, when clicked, broadcast, forever, if then, touching, mouse down?.
C-2.	Use of blocks in game scripts: single blocks; group of blocks. N.B. For assessment purposes, students should be provided with a game script having labelled single blocks and a group of blocks for which they need to state the use in relation to the game environment.
	Flowchart elements for a game script: proper symbols; proper connections; proper logical flow; proper labelling.
A-2.	Inserting a sprite from library: access library to choose sprite; choose sprite; choose sprite costume.
	Editing a backdrop: add backdrop to game environment; import an image file; add text.
	Importing a sound element: download a sound file; edit a sound file using audio editing software; export sound file from audio editing software; import sound file in game environment. N.B. For assessment purposes, the sound element could be background music or narration or a combination of both.
A-3.	Scripting a sprite movement: use of events blocks; use of motion blocks; use of control blocks.
	Playing an audio file: apply an effect using the game sound editor; set sound volume using blocks; play sound effect in game using blocks.
	Manipulating sprite settings: <ul style="list-style-type: none"> • Motion: e.g. sprite direction, position of sprite, rotation; • Looks: e.g. make sprite talk/think, change sprite size, change sprite special effect.

Subject Focus	Programming
LO 3.	Develop a computer game.
K-6.	Data types: string; Boolean; integer; real.
	Variable scopes: e.g. local variables, global variables, cloud variables.
K-7.	Procedure: independent set of instructions; referenced within the main source code.
	Advantages of using procedures: e.g. reduce coding time, re-usability of code, easier to detect errors.
	N.B. For assessment purposes students are to order a procedure which is not made up of more than TEN blocks.
C-3.	Justification of data types: use. N.B. For assessment purposes, students are to justify TWO data types.
	Explanation of variables: use; variable scope. N.B. For assessment purposes, students are to explain TWO variables.
	Interpretation of procedures outcome: scope; output.
A-4.	Built-in elements for a game related to: mouse/keyboard inputs; variables; operators.
	Control structures for a single-level game: selection; iteration; broadcasts.
	Developing a multi-level game: define procedure (block); code the procedure; develop at least another game level; set conditions to switch between levels.

Subject Focus	Testing and documentation
LO 4.	Document a computer game which has been tested for functionality.
K-8.	Purposes of testing: e.g. detect errors, quality assurance, system meets user requirements.
	Types of errors: e.g. syntax errors, logical errors, run-time errors.
	Types of documentation: e.g. requirements documentation, technical documentation, user documentation.
A-5.	Plan to test a computer game: what is being tested; test data; expected output.
	Testing a computer game: carry out tests based on test plan; document actual output; document remarks.
	Documentation of a computer game: <ul style="list-style-type: none"> • Technical documentation: game script including comments; • User documentation: purpose of the game and hardware requirements; how to play the computer game.

Learning Outcomes and Assessment Criteria

Subject Focus:	Elements of a game environment
Learning Outcome 1:	Plan a computer game idea.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. Name different genres of computer games.	K-1. Outline different genres of computer games.	K-1. Describe different computer game platforms.	C-1. Justify the appropriate game genres for a given scenario.	C-1. Justify the appropriate computer platform for a game player in a given scenario.	C-1. Justify appropriate input and output devices to be used when playing a game for a given scenario.	A-1. Propose a game idea for a given scenario.	A-1. Plan the game idea.	A-1. Present the game idea to an audience, using appropriate technology.
K-2. List the basic elements of a computer game.	K-2. Outline the basic elements of a computer game.	K-2. Describe the characteristics of a good computer game.						

Subject Focus:	Animating sprites
Learning Outcome 2:	Create digital graphics, sounds and sprites for a computer game.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-3. Name different image and sound formats.	K-3. State the characteristics of an image and sound format.	K-3. Describe the characteristics of an image and sound format.				A-2. Insert a sprite from library.	A-2. Edit a backdrop for a game environment based on given requirements.	A-2. Import a sound element in a game environment following modifications based on given requirements.
K-4. Draw flowchart symbols.	K-4. Outline the use of flowchart symbols.	K-4. Draw flowcharts for the control structures.	C-2. State the use of blocks in a given game script.	C-2. Explain the aim of a given game script.	C-2. Draw the flowchart for a given game script.			
K-5. Match the code blocks with their respective category.	K-5. Outline the purpose of block categories.	K-5. Describe the use of blocks through examples.				A-3. Script the movement of a sprite.	A-3. Play an audio file through a script of code.	A-3. Manipulate sprite settings in the script of code.

Subject Focus:	Programming
Learning Outcome 3:	Develop a computer game.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-6. Select appropriate data types for given variables.	K-6. Define variables and constants.	K-6. Differentiate between variable scopes.	C-3. Justify the data types used in a given script.	C-3. Explain how variables will be used in a given script.	C-3. Interpret the outcome of given procedures.	A-4. Develop a game using built-in elements.	A-4. Develop a single-level game using customised control structures.	A-4. Develop a multi-level game using customised procedures.
K-7. Define a procedure.	K-7. Outline the advantages of using procedures.	K-7. Order the given blocks in a given procedure.						

Subject Focus:	Testing and documentation
Learning Outcome 4:	Document a computer game which has been tested for functionality.

Knowledge Criteria			Comprehension Criteria			Application Criteria		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. State the purposes of testing.	K-8. Outline types of errors.	K-8. Differentiate between different types of documentation.				A-5. Prepare a test plan to test a computer game.	A-5. Test a computer game.	A-5. Document a computer game based on testing.

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

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Application	3	3	4	10

Appendix 1 – Minimum required resources

This list is not intended to be exhaustive. These resources should be available for at least 16 candidates.

Common

Computer lab/workshop with electrical power outlets, projector, sound system and work-station tables

Internet access

Lockable storage cabinets to store candidates' work, tools and consumables

16 x 4GB USB flash drives (one per candidate)

1 x A4 colour printer

1 x external storage hard disk

2 x digital video cameras complete with external storage and tripod

Health and Safety equipment including First Aid box and fire extinguisher

Unit 1 (Year 9)

Hardware

16 x functional old computers (such as Dual Core and above) with mice, keyboards and monitors

16 x computer repair tool-kit including different screwdrivers, such as Phillips and flat head screwdrivers, and tweezers (one per candidate)

16 x screw organisers or screw tubes including screws (one per candidate)

8 x anti-static bench mats (one per two candidates)

16 x anti-static wrist bands and earthing leads (one per candidate)

Compressed air cans or a mini air compressor

Rubbing alcohol

Compound pastes

4 x USB and LAN cable testers

16 x RAM, CPU and heat sink, hard disk drives, optical disk drives, graphics cards, sound cards, wireless network cards, USB port extenders, and Power Supply Units

Hardware components (not necessarily functional) which are **NOT** compatible with computer systems to be used for Replacement/Installation/Upgrade (RIU)

16 x variable temperature-controlled soldering iron and soldering stand

16 x soldering iron bit cleaner including sponge

Solder

8 x universal side cutters (one between two candidates)

8 x long nose pliers (one between two candidates)

8 x wire stripper pliers (one between two candidates)

8 x desoldering pump (one between two candidates)

Desoldering braid (wick)

16 x magnifying glass

16 x third-hand tools

16 x fume extractors

16 x safety glasses

8 x digital multimeters

32 x printed circuit boards (two per candidate)

10 x SIL connectors

16 x micro-controllers

32 x sensors such as sound sensor, moisture sensor, light sensor, LDR sensor

16 x USB data cables

Software

A recent Operating System e.g. Windows 10 plus Key for installation

Third-party diagnostic software tool e.g. CPU-Z, Speccy

Unit 2 (Year 10)

Hardware

16 x functional computers with network ports, mice, keyboards and monitors (ideally with wireless NICs)

1 x computer to be used as a DHCP server (unless routers provide DHCP functionality)

Sample fibre optic cables and connectors e.g. ST, SC

Sample coaxial cables and connectors e.g. BNC, RG6

Network cable roll e.g. CAT5e or CAT6

RJ-45 connectors

8 x universal side cutters (one per two candidates)

8 x wire stripper pliers (one per two candidates)

8 x network cable crimping pliers (one per two candidates)

4 x LAN cable testers

8 x wireless routers (including wired interfaces)

4 x wireless access points

2 x wireless devices such as smartphones, tablets or laptops

4 x printers (or any other devices) to be shared on the network

1" trunking and corners

8 x mini hand saw

16 x RJ-45 network wall face cover including keystone

8 x punch down tools (one per two candidates)

1 x 24U floor standing network cabinet
4 x rack management systems
4 x patch panels
1 x power distribution unit UK type sockets
1 x power distribution unit IEC C14 type sockets
Labels for patch panel
1 x 48-port switch or 2 x 24-port switches including brackets to fix to cabinet
16 x set of screwdrivers of different types and sizes of screwdrivers

Software

DHCP Server
Internet Security Suite e.g. Avast, Comodo

Unit 3 (Year 11)

Hardware

16 x functional computers, which support image and sound editing, with mice, keyboards, monitors and speakers

Software

Image editing software e.g. GIMP, pixlr
Sound editing software e.g. Audacity, WavePad sound editor
Block-based programming language e.g. Scratch