

# **Level 2 Technical Certificate in Digital Technologies (5220-21)**

October 2017 Version 5.0

## **Qualification Handbook**

## Qualification at a glance

<b>Industry area</b>	Digital
<b>City &amp; Guilds qualification number</b>	5220-21
<b>Age group</b>	16-19 (Key Stage 5), 19+
<b>Entry requirements</b>	Centres must ensure that any pre-requisites stated in the <i>What is this qualification about?</i> section are met.
<b>Assessment</b>	<p>To gain this qualification, candidates must successfully achieve the following assessments:</p> <ul style="list-style-type: none"> <li>• One externally set, externally moderated assignment</li> <li>• One externally set, externally marked test, sat under examination conditions</li> </ul>
<b>Additional requirements to gain this qualification</b>	Employer involvement in the delivery and/or assessment of this qualification is essential for all candidates and will be externally quality assured.
<b>Grading</b>	<p>This qualification is graded Pass/Merit/Distinction/Distinction*</p> <p>For more information on grading, please see Section 7: Grading.</p>
<b>Approvals</b>	These qualifications require full centre and qualification approval
<b>Support materials</b>	<p>Sample assessments</p> <p>Guidance for delivery</p> <p>Guidance on use of marking grids</p>
<b>Registration and certification</b>	Registration and certification of this qualification is through the Walled Garden, and is subject to end dates.
<b>External quality assurance</b>	This qualification is externally quality assured by City & Guilds, and its internally marked assignments are subject to external moderation. There is no direct claim status available for this qualification.

Title and level	Size (GLH)	City & Guilds qualification number	Ofqual accreditation number
Level 2 Technical Certificate in Digital Technologies	360	5220-21	601/7371/3

Version and date	Change detail	Section
2.0 January 2017	Purpose statement updated	1 Introduction: What is this qualification about?
3.0 February 2017	Assessment components updated to include paper-based components	Assessment requirements and employer involvement
	Web and Social Media Development test spec updated with minor weighting changes	Test specifications
4.0 May 2017	External theory test and revised with updated coverage	5 Assessment
	Assessment Objectives o6 – o8 removed and weightings updated	
	Branding Changes	City & Guilds Logo
4.1 September 2017	GLH and TQT added	Qualification structure
5.0 October 2017	Grading tables updated	7 Grading

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# 1 Introduction

## What is this qualification about?

The following purpose statement is for the **Level 2 Technical Certificate in Digital Technologies (601/7371/3)**

Area	Description
OVERVIEW	
Who is this qualification for?	<p>This Level 2 Technical Certificate in Digital Technologies aims to provide you with a range of essential technical practical skills and knowledge that will equip you to seek employment in one of three key areas within the Digital Industries environment or prepare you for further learning. This includes the core skills of</p> <ul style="list-style-type: none"><li>• Introduction to Digital Technologies</li><li>• Cyber Security</li><li>• Introduction to Supporting Users</li></ul> <p>Following successful completion of this qualification you will be able to work in a support role dealing with systems and infrastructure, software issues or web and social media. This may be in a dedicated support team or as part of a general ICT team depending on size of the organisation.</p> <p>The qualification is suitable for anyone over the age of 16 years. You do not need any previous knowledge or experience to begin this qualification.</p>
What does this qualification cover?	<p>Depending on the area of Digital Industries you wish to enter, you can select from three pathways, which include the core skills, and you will be studying:</p> <ul style="list-style-type: none"><li>• <b>Software and Application</b><ul style="list-style-type: none"><li>○ Principles of Software Development</li><li>○ Application Development</li><li>○ Mobile Application Development</li><li>○ HTML5 and Web Enhancements</li><li>○ Principles of Software Testing</li></ul></li><li>• <b>Network and Infrastructure</b><ul style="list-style-type: none"><li>○ Networking Concepts</li><li>○ Operating Systems</li><li>○ Server Administration</li><li>○ Principles of Cloud Computing</li><li>○ Troubleshooting Networks</li></ul></li><li>• <b>Web and Social Media support</b></li></ul>



- 
- Principles of Website Development
  - Principles of Social Media
  - Design and Create Websites
  - Hosting and Optimisation of Websites
  - Website Testing and Support

Centres and providers work with local employers who will contribute to the knowledge and delivery of training. The different ways in which the centre could support your learning by working with local or national employers could include;

- demonstrations of systems and practices within the employer
- talks on the industry from an employer as part of a classroom workshop or lecture
- structured work placement within a business
- employers input into projects and exercises, or setting assessment requirements and providing feedback on the results

This practical based training is ideal preparation for gaining employment in an organisation making use of digital technology or further specialist study.

How does this qualification relate to a wider learning programme?

While this qualification provides a real opportunity for you to gain work specific skills and knowledge within Digital Industries, it also provides you with an opportunity to develop the English and Maths skills relevant to the role. This might include problem solving, communication by phone or email both to external and internal contacts, scheduling, web page layout, understanding network or software developments that would benefit you in your progression opportunities and into employment.

It will provide an opportunity to connect your technical learning with real-life work placement through the work experience element of your course. There will be other non-qualification activities which you will engage in whilst studying such as enrichment activities which might include the development of employability skills, team work and problem solving techniques, communications and supporting users, which are really important when thinking about working in this industry.

You will also receive personal tutorials which will provide opportunities to set meaningful targets for yourself and to carryout self-evaluation and reflection.

## WHAT COULD THIS QUALIFICATION LEAD TO?

Will the qualification lead to employment, and if so, in which job role and at what level?

Achievement of this qualification can lead to employment in digital support roles;

- Software and Application support
- Network and Infrastructure support
- Web and Social Media support

These roles are likely to be first line support and you will be supported for areas where more technical knowledge/skills are required.

Will the qualification lead to further learning?

This qualification you can lead to a number of further learning opportunities, such as

- Level 3 Apprenticeship for IT, Software, Web & Telecoms Professionals
- Infrastructure Technician Apprenticeships Standards
- Network Engineer Apprenticeships Standards
- Software Developer Apprenticeships Standards
- Level 3 Advanced Technical Certificate in Digital Industries
- Level 3 Advanced Technical Extended Diploma in Digital Industries

## WHO SUPPORTS THIS QUALIFICATION?

Employer/Higher Education Institutions

Cisco  
CompTIA  
IBM  
Forge Rock  
Esuasive

## Qualification structure

For the **Level 2 Technical Certificate in Digital Technologies** the teaching programme must cover the content detailed in the structure below:

Unit number	Unit title	GLH
<b>Mandatory</b>		
201	Introduction to Digital Technologies	90
202	Cyber Security	30
203	Introduction to Supporting Users	30
<b>Network and Infrastructure Pathway</b>		
204	Networking Concepts	60
205	Operating Systems	30
206	Server Administration	60
207	Principles of Cloud Computing	30
208	Troubleshooting Networks	30
<b>Software and Applications Pathway</b>		
209	Principles of Software Development	60
210	Application Development	60
211	Mobile Application Development	30
212	HTML5 and Web Enhancements	30
213	Principles of Software Testing	30
<b>Web and Social Media Pathway</b>		
214	Principles of Website Development	60
215	Principles of Social Media	30
216	Design and Create Websites	60
217	Hosting and Optimisation of Websites	30
218	Website Testing and Support	30

## Total Qualification Time

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve the qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 2 Technical Certificate in Digital Technologies	360	432

## Assessment requirements and employer involvement

To achieve the **Level 2 Technical Certificate in Digital Technologies (Network and Infrastructure pathway)** candidates must successfully complete **both** the mandatory assessment components

Component number	Title
<b>Mandatory</b>	
022 (or 522)	Externally set, externally marked test
023	Externally set, externally moderated synoptic assignment

To achieve the **Level 2 Technical Certificate in Digital Technologies (Software and Applications pathway)** candidates must successfully complete **both** the mandatory assessment components

Component number	Title
<b>Mandatory</b>	
022 (or 522)	Externally set, externally marked test
025	Externally set, externally moderated synoptic assignment

To achieve the **Level 2 Technical Certificate in Digital Technologies (Web and Social Media pathway)** candidates must successfully complete **both** the mandatory assessment components

Component number	Title
<b>Mandatory</b>	
022 (or 522)	Externally set, externally marked test
027	Externally set, externally moderated synoptic assignment

In addition, candidates **must** achieve the mandatory employer involvement requirement for this qualification **before** they can be awarded a qualification grade. For more information, please see guidance in *Section 4: Employer involvement*.

### Employer involvement

Component number	Title
<b>Mandatory</b>	
821	Employer involvement

## 2 Centre requirements

### Approval

New centres will need to gain centre approval. Existing centres who wish to offer this qualification must go through City & Guilds' **full** Qualification Approval Process. There is no fast track approval for this qualification. Please refer to the City & Guilds website for further information on the approval process: [www.cityandguilds.com](http://www.cityandguilds.com)

### Resource requirements

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

### Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following requirements:

- be technically competent in the areas in which they are delivering
- be able to deliver across the breadth and depth of the content of the qualification being taught
- have recent relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- demonstrate continuing CPD.

### Physical resources

Centres must be able to demonstrate that they have access to the equipment and technical resources required to deliver this qualification and its assessments.

### Internal Quality Assurance

Internal quality assurance is key to ensuring accuracy and consistency of tutors and markers. Internal Quality Assurers (IQAs) monitor the work of all tutors involved with a qualification to ensure they are applying standards consistently throughout assessment activities. IQAs must have, and maintain, an appropriate level of technical competence and be qualified to make both marking and quality assurance decisions through a teaching qualification or recent, relevant experience.

### Learner entry requirements

Centres must ensure that all learners have the opportunity to gain the qualification through appropriate study and training, and that any prerequisites stated in the *What is this qualification about?* section are met when registering on this qualification.

### Age restrictions

This qualification is approved for learners aged 16 – 19, 19+.

### 3 Delivering technical qualifications

#### Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific training needs,
- support and guidance they may need when working towards their qualification,
- the appropriate type and level of qualification.

We recommend that centres provide an introduction so that learners fully understand the requirements of the qualification, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

#### Employer involvement

Employer involvement is essential to maximise the value of each learner's experience. Centres are required to involve employers in the delivery of technical qualifications and/or their assessment, for every learner. This must be in place or planned before delivery programmes begin in order to gain qualification approval. See *Section 4: Employer involvement* for more detail.

#### Support materials

The following resources are available for this qualification:

Description	How to access
Sample assessments Guidance for delivery Guidance on use of marking grids	Available 2016 on the qualification pages on the City & Guilds Website: <a href="http://www.cityandguilds.com">www.cityandguilds.com</a>

## 4 Employer involvement

Department for Education (DfE) requirements state:

*Employer involvement in the delivery and/or assessment of technical qualifications provides a clear 'line of sight' to work, enriches learning, raises the credibility of the qualification in the eyes of employers, parents and students and furthers collaboration between the learning and skills sector and industry.*

*[Technical qualifications] must:*

- *require all students to undertake meaningful activity involving employers during their study; and*
- *be governed by quality assurance procedures run by the awarding organisation to confirm that education providers have secured employer involvement for every student.*

Extract from: ***Vocational qualifications for 16 to 19 year olds 2017 and 2018 performance tables: technical guidance for awarding organisations***, DfE (2015) paragraphs 89-90.

City & Guilds will provide support and quality assurance of employer involvement.

### Qualification approval

To be approved to offer City & Guilds technicals, the centres must provide an action plan showing how every learner will be able to experience meaningful employer involvement, and from where sufficient and suitable employer representatives are expected to be sourced for their learners.

Centres must include in their plan sufficient activities throughout the learning programme that provide a range of employer interactions for learners. Centres must also describe how they will make contingencies for learners who may miss events through absence.

Centres which cannot show sufficient commitment from employers and/or a credible activity plan will be given an action for improvement with a realistic timescale for completion. **Approval will not be given** if employer involvement cannot be assured either at the start of the qualification, or through an appropriate plan of action to address this requirement before the learner is certificated.

### Monitoring and reporting learner engagement

Employer involvement is a formal component of this qualification so centres must gather evidence that demonstrates that each learner has been involved in meaningful employer based activities against the mandatory content before claiming the *Employer involvement* component for learners.

Centres must record the range and type of employer involvement each learner has experienced. These records must be available for review by External Quality Assurers (EQAs) on request.

### Types of involvement

Centres should note that to be eligible, employer involvement activities **must** relate to one or more elements of the mandatory content of this qualification. This will be quality assured by City & Guilds and any candidate who does not meet this criteria will not be able to achieve the qualification certificate.

As the aim of employer involvement is to enrich learning and to give learners a taste of the expectations of employers in the industry area they are studying, centres are encouraged to work creatively with local employers.



Employers can identify the areas of skills and knowledge in their particular industry that they would wish to see emphasised for learners who may apply to work with them in the future. Centres and employers can then establish the type of input, and which employer representative might be able to best support these aims.

To be of most benefit this must add to, rather than replace the centre's programme of learning.

Some examples of meaningful employer involvement are listed below. Employer involvement not related to the mandatory element of the qualification, although valuable in other ways, does not count towards this element of the qualification.

The DfE has set out activities that are and those that are not eligible as meaningful employer involvement as follows<sup>1,2</sup>:

**Meaningful employer involvement:**

*In all cases participating industry practitioners and employers must be relevant to the industry sector or occupation/occupational group to which the qualification relates.*

- *students undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification<sup>3</sup>;*
- *students undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s);*
- *students take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures;*
- *industry practitioners operate as 'expert witnesses' that contribute to the assessment of a student's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.*

*The following activities, whilst valuable, do not meet the requirement for meaningful employer involvement:*

- *employers' or industry practitioners' input to the initial design and content of a qualification;*
- *employers hosting visits, providing premises, facilities or equipment;*
- *employers or industry practitioners providing talks or contributing to delivery on employability, general careers advice, CV writing, interview training etc;*
- *student attendance at career fairs, events or other networking opportunities;*
- *simulated or provider-based working environments eg hairdressing salons, florists, restaurants, travel agents, small manufacturing units, car servicing facilities;*
- *employers providing students with job references.*

Centres and providers work with local employers who will contribute to the knowledge and delivery of training. Employers will provide demonstrations and talks on the industry and where possible work placements will also be provided by the employers. This practically based training is ideal preparation for gaining employment in the digital industry or specialist further study.

A partnership approach should be adopted where possible with employers with whom the centre has links, and with employers used for work experience placements.

It would be helpful for tutors to develop a method of maintaining contact with a range of employers in the sectors who may be able to help with keeping the examples of legislation, policies and codes of practice used in the taught content up to date.

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<sup>1</sup> As extracted from: Vocational qualifications for 16 to 19 year olds  
2017 and 2018 performance tables: technical guidance for awarding organisations

<sup>2</sup> This list has been informed by a call for examples of good practice in employer involvement in the delivery and assessment of technical qualifications - **Employer involvement in the delivery and assessment of vocational qualifications**

<sup>3</sup> DfE work experience guidance

## Types of evidence

The types of evidence required to support a claim for this component will vary depending on the nature of the involvement. Eg for a guest lecture it is expected that a synopsis of the lecture and register would be taken which each learner and the guest speaker will have signed; expert witnesses will be identified and will have signed the relevant assessment paperwork for each learner they have been involved in assessing; evidence of contribution from employers to the development of locally set or adapted assignments.

## Quality assurance process

After approval and during the first year of delivery, EQAs will request final plans and records of employer involvement activities that have taken place to ensure that the plans are sufficient and to provide support and guidance if involvement is not sufficient.

Evidence will be validated by EQAs before centres can claim the Employer involvement component for each learner. Where employer involvement is not judged to be sufficient, certificates cannot be claimed for learners.

## Sufficiency of involvement for each learner

It is expected that the centre will plan a range of activities that provide sufficient live involvement for each learner to have opportunities to interact directly with a range of individuals employed in the related industry. Centres must also provide contingencies for learners who may be absent for part of their teaching, so that they are not disadvantaged. Any absence that results in a learner missing arranged activities must be documented.

## Live involvement

Learners will gain most benefit from direct interaction with employers and/or their staff; however the use of technology (eg the use of live webinars) is encouraged to maximise the range of interactions. Where learners are able to interact in real time with employers, including through the use of technology, this will be classed as 'live involvement'.

It is considered good practice to record learning activities, where possible, to allow learners to revisit their experience and to provide a contingency for absent learners. This is not classed as live involvement however, and any involvement of this type for a learner must be identified as contingency.

## Timing

A learner who has not met the minimum requirements cannot be awarded the component, and will therefore not achieve the qualification. It is therefore important that employer involvement is not left until the end of the qualification, and that centres monitor and provide contingencies throughout the learning period.

## 5 Assessment

### Summary of assessment methods and conditions

Component numbers	Assessment method	Description and conditions
023, 025, 027	Externally moderated synoptic assignment	<p>These assignments are <b>externally set, internally marked and externally moderated</b>, and are designed to require the candidate to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the whole content area. Candidates will be judged against the assessment objectives listed on pages 18-20.</p> <p>Assignments will be released to centre staff towards the end of the learners' programme, usually the week before Easter each year.</p> <p>Centres will be required to maintain the security of all live assessment materials until assessment windows are open. Assignments will therefore be password protected and released to centres through a secure method.</p> <p>Guidance on equipment, resources and duration will be released as appropriate to ensure centres can plan for delivery of practical assignments in advance. The marking grids for the assignments will be available to centres from the start of the learning programme.</p> <p>Candidates who fail this assignment on first submission of marks will have <b>one</b> opportunity to re-sit, and must sit a new task or assignment different to the original assessment. If the re-sit is failed the candidate will fail the qualification as a whole, and cannot achieve the qualification within that academic year.</p> <p>Please note that for externally set assignments City &amp; Guilds provides guidance and support to centres on the marking process and associated marking grid in the assessment pack for the qualification, and in the Guidance on the use of marking grids.</p>
022 (or 522)	Externally marked test	<p>This test is <b>externally set and externally marked</b>, and will be sat online through City &amp; Guilds' computer-based testing platform.</p> <p>The test is designed to assess candidate's depth and breadth of understanding across the mandatory content in the qualification at the end of the period of learning, and will be sat under invigilated examination conditions. See JCQ requirements for details: <a href="http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations">http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations</a></p> <p>The test specifications on pages 21-23 show the coverage of this test across the qualification content.</p> <p>Candidates who fail this test at the first sitting will have <b>one</b> opportunity to re-sit the test. If the re-sit is failed the candidate will fail the qualification as a whole, and cannot achieve the qualification within that academic year.</p>

## **What is synoptic assessment?**

Technical qualifications are based around the development of a toolkit of knowledge, understanding and skills that an individual needs in order to have the capability to work in a particular industry or occupational area. Individuals in all technical areas are expected to be able to apply their knowledge, understanding and skills in decision making to solve problems and achieve given outcomes independently and confidently.

City & Guilds technical qualifications require candidates to draw together their learning from across the qualification to solve problems or achieve specific outcomes by explicitly assessing this through the synoptic assignment component.

In this externally set, internally marked and externally moderated assessment the focus is on bringing together, selecting and applying learning from across the qualification rather than demonstrating achievement against units or subsets of the qualification content. The candidate will be given an appropriately levelled, substantial, occupationally relevant problem to solve or outcome to achieve. For example this might be in the form of a briefing from a client, leaving the candidate with the scope to select and carry out the processes required to achieve the client's wishes, as they would in the workplace.

Candidates will be marked against assessment objectives (AOs) such as their breadth and accuracy of knowledge, understanding of concepts, and the quality of their technical skills as well as their ability to use what they have learned in an integrated way to achieve a considered and high quality outcome. These are detailed on pages 18-20.

## **How the assignment is synoptic for this qualification**

The typical assignment brief could be to conduct research, design and produce digital information to meet the detailed requirements of specific customers. For example, the networking and infrastructure assignment might be based around a scenario within a small organisation which asks the candidate to conduct research into technical specifications, set up, configure and test a network, and install and configure components and upgrades to a server operating system. Candidates would be expected to undertake an audit of an existing network and test it. They should conduct research into components required for upgrades and install required upgrades and the server based operating system. They should then be able to install and configure components to implement a wireless network. Throughout the assignment candidates should record all steps and process and present the results of their findings to the customer.

## **External test for stretch, challenge and integration**

The external assessment will draw from across the mandatory content of the qualification, using a range of shorter questions to confirm breadth of knowledge and understanding. Extended response questions are included, giving candidates the opportunity to demonstrate higher level understanding and integration through discussion, analysis and evaluation, and ensuring the assessment can differentiate between 'just able' and higher achieving candidates.

## Assessment objectives for synoptic assignments

The assessments for this qualification are set against a set of assessment objectives (AOs) which are used across all City & Guilds Technicals to promote consistency among qualifications of a similar purpose. They are designed to allow judgement of the candidate to be made across a number of different categories of performance.

Each assessment for the qualification has been allocated a set number of marks against these AOs based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

The following table explains all AOs in detail, including weightings for the synoptic assignments. In some cases, due to the nature of a qualification's content, it is not appropriate to award marks for some AOs. Weightings for tests (AOs 1, 2 and 4 only) can be found with the test specification.

Assessment objective	Level 2 Technical Certificate in Digital Technologies (Network and Infrastructure Pathway) Typical expected evidence of knowledge, understanding and skills	Approximate weighting
<b>AO1</b> Recalls knowledge from across the breadth of the qualification.	Recall of knowledge is covered extensively in the written test and therefore does not contribute to the marking of the synoptic assignment.	10%
<b>AO2</b> Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	An understanding of the concepts required in providing communication services via a Local Area Network (LAN) including: hardware, software, protocols and media.	25%
<b>AO3</b> Demonstrates technical skills from across the breadth of the qualification.	The skills necessary to provide communication services via a Local Area Network (LAN) including: Troubleshoot, install and configuring hardware, software and protocols.  The candidate should be able to select and use appropriate sources of information e.g. hardware device manufacturers' websites referencing them appropriately.	35%
<b>AO4</b> Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	The ability to research technologies, use understanding of the concepts of networking and the skills required to implement a Local Area Network (LAN).  Ability to produce documents using formats, styles and conventions that ensure the information conveyed is communicated in the most suitable manner to the target audience.	25%

**AO5** Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.

Candidate is able to produce accurate documentation and can configure networks as specified.

5%

Assessment objective	Level 2 Technical Certificate in Digital Technologies (Software and Application Pathway) Typical expected evidence of knowledge, understanding and skills	Approximate Weighting (Assignment)
<b>AO1</b> Recalls knowledge from across the breadth of the qualification.	Recall of knowledge is covered extensively in the written test and therefore does not contribute to the marking of the synoptic assignment.	10%
<b>AO2</b> Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	Creating documentation to support the development of a software application, including the selection of a system life cycle model and programming language.	25%
<b>AO3</b> Demonstrates technical skills from across the breadth of the qualification.	Developing and testing an application designed to meet a specific outcome, including the use of a wide range of programming strategies including the testing of applications.	35%
<b>AO4</b> Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	Research different system life cycle models and programming techniques that can be used when developing applications.  Application of knowledge gained to develop the skills required to produce a functioning application	20%
<b>AO5</b> Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.	Producing accurate documentation that contains detailed information that enables the development and testing of an application.  Designing and creating an interface that incorporates features to ensure that users are able to interact effectively with the application.  Producing documents using formats, styles and conventions that ensure the information conveyed is communicated in	10%

the most suitable manner to the target audience



Assessment objective	Level 2 Technical Certificate in Digital Technologies (Web and Social Media Pathway) Typical expected evidence of knowledge, understanding and skills	Approximate Weighting (Assignment)
<b>AO1</b> Recalls knowledge from across the breadth of the qualification.	Recall of knowledge is covered extensively in the written test and therefore does not contribute to the marking of the synoptic assignment.	15%
<b>AO2</b> Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	Creating planning documentation to support the development of a website to meet the requirements of a client, including a storey board that details the colour scheme, navigation and content	25%
<b>AO3</b> Demonstrates technical skills from across the breadth of the qualification.	Developing and testing a website that contains a blog to meet a clients requirements, including the use of a wide range of techniques to combine content and enhance its presentation.	30%
<b>AO4</b> Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	Research the topic specified by the client and summarise their findings in a manner that is suitable for the intended audience.  Applying the W3C standards for accessibility to ensure that the website enables access for visually impaired or disabled users.	20%
<b>AO5</b> Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions.	Produced accurate documentation that contains detailed information which enables the development and testing of a website.  Produced content for a website that meets the requirements and is suitable for the intended audience.	10%

## Test specifications

### Level 2 Digital Technologies - Theory exam (all pathways)

AO weightings per test

AO	Test weighting (approx. %)
AO1 Recalls knowledge from across the breadth of the qualification.	22.5%
AO2 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification.	55%
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	22.5%

The way the test covers the content of the qualification is laid out in the table below:

**Assessment type:** Examiner marked, written test\*

**Assessment conditions:** Invigilated examination conditions

**Grading:** X/P/M/D

Test (022/522)	Duration: 2 hours 40 minutes		
Unit	Outcome	Number of marks	%
201	Learning Outcomes 1, 2, 3, 4, 5	30	37.5%
202	Learning Outcomes 1, 2, 3	22	27.5%
203	Learning Outcomes 1, 2, 3	10	12.5%
N/A	Integration across the units	18	22.5%
<b>Total</b>		<b>80</b>	<b>100</b>

\*These tests are sat under invigilated examination conditions, as defined by the JCQ:  
<http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations>.

Entry for tests can be made through the City & Guilds Walled Garden.

## 6 Moderation and standardisation of assessment

City & Guilds' externally set assignments for technical qualifications are designed to draw from across the qualifications' content, and to contribute a significant proportion towards the learner's final qualification grade. They are subject to a rigorous external quality assurance process known as external moderation. This process is detailed below.

### Internal standardisation

For internally marked work<sup>4</sup> the centre is required to conduct internal standardisation to ensure that all work at the centre has been marked to the same standard. If two or more tutors are involved in marking assessments, one must be designated as the lead marker responsible for internal standardisation. The lead marker takes responsibility during standardisation for ensuring a single approach and standard is achieved. If there is a disagreement the lead marker will have the final say.

For standardisation purposes, before final marking takes place, common pieces of work must be selected and marked by all markers, and any differences between interpretation and marks awarded must be discussed and reconciled at an internal standardisation session in which all markers must participate.

The Internal Quality Assurer (IQA) must ensure that the training includes the use of reference and archive materials such as work from previous years as appropriate.

The IQA must sign the *Centre Declaration Sheet* (CDS) to confirm that internal standardisation has taken place. If only one tutor has undertaken the marking, that person must sign this form.

The completed record form must be attached to each candidate's work and the CDS must be submitted to City & Guilds during the moderation. The record form and CDS must be signed in order for the candidate's results to be processed.

### Supervision and authentication of internally assessed work

The Head of Centre is responsible for ensuring that internally assessed work is conducted in accordance with City & Guilds' requirements.

City & Guilds requires:

- candidates to sign the *Declaration of authenticity* form to confirm that any work submitted is their own
- tutors to confirm on the record form that the work assessed is solely that of the candidate concerned and was conducted under the conditions laid down in the assessment documentation

The tutor must be sufficiently aware of the candidate's standard and level of work to make a judgement whether the work submitted is within the expected ability and style of the candidate or whether a further investigation into the authenticity of the work is required.

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<sup>4</sup> For any internally assessed optional unit assignments, the same process must be followed where assessors must standardise their interpretation of the assessment and grading criteria.

If the tutor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

### **Moderation**

Moderation is the process where external examiners are standardised to a national standard in order to review centre marking of internally marked assessments. These examiners are referred to as 'moderators'. Moderators will mark a representative sample of candidate's work from every centre. Their marks act as a benchmark to inform City & Guilds whether centre marking is in line with the national standard.

Where moderation shows that the centre is applying the marking criteria correctly, centre marks for the whole cohort will be accepted.

Where moderation shows that the centre is either consistently too lenient or consistently too harsh in comparison to the national standard, an appropriate adjustment will be made to the marks of the whole cohort, retaining the centre's rank ordering.

Where centre application of the marking criteria is inconsistent, an appropriate adjustment for the whole cohort may not be possible on the basis of the sample of candidate work. In these instances a complete remark of the candidate work may be necessary. This may be carried out by the centre based on feedback provided by the moderator, or carried out by the moderator directly.

Moderation applies to all internally marked assignments. Following standardisation and marking, the centre submits all marks and candidate work to City & Guilds. This may involve digital or postal submission. The deadline for submission of evidence will be available on Walled Garden.

In most cases candidate work will be submitted directly to the moderator for moderation, either postally or electronically. This includes written work, photographic and pictorial evidence, or video and audio evidence. For some qualifications there will be a requirement for moderators to visit centres to observe practical assessments being undertaken. This will be for qualifications where the assessment of essential learner skills can only be demonstrated through live observation. The purpose of these visits is to ensure that the centre is assessing the practical skills to the required standards, and to provide the moderators with additional evidence to be used during moderation. These visits will be planned in advance with the centre for all relevant qualifications.

### **Post-moderation procedures**

Once the moderation process has been completed, the confirmed marks for the cohort are provided to the centre along with feedback from the moderator on the standard of marking at the centre, highlighting areas of good practice, and potential areas for improvement. This will inform future marking and internal standardisation activities.

City & Guilds will then select a sample of work to be used for awarding, the process by which grade boundaries are set.

### **Centres retaining evidence**

Centres must also retain assessment records for each candidate for a minimum of three years. To help prevent plagiarism or unfair advantage in future versions, candidate work may not be returned to candidates. Samples may however be retained by the centre as examples for future standardisation of marking.

### **Use of technology and innovation**

City & Guilds will set evidence requirements for moderated assignments based on their fitness for purpose in terms of validity, reliability and manageability. This will include use of digital evidence and new technologies to support the moderation process wherever current available technology allows.

## 7 Grading

### Awarding individual assessments

Individual assessments will be graded pass/merit/distinction where relevant. The grade boundaries for pass and distinction for each assessment will be set through a judgemental process using technical experts. Merit will usually be set at the midpoint between pass and distinction. The grade descriptors for pass and distinction, and other relevant information (eg archived samples of candidate work and statistical evidence) will be used to determine the mark at which candidate performance in the assessment best aligns with the grade descriptor in the context of the qualification's purpose. Boundaries will be set for each version of each assessment to take into account relative difficulty.

### Grade descriptors

#### To achieve a pass, a candidate will be able to

- Demonstrate the knowledge and understanding required to work in the occupational area, its key principles, practices and legislation.
- Describe some of the main factors impacting on the occupation to show good awareness of how work tasks are shaped by the broader social, environmental, and business environment it operates within.
- Use the technical and industry specific terminology commonly used in the industry area accurately.
- Demonstrate the application of relevant theory and understanding to solve straightforward problems.
- Interpret briefs for routine tasks, attending to the key aspects, and showing a secure understanding of the application of main concepts and key themes to specific work related tasks.
- Carry out routine planning which shows the ability to identify the relevant information in the brief and use knowledge and understanding from across the qualification (including technical information) to interpret what a fit for purpose outcome would be and develop a plausible plan to achieve it.
- Achieve an outcome which successfully meets the key requirements of the brief
- Identify and reflect on the most obvious measures of success for the task and evaluate how successful they have been in meeting the intentions of the plan.
- Work safely throughout, independently carrying out routine tasks and procedures and having some confidence in attempting more complex tasks.

#### To achieve a distinction, a candidate will be able to

- Demonstrate the high level of knowledge and understanding required to work to a high level in the occupational area, its key principles, practices and legislation.
- Analyse the impact of different factors on the occupation to show good understanding of how work tasks are shaped by the broader social, environmental and business environment it operates within.
- Use the technical and industry specific terminology used in the industry area accurately and with confidence.
- Demonstrate the application of relevant theory and understanding to solve problems which are sometimes non-routine.
- Analyse the brief in detail, showing confident understanding of concepts and themes from across the qualification content, bringing these together to develop a clear and stretching plan, that would credibly achieve a fit for purpose outcome

- Achieve an outcome which shows an attention to detail in its planning, development and completion, so that it meets the brief completely and to a high quality.
- Carry out an evaluation focussing on relevant quality points, identifying areas of development/ improvement as well as assessing the fitness for purpose of the outcome.

### Awarding qualification grades, including Distinction\*

The overall qualification grade will be calculated based on aggregation of the candidate's achievement in each of the assessments for the mandatory units, taking into account the assessments' weighting. The **Level 2 Technical Certificate in Digital Technologies** will be reported on a four grade scale: Pass, Merit, Distinction, Distinction\*.

All assessments **must** be achieved at a minimum of Pass for the qualification to be awarded. Candidates who fail to reach the minimum standard for grade Pass for an assessment(s) will not have a qualification grade awarded and will not receive a qualification certificate.

The contribution of assessments towards the overall qualification grade is as follows:

Assessment method	Grade scale	% contribution
Synoptic Assignment	X/P/M/D	60%
Exam	X/P/M/D	40%

Both synoptic assignments and exams are awarded (see 'Awarding individual assessments', at the start of Section 7, above), and candidates' grades converted to points. The minimum points available for each assessment grade is listed in the table below. A range of points between the Pass, Merit and Distinction boundaries will be accessible to candidates. For example a candidate that achieves a middle to high Pass in an assessment will receive between 8 and 10 points, a candidate that achieves a low to middle Merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate's score in that assessment.

	Pass	Merit	Distinction
Assignment: 60%	6	12	18
Exam: 40%	6	12	18

The candidate's points for each assessment are multiplied by the % contribution of the assessment and then aggregated. The minimum points required for each qualification grade are as follows:

Qualification Grade	Points
Distinction*	20.5
Distinction	17
Merit	11
Pass	6

Candidates achieving Distinction\* will be the highest achieving of the Distinction candidates.



## 8 Administration

Approved centres must have effective quality assurance systems to ensure valid and reliable delivery and assessment of qualifications. Quality assurance includes initial centre registration by City & Guilds and the centre's own internal procedures for monitoring quality assurance procedures.

Consistent quality assurance requires City & Guilds and its associated centres to work together closely; our Quality Assurance Model encompasses both internal quality assurance (activities and processes undertaken within centres) and external quality assurance (activities and processes undertaken by City & Guilds).

For this qualification, standards and rigorous quality assurance are maintained by the use of:

- internal quality assurance
- City & Guilds external moderation.

In order to carry out the quality assurance role, Internal Quality Assurers (IQAs) must have and maintain an appropriate level of technical competence and have recent relevant assessment experience. For more information on the requirements, refer to *Section 2: Centre requirements* in this handbook.

To meet the quality assurance criteria for this qualification, the centre must ensure that the following procedures are followed:

- suitable training of staff involved in the assessment of the qualification to ensure they understand the process of marking and standardisation
- completion by the person responsible for internal standardisation of the Centre Declaration Sheet to confirm that internal standardisation has taken place
- the completion by candidates and supervisors/tutors of the record form for each candidate's work.

### External quality assurance

City & Guilds will undertake external moderation activities to ensure that the quality assurance criteria for this qualification are being met. Centres must ensure that they co-operate with City & Guilds staff and representatives when undertaking these activities.

City & Guilds requires the Head of Centre to

- facilitate any inspection of the centre which is undertaken on behalf of City & Guilds
- make secure arrangements to receive, check and keep assessment material secure at all times, maintain the security of City & Guilds confidential material from receipt to the time when it is no longer confidential and keep completed assignment work and examination scripts secure from the time they are collected from the candidates to their dispatch to City & Guilds.

### Enquiries about results

The services available for enquiries about results include a review of marking for assignment and test results. Requests must be submitted within the specified period after the publication of results for individual assessments.

For further details of enquiries about results services, please visit the City & Guilds website at [www.cityandguilds.com](http://www.cityandguilds.com).

### Re-sits and shelf-life of assessment results

Candidates who have failed an assessment or wish to re-take it in an attempt to improve their grade, can re-sit this assessment **once only**. The best result will count towards the final qualification.

### Factors affecting individual learners

If work is lost, City & Guilds should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form, JCQ/LCW, to inform City & Guilds Customer Services of the circumstances.

Learners who move from one centre to another during the course may require individual attention. Possible courses of action depend on the stage at which the move takes place. Centres should contact City & Guilds at the earliest possible stage for advice about appropriate arrangements in individual cases.

### Malpractice

Please refer to the City & Guilds guidance notes *Managing cases of suspected malpractice in examinations and assessments*. This document sets out the procedures to be followed in identifying and reporting malpractice by candidates and/or centre staff and the actions which City & Guilds may subsequently take. The document includes examples of candidate and centre malpractice and explains the responsibilities of centre staff to report actual or suspected malpractice. Centres can access this document on the City & Guilds website.

Examples of candidate malpractice are detailed below (please note that this is not an exhaustive list):

- falsification of assessment evidence or results documentation
- plagiarism of any nature
- collusion with others
- copying from another candidate (including the use of ICT to aid copying), or allowing work to be copied
- deliberate destruction of another's work
- false declaration of authenticity in relation to assessments
- impersonation.

These actions constitute malpractice, for which a penalty (eg disqualification from the assessment) will be applied.

Where suspected malpractice is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to City & Guilds at the earliest opportunity. Please refer to the form in the document *Managing cases of suspected malpractice in examinations and assessments*. Alternatively please complete the form, JCQ/M1. Copies of this form can be found on the JCQ website: <http://www.jcq.org.uk>

### Access arrangements and special consideration

We have taken note of the provisions of equalities legislation in developing and administering this specification.

We can make arrangements so that candidates with disabilities, special educational needs and temporary injuries can access the assessment. These arrangements must be made before assessment takes place.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the *JCQ access arrangements and reasonable adjustments* and *Access arrangements - when and how applications need to be made to City & Guilds* for more information. Both are available on the City & Guilds website: <http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

### **Special consideration**

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given after the examination.

Applications for either access arrangements or special consideration should be submitted to City & Guilds by the Examinations Officer at the centre. For more information please consult the current version of the JCQ document, *A guide to the special consideration process*.

URN:	T/507/7256
Level:	2
GLH:	90

### What is this unit about?

The purpose of this unit is to provide the learner with an introduction to digital technologies.

Learners will explore the function and features of hardware and both Operating Systems and application software programmes.

They will investigate the available types of hardware and software to enable them to produce system specifications to meet specific requirements.

They will be presented with opportunities to engage using digital technologies and will understand the legal responsibilities and risks when working in a collaborative environment.

The learner may be introduced to this unit by asking themselves questions such as:

- What are digital technologies?
- What types of systems are available?
- What types of software are commonly used?
- How can I work collaboratively?
- What laws affect my use of digital technologies?

### Learning outcomes

In this unit, learners will be able to:

1. Understand hardware requirements
2. Understand types of software
3. Understand network systems
4. Understand digital engagement using collaborative technologies
5. Understand legislation related to the use of computers

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome:

#### 1. Understand hardware requirements

### Topics

- 1.1 Types of systems
- 1.2 Characteristics of components and their functions
- 1.3 Install and configure hardware

#### Topic 1.1

Learners will understand the uses of different types of systems

- fixed systems
  - super computers eg single purpose that requires manipulation of a large amount of mathematical data (weather forecasting)
  - mainframes eg high performance that can perform multiple tasks (banking)
  - desktop eg wide range of purposes for an individual user or organisations
- mobile systems – allows a wide range of tasks to be performed whilst on the move
  - laptop/notebook
  - netbook
  - tablet
  - smartphone

#### Topic 1.2

Learners will know the characteristics of hardware components that make up a computer system including

- processors
  - Central Processing Unit (CPU) eg pin grid array (PGA), land grid array (LGA)
  - Graphics Processing Unit (GPU)
- memory
  - volatile
  - non-volatile
- storage
  - local
  - remote
  - Solid State Drives (SSD)
  - portable storage eg memory sticks, hard drives, memory cards
  - optical drives eg dvd
- connection methods
  - Universal Series Bus (USB) 2/3
  - Video Graphics Array (VGA)
  - Digital Versatile Interface (DVI)
  - High Definition Multimedia Interface (HDMI)
  - FireWire (IEEE1394)
  - Thunderbolt

- Serial Advanced Technologies Attachment (SATA)
- input / output devices eg printers, display devices

Learners will understand the functions of hardware components that make up a computer system including

- processors
- memory
- storage
- input / output devices

Learners will be able to produce hardware system specifications for different uses.

### Topic 1.3

Learners will install and configure hardware components including

- motherboard
- Random Access Memory (RAM)
- internal storage eg SATA, SSD
- graphics cards
- audio interface/sound card
- optical drives
- network interface device
- input/ output devices eg graphics tablets, keyboard, monitor, mouse
- Power Supply Unit (PSU)

## Learning outcome:

### 2. Understand types of software

#### Topics

2.1 Operating Systems

2.2 Device drivers

2.3 Application software

### Topic 2.1

Learners will understand the key functions of Operating Systems including

- file management
- storage management
- memory management
- resource management eg control of peripherals
- security
- user interface

Learners will compare different types of Operating Systems including

- vendor eg MS Windows, MacOS, iOS:
  - cost of licences
  - EULA

- system requirements
- open source eg Linux, Android :
  - free for non-commercial usage
  - end users can access and alter the source code
  - system requirements
  - availability of applications

### Topic 2.2

Learners will understand the functions of device drivers

- to provide a software interface to hardware devices
- to enable os and other computer programs to access hardware functions

### Topic 2.3

Learners understand the purposes of different types of application software including

- database
- spreadsheets
- presentation software
- word processing
- utilities eg anti-virus, compression tools
- web browsers
- specialist software eg audio, visual, graphics
- bespoke software - designed to meet a specific need

Learners will understand how software can be adapted to meet the needs of end users including

- disabilities eg sight impaired, physical limitations
- customisation eg use of macros, toolbars
- personalisation eg templates, house style and appearance of software

Learners will be able to produce software system specifications for different uses.

## Learning outcome:

### 3. Understand network systems

#### Topics

3.1 Network systems

3.2 Numbering systems

3.3 Implement networks

### Topic 3.1

Learners will understand the purpose of components used to implement networks including

- network topologies
  - star
  - infrastructure mode (wireless)
  - ad hoc mode (wireless)
- types of networks

- client server
- peer to peer
- network protocols
  - Medium Access Control (MAC)
  - IP
  - SMTP
  - IMAP
  - POP3
  - FTP
  - HTTP
  - HTTPS
- Sharing resources
  - file sharing
  - devices eg printers

### Topic 3.2

Learners will understand numbering systems, including

- binary
- hexadecimal
- decimal

### Topic 3.3

Learners will be able to connect and configure computers in a network

- connect directly using wired or wireless technologies
- configure the ip addresses for the attached devices
- share access to files
- share access to at least one external device

## Learning outcome:

### 4. Understand digital engagement using collaborative technologies

## Topics

#### 4.1 Risks associated with digital engagement

#### 4.2 Digital engagement

### Topic 4.1

Learners will understand the personal and organisational risks associated with digital engagement and describe ways in which they can be mitigated, including

- personal
  - cyber bullying
  - harassment eg trolling
  - identity theft
  - grooming
  - sexting
  - loss of personal information
  - phishing



- inability to retract information posted online
- organisational
  - loss of sensitive information
  - loss of reputation
  - financial penalties for non-compliance
  - cyber attacks
  - loss of service

#### Topic 4.2

Learners will understand different channels in which users can work collaboratively and will engage with others using different channels including

- blogs
- micro blogs
- social networks
- forums
- cloud technologies eg storage, applications

### Learning outcome:

#### 5. Understand legislation related to the use of computers

### Topics

#### 5.1 Legislation related to the use of computers

#### Topic 5.1

Learners will understand the potential impact of legislation affecting the use of computers. This will include the following Acts

- data protection:
  - eight principles
- computer misuse
- copyright design and patents

### Guidance for delivery

Centres should ensure that their user policies allow learners to use internet based resources as part of this unit.

The main purpose of this unit is for the learner to understand the choice of hardware and software available when considering the setting up of a computer system. Learners should be encouraged to compare the range of hardware and software available and to select the most suitable for different uses.

They should be provided with the opportunity to interact with different types of hardware and be exposed to both open source and vendor specific software.

The learners are required to produce both hardware and software specifications for systems to meet specific tasks. These could include the following:

- Video editing
- Gaming
- Audio editing
- General use eg office based applications
- 3D modelling
- Web browsing
- Bespoke software packages

In topic 1.2 the learners are required to install and configure hardware. In order to maximise the opportunities presented it is suggested that a complete build of a system be undertaken. If this is undertaken it is recommended that the learner be provided with a motherboard that has a pre-installed CPU, heat sink and fan as this will prevent damage to the CPU.

In topic 2.3 the learners should be provided with a variety of pre-loaded software including vendor and open source Software. This will allow them to investigate the functionality of the software and its suitability for specific tasks.

When discussing mitigation of risks as covered in Topic 4.1 learners should investigate the use of suitable netiquette as a way of reducing risks. There are a number of websites shown in the resources to support the delivery of this topic area. Learners should be aware that information once posted online is in the public domain and remains so. This can considerably damage the individuals' reputation and potentially lead to prosecution.

## Suggested learning resources

### **Books**

How Computers Work (How It Works) Published by: QUE, 2014 ISBN-13: 9780789749840	White, R & Downs, T.E
Build Your Own Computer: The Complete Step-by-step Manual to Constructing a PC That's Right for You Published by: J H Haynes & Co Ltd, 2012 ISBN-13 9780857332684	MacRae, K & Marshall, G
How Networks Work Published by: QUE, 2002 ISBN-13 9780789727534	Derfler, Jr F.J & Freed, L
A Brief Guide to Cloud Computing: An essential guide to the next computing revolution Published by: Robinson, 2010 ISBN-13 9781849014069	Barnatt, C

### **Magazines**

- Computeractive
- PC Advisor
- PC Mag UK
- PC Pro

### **Websites**

Online Technical Dictionary for IT Professionals

<http://www.webopedia.com>

GCF Learn Free

<http://www.gcflearnfree.org/technology>

Digitally confident

<http://www.digitallyconfident.org>

URN:	K/507/7254
Level:	2
GLH:	30

### What is this unit about?

The purpose of this unit is for learners to develop an understanding of Cyber security and how threats and vulnerabilities can be mitigated against. This will involve researching emerging trends in IT security to ensure that they have the knowledge and skills that could be used across a range of career paths from IT users to systems engineers.

Learners should understand why it is important to backup organisational and personal data and be able to backup and restore data.

Learners may be introduced to this unit by asking themselves questions such as:

- Why should I worry about Cyber security?
- What is a security threat?
- What are vulnerabilities?
- How can I protect an IT system?
- Why do I backup my computer?
- How can I restore data?

### Learning outcomes

In this unit, learners will be able to:

1. Understand Cyber security threats and vulnerabilities
2. Understand Cyber security protection measures
3. Understand the backup process

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome:

#### 1. Understand Cyber security threats and vulnerabilities

### Topics

- 1.1 Threats, risks and hazards
- 1.2 Impact of security breaches
- 1.3 Vulnerabilities

#### Topic 1.1

Learners understand the difference between threats, risks and hazards in an IT system.

Learners will research emerging threats to Cyber security and recommend methods of mitigating these threats eg new viruses

#### Topic 1.2

Learners understand the potential impact of Cyber security breaches to both individuals and an organisation, including

- individuals
  - identity theft
  - fraud
  - loss of sensitive data
  - damaged reputation
- organisation
  - loss of sensitive information
  - disclosure of sensitive information
  - loss of services
  - prosecution for non-compliance with legislation
  - loss of revenue
  - damaged reputation

#### Topic 1.3

Learners will understand system vulnerabilities and the ways in which they compromise security, including

- IT users
  - discussion of sensitive information in public
  - using confidential data off site eg customer files
  - installing non approved software onto a network
  - opening spam emails
  - writing down computer passwords
  - password formats
- technology
  - unpatched internet browsers
  - inappropriate file sharing

- unsecure social networking accounts
- loss of mobile data storage eg usb memory pens
- software
  - backdoor entry
  - bugs and path faults
  - upgrades
- network infrastructure
  - unprotected wireless network
  - misconfigured hardware
  - unsecure network architecture
  - open ports
  - access rights

## Learning outcome:

### 2. Understand Cyber security protection measures

#### Topics

##### 2.1 Methods of mitigating risks

##### 2.2 Configuring Cyber security technologies

#### Topic 2.1

Learners understand security methods that can be implemented to mitigate risks in an IT system, including

- hardware and software
  - firewalls
  - anti-virus software & definitions
  - Virtual Private Network (VPN)
- IT users
  - education
  - compliance with policies eg safe usage
- administrators
  - update software
  - manage user access rights
  - removable media control
- physical security
  - biometrics
  - swipe cards
  - locks eg key operated locks
  - cypher locks eg keypad

#### Topic 2.2

Learners will configure technologies to ensure security, including

- hardware and software
  - firewalls e.g blocking websites
  - anti-virus software & updating definitions
- administrators
  - update software
  - manage user access rights

## Learning outcome:

### 3. Understand the backup process

#### Topics

3.1 Importance of backing up data

3.2 Backup tools

3.3 Types of backup

3.4 Backup and restore data

#### Topic 3.1

Learners understand the importance of backing up data including

- to ensure data integrity eg to restore data after a system crash
- to maintain business continuity eg disaster recovery
- to comply with legislation

#### Topic 3.2

Learners know the range of software and hardware backup tools available, including

- software
  - operating system backup tools
  - third party vendor software
  - file transfer protocol (ftp)
  - cloud backup eg online storage websites
- hardware
  - USB connected device eg portable hard drive
  - CD/DVD
  - internal hard drive
  - Network attachment storage (NAS)
  - tape drive

#### Topic 3.3

Learners understand the types of backup that can be used as part of a data integrity strategy

- full
- incremental
- differential

#### Topic 3.4

Learners will be able to backup and restore data on local systems including

- backup
  - individual file backup
  - large data backup
  - data transfer
  - external storage backup
  - operating system backup
- restore
  - system restore
  - archived file restore

## Guidance for delivery

Learners should be encouraged to research the latest threats that exist to IT systems and how they are being mitigated to ensure their knowledge remains current. Learners should also be familiar with the latest backup technologies and their features.

The following definitions may be helpful for delivery

**Threat** – Potential source of an adverse event or source of harm

**Risk** – A combination of probability of occurrence of harm and the severity

**Hazard** – A potential source of harm

**Vulnerability** – A specific issue that could allow harm to be caused eg back door access to a software program

**Mitigation** – The action of reducing the severity, seriousness, or painfulness of something

To enable learners to research emerging trends to Cyber security they should have access to the internet to allow them to visit websites such as Sophos which provides details of latest viral threats.

Where possible, tutors should use real life examples to highlight the importance of disaster recovery eg comparing the loss of sensitive data by organisation with the loss of data from a personal smartphone/tablets.

## Suggested learning resources

### **Books**

Computer Security Principles and Practice

Stallings, W & Brown, L

Published by Pearson, 2014

ISBN-10 1292066172

ISBN-13 978-1292066172

### **Websites**

BBC

<http://www.bbc.co.uk/schools/gcsebitesize/ict/databases/6datasecurityrev1.shtml>

Sophos

<https://www.sophos.com/en-us/-/security-news-trends/security-trends/threatsaurus>

IT Security

<http://www.itsecurity.com>



URN	Y/507/7265
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is to develop learners understanding of the concepts involved in supporting users.

Learners will explore the tools and techniques that can be used to gather information regarding user issues. This will enable learners to provide user support.

Learners may be introduced to this unit by asking themselves questions such as

- How do I gather information regarding end user issues?
- What skills do I require to support end users?
- How do I record issues?
- What information do I need to record?

### Learning outcomes

In this unit, learners will be able to

1. Understand the support process
2. Support end users
3. Understand end user documentation

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand the support process

## Topics

- 1.1 Benefits of providing support
- 1.2 Policies that impact on providing support to users
- 1.3 Methods of collecting information from users

### Topic 1.1

Learners understand the benefits of providing support, including

- customer satisfaction
- allowing trends to be identified
- providing information to inform troubleshooting decisions
- identifying potential improvements
- maintaining network availability

### Topic 1.2

Learners understand the policies that impact on supporting users, including

- service level agreements
- operating procedures
- helpdesk procedures
  - customer service
  - fault reporting
  - authorisation
  - escalation
  - quality assurance

### Topic 1.3

Learners understand the methods used to gather information from users in order to provide support, including

- face to face
  - active listening
  - barriers to listening
- telephone
- fault reporting software
- email

## Learning outcome

### 2. Support end users

## Topics

- 2.1 Stages of supporting users
- 2.2 Gathering and recording information from end users

### Topic 2.1

Learners understand the different stages of supporting users

- identify the problem
  - user feedback/questioning
    - open questions
    - closed questions
    - emails
  - identifying any changes made
  - reviewing fault logs/helpdesk software reports
- establish a theory of probable causes
  - flow charts
- test the theory to determine cause
- prepare a plan to resolve the issue
- implement the plan
- test the functionality after the plan has been implemented
- record findings, actions and outcomes

### Topic 2.2

Learners will gather and record information and/or feedback from end users to support future developments and improved end user experience.

## Learning outcome

### 3. Understand end user documentation

## Topics

#### 3.1 Types of end user support documentation

#### 3.2 Documentation production

### Topic 3.1

Learners must understand different types of end user support documentation, including

- local
  - policies
  - guidelines
  - FAQs
- online
  - websites
  - forums
  - user groups

### Topic 3.2

Learners will understand considerations to be taken into account when creating end user documentation, including

- end user skills/knowledge
- use of technical jargon and vocabulary
- style and tone
- use of multimedia eg video, image and text



## Guidance for delivery

Learners should be exposed to the theoretical and practical aspects of supporting end users. They should be encouraged to research the various methods that can be used to support end users and any limitations of the methods identified.

Learners should be exposed to a variety of hardware and software issues to allow them to undertake practical activities relating to supporting end users. When recording faults paper based or software methods can be used.

This unit can be taught alongside the Networking Concepts unit as it expands upon concepts developed in that unit. The concepts of using the CLI would be expanded on in the Server Administration and Network Operating Systems units.

URN	K/507/7268
Level	2
GLH	60

### What is this unit about?

The purpose of this unit is to provide the learners with an understanding of networks. As networks are now pervasive, having an understanding of the concepts will enable the learners to work in a range of different environments, including Small Office/Home Office (SOHO) and enterprise networks.

The learner is required to explore interconnecting devices that make up a network and how they interact. Learners will investigate the different network topologies, cabling and consider the advantages and limitations of peer-to-peer and client-server networks.

The learner will gain an understanding of the role of the OSI model, standards and protocols in enabling and controlling communications using networks.

The knowledge and understanding will be applied when installing and configuring interconnection devices to implement networks.

The learner may be introduced to this unit by asking themselves questions such as

- What are the layers and functions of the OSI model?
- What is a network protocol?
- What protocols are used as part of networks?
- What are interconnection devices?
- How can I configure a network interface card?

### Learning outcomes

In this unit, learners will be able to

1. Understand network infrastructure
2. Understand interconnection devices and media
3. Understand networking protocols
4. Implement networks

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand network infrastructure

## Topics

#### 1.1 Types of networks

#### 1.2 Network topologies

#### 1.3 Network communication methods

##### Topic 1.1

Learners understand the types of networks that can be implemented, including

- Personal Area Networks (PAN)
- Local Area Networks (LAN)
- Wide Area Network (WAN)
- wireless networks
- internet
- intranet
- peer to peer
- client server

##### Topic 1.2

Learners understand the advantages and disadvantages of different types of network topologies, including

- physical topologies
  - bus
  - star
  - ring
  - mesh
  - ad-hoc mode (wireless)
  - infrastructure mode (wireless)
  - hybrid
- logical topologies
  - bus
  - ring

##### Topic 1.3

Learners understand the characteristics of network communication methods, including

- simplex
- half duplex
- duplex
- unicast
- broadcast
- multicast
- point to point
- packet switching
- circuit switching

## Learning outcome

### 2. Understand interconnection devices and media

#### Topics

2.1 Network Interface cards/devices

2.2 Interconnection devices

2.3 Network media

##### Topic 2.1

Learners understand the characteristics of Network Interface Cards (NIC)

- network connection type
  - twisted pair (rj45)
  - fiber optic (st, sc, mt-rj, fc)
  - wireless
- system connection type
  - PCIe
  - USB
  - built in
- data transmission speed

##### Topic 2.2

Learners understand the functionality of interconnection devices used as part of network infrastructure, including

- broadcast domains
- collision domains
- hubs
  - broadcasts data
- switches
  - segments networks
  - MAC address filtering
  - multilayer switches (Virtual local area network (VLANs))
- routers
  - routes data based on ip address
- wireless routers
  - routes data based on ip address
  - provides physical connections to wired networks
- wireless access points
  - extends the range of wireless networks
- powerline adaptor

##### Topic 2.3

Learners will compare the characteristics and limitations of different media types used to implement networks, including

- characteristics of twisted pair cable
  - UTP
  - STP
  - plenum grade cable - used in air conditioning ducts



- segment length
- transmission speeds (Cat 5e, Cat 6)
- characteristics of fibre optic cables
  - single mode
  - multi mode
- characteristics of wireless
  - IEEE 802.8 A,B,G,N standards
  - MIMO
  - IEEE 802.15
  - IEEE 802.16
  - WPA2
  - SSID

## Learning outcome

### 3. Understand networking protocols

## Topics

3.1 Layers of the Open Systems Interconnect (OSI) model

3.2 Networking protocols

3.3 Configure network connectivity

#### Topic 3.1

Learners will understand the functions of each layer of the OSI model, including

- application layer
  - provides services to the software through which the user requests network services
- presentation
  - data representation and encryption
- session
  - establishes, maintains and ends communication with the receiving device
- transport
  - maintains flow control of data and provides error checking and recovery of data between the devices
- network
  - defines the processes used to route data across the network using logical addressing
- data link
  - concerned with the linkages and mechanisms used to move data about the network
- physical
  - defines the electrical and physical specifications for the media that carry the data across the network

Learners will know specific protocols associated with each layer of the OSI model, including

- application layer
  - HTTP, DHCP, Telnet, BOOTP, SMTP, POP3, FTP
- presentation
  - SSL/TLS
- session
  - NetBIOS
- transport
  - TCP, UDP, NetBEUI
- network
  - IPv4, IPv6, NAT, ICMP

- data link
  - Ethernet, MAC
- physical
  - DSL

Learners will know about interconnection devices associated with the following layers of the OSI model, including

- network layer
  - routers
- data link layer
  - switches, network interface card/device
- physical
  - hub

### Topic 3.2

Learners will define the term protocols within networks and understand the functions of networking protocols, including

- TCP
- IP v4
  - Class A, B, C addresses
  - Private IP address ranges
  - Default subnet masks
- IP v6
  - Address format
  - Dual IP stack
  - Tunnelling
- SNMP
- HTTP
- SMTP
- IMAP
- POP
- DNS
- DHCP
- Access control methods
  - CSMA/CD
  - CSMA/CA
- Virtual Private Network (VPN)

### Topic 3.3

Learners will be able to configure network connectivity including

- IP addresses
- default gateways
- default DNS server
- VPN connections

## Learning outcome

### 4. Implement networks

#### Topics

4.1 Install and configure wired networks

4.2 Install and configure wireless networks

#### Topic 4.1

Learners will install and configure devices to enable the implementation of wired networks

- install
  - wired routers
  - switches
  - network interface devices
  - associated media
  - device drivers
- configure
  - NIC/USB device
    - IP address and subnet mask
    - protocols

#### Topic 4.2

Learners will install and configure devices to enable the implementation of wireless networks

- install
  - wireless routers/access points
  - network interface devices
  - associated media
  - device drivers
- configure
  - wireless routers/access points
    - encryption
    - SSID
  - NIC/USB device
    - IP address and subnet mask
    - protocols

### Guidance for delivery

Learners should be exposed to the theoretical and practical aspects of creating networks to allow them to develop a thorough understanding of the concepts involved. They should be encouraged to research the various elements required to implement networks.

Although the unit content is predominately theory-based the emphasis should be on the practical application of different types of networks and how they function. Tutors could base discussions around their own local area network(s) and visits to local organisations to observe the practical application can help to reinforce this aspect of learning.

When the learners are implementing networks they should be provided with access to a pre-configured wired router. Wireless routers should have a default SSID and the encryption should be disabled prior to use.

### Suggested learning resources

#### *Books*

Microsoft Windows Networking Essentials  
Publisher John Wiley & Sons, 1<sup>st</sup> edition, 2011  
ISBN-10 1118016858  
ISBN-13 978-1118016855

Gibson, D

Networking All-in-One for Dummies  
Publisher John Wiley & Sons, 5<sup>th</sup> edition, 2012  
ISBN-10 1118380983  
ISBN-13 978-11183809

Lowe, D

### ***Websites***

Cisco

[www.cisco.com](http://www.cisco.com)

URN	H/507/7270
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners to demonstrate the ability to install, configure and administer Operating Systems. To enable them to achieve this they will have to investigate the hardware and software that is currently available for use to ensure that it is compatible with the Operating System that is being installed.

Once the Operating System has been installed learners will be expected to undertake routine maintenance tasks to ensure that any system vulnerabilities are mitigated and device drivers are updated as required.

The learner may be introduced to this unit by asking themselves questions such as

- What Operating System am I using?
- How can I change settings?
- Why do I have to update the Operating System?
- How do I maintain my Operating System?
- How do I change passwords?

### Learning outcomes

In this unit, learners will be able to

1. Understand the installation process
2. Configure and personalise Operating Systems
3. Administer users and resources
4. Understand Operating System maintenance

### Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

1. Understand the installation process

## Topics

- 1.1 Factors to be considered when selecting Operating Systems
- 1.2 Installation options
- 1.3 Install and configure an Operating System

### Topic 1.1

Learners understand the factors that need to be considered for selecting Operating Systems (OS)

- support lifecycle
- hardware and software compatibility
- device that the OS is to be run on eg desktop, laptop, tablet, smartphone
- interface eg keyboard, mouse, touch, voice
- system requirements eg 32bit/64bit processor, memory, storage
- licensing eg open source, enterprise, volume and end user
- OS editions eg home, professional, educational, mobile
- saving and transferring settings and files between operating systems
- OS features

### Topic 1.2

Learners will understand the available installation options for installing OS, including

- installation methods eg upgrade, clean install, live OS
- user interface eg Command Line Interface (CLI), Graphical User Interface (GUI)
- partitioning types eg primary, extended, logical, swap, active (boot), basic, volumes
- removable eg DVD, USB
  - network eg from folder share, deployment share/server
  - remote eg System Center Configuration Manager (SCCM)

### Topic 1.3

Learners will install and configure an OS

- install eg interactive, clone
- drive partitioning
- file format
- startup options
- services
- device drivers
- network connectivity settings

## Learning outcome

### 2. Configure and personalise Operating Systems

## Topics

- 2.1 Configuring system functionality
- 2.2 System personalisation
- 2.3 Configure an OS

### Topic 2.1

Learners will understand the configuration process once the OS has been installed, including

- computer name
- domain
- language
- firewalls

### Topic 2.2

Learners will understand ways in which OS can be personalised, including

- desktop settings eg background, lock screen, colors, themes, menus
- account settings eg local, network, vendor account (Google, Apple, Microsoft)
- interface eg login options, shortcuts, icon size
- storage locations eg shared/home folders
- accessibility eg contrast, narrator, sticky keys, magnifier, large icons

### Topic 2.3

Learners will be able to configure and personalise settings within an OS

## Learning outcome

### 3. Administer users and resources

#### Topics

- 3.1 Users and groups
- 3.2 Administrative processes
- 3.3 Controlling access to storage
- 3.4 Administer user accounts and resources

### Topic 3.1

Learners will understand the difference between local users and groups.

Learners will also understand the built in user accounts that are found in an OS, including

- administrator
- system
- users
- guests

### Topic 3.2

Learners will understand processes used for administering users, including

- creating accounts
- deleting accounts
- disabling accounts
- password complexity
- changing passwords

### Topic 3.3

Learners will understand methods used to control access to storage, including

- disk quotas
- file and folder permissions eg full, modify, execute, read/write, read only

- sharing permissions
- inheritance of permissions
- mapping drives
- encryption eg whole disk, file

#### **Topic 3.4**

Learners will be able to administer user accounts and resources, including

- sharing printers
- assigning permissions to shared resources and files
- creating user accounts
- changing passwords
- allocating file and folder permissions
- mapping drives

### **Learning outcome**

#### **4. Understand Operating System maintenance**

#### **Topics**

- 4.1 Maintenance tools
- 4.2 Updates
- 4.3 Backup and Recovery
- 4.4 Maintain an operating system

#### **Topic 4.1**

Learners will understand the tools and utilities that can be used to perform routine maintenance on an OS, including

- device manager
- MSconfig
- system information
- apt-get
- Maintenance mode (Linux)
- defragmentation
- disk management

#### **Topic 4.2**

Learners will understand the importance of applying updates on OS

- driver updates
- OS updates/patches eg security, systems
- anti-virus definitions

#### **Topic 4.3**

Learners will understand the processes involved in backing up and recovering local data including

- restore points
- data restoration

#### **Topic 4.4**



Learners will carry out routine maintenance tasks, including

- backup and restore data
- install updates/patches eg OS, device drivers
- disk management eg removal of temporary files, defragmentation
- gather information on system performance
- update anti-virus definitions

## Guidance for delivery

It is expected that learners studying this unit will have the pre-requisite knowledge delivered in the *Principles of digital technology, IT security and networking concepts* units. This unit builds upon the concepts of these units.

This unit can be taught using either open source or vendor specific Operating Systems. These may be installed directly on to the physical hardware or into a virtual environment.

All outcomes apart from the installation of Operating Systems in topic 1.3 can be achieved by using a live Operating System.

Software media can be obtained in the form of ISO files, trial editions can be downloaded from the various vendor websites such as;

- |                        |   |
|------------------------|---|
| • Microsoft Windows    | <a href="http://www.microsoft.com/en-us/evalcenter/">http://www.microsoft.com/en-us/evalcenter/</a>                                 |
| • Ubuntu               | <a href="http://www.ubuntu.com/">http://www.ubuntu.com/</a>   |
| • Chromium<br>chromium | <a href="http://www.chromium.org/getting-involved/download-chromium">http://www.chromium.org/getting-involved/download-chromium</a> |

Tutors should ensure that the learners are aware when delivering topic 1.1 that Operating Systems are supported by the manufacturer for a defined period of time. Once this period has elapsed they are classed as legacy systems and the manufacturer may not provide updates/ patched to address system vulnerabilities.

This unit could be taught alongside the *Server Administration* unit as this would allow the learners to investigate the interactions between servers and clients on a network.

The learning outcomes provide the opportunity for learners to undertake practical activities to reinforce the knowledge previously gained. This will also develop the skills required by learners to support and maintain operating systems in a multitude of environments.

## Suggested learning resources

### Books

Microsoft Windows Operating System Essentials  
Published by John Wiley & Sons, 2012

Carpenter, T

ISBN 978- 1118195529

How Linux Works What Every Superuser Should Know      Ward, B  
Published by No Starch Press, 2014  
ISBN 978- 1593275679

Introducing Windows 10 for IT Professionals, Preview Edition      Bott, E  
Published by Microsoft Press, 2015  
ISBN 978-0-7356-9696-9  
Can be downloaded free from <http://www.microsoftvirtualacademy.com/ebooks>

## **Websites**

TechNet Virtual Labs  
<https://technet.microsoft.com/en-us/virtuallabs/>

Windows How-to (Support centre)  
<http://windows.microsoft.com/en-gb/windows/support>

Ubuntu Wiki  
<https://wiki.ubuntu.com/>

URN	T/507/7273
Level	2
GLH	60

### What is this unit about?

This unit provides an introduction to server administration and the skills required to install, configure and optimise servers.

Learners will explore the stages involved in installing and configuring the basic services required to run a server based Operating System (OS). Once they have installed and configured they will be expected to undertake routine administrative tasks related to users and gather information on the system.

Learners will undertake a number of practical activities to consolidate the theoretical aspects of this unit.

The learner may be introduced to this unit by asking themselves questions such as

- What is a server?
- What types of services are provided to the network by a server?
- Why do I have to sign in to access the network's services?
- What controls my access to the network's services such as printers?
- What do I need to know to install a server?

### Learning outcomes

In this unit, learners will be able to

1. Understand server installation
2. Understand server configuration and administration
3. Optimise a server

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand server installation

## Topics

#### 1.1 Plan for server installation

#### 1.2 Installation options

#### 1.3 Install and configure server Operating Systems

##### Topic 1.1

Learners will understand factors to be considered before installing server OS, including

- software and hardware compatibility eg firmware updates, BIOS, storage controller
- licensing eg open source, enterprise, volume and end user
- local/remote resources
- system requirements eg 32bit/64bit processor, number of processor cores, memory, storage
- server OS features eg virtualisation, remote access
- role of the server eg domain controller, file server, print server

Learners will know different storage technologies that can be used with servers, including

- local eg SATA, SCSI, IDE
- network eg NAS, SAN
- RAID eg types, combinations, hardware vs. software
- disk types eg basic, dynamic, virtual hard drive

##### Topic 1.2

Learners will understand the available installation options when installing a server based OS

- server edition eg essentials, standard, datacenter
- upgrade vs clean install
- user interface eg Command Line Interface (CLI), Graphical User Interface (GUI)
- partitioning eg disks, volumes, file system formatting eg ext3, ext4, NTFS, ReFS
- installation process eg interactive, unattended, automated deployment across networks

##### Topic 1.3

Learners will install and configure a server OS

- install eg interactive, unattended
- drive partitioning
- file format
- startup options
- services
- device drivers

## Learning outcome

### 2. Understand server configuration and administration

#### Topics

- 2.1 Network services
- 2.2 Directory services
- 2.3 Applying policies
- 2.4 Configure services
- 2.5 Administer users

##### Topic 2.1

Learners will understand the services that can be configured on a server, including

- network eg DHCP, DNS
- application eg mail, database, collaboration
- internet eg IIS, LAMP, FTP
- remote access
- print services eg local printers, network printers
- virtualisation

##### Topic 2.2

Learners will understand the core components and the roles of Active Directory (AD) and Lightweight Directory Access Protocol (LDAP). They will also understand local and domain based user administration.

core components

- domains
- domain controllers
- forests

local based user administration

- accounts
- groups

domain based user administration

- accounts
- groups
- organisational units

##### Topic 2.3

Learners will understand how directory services such as AD/LDAP are used to apply policies across a network

- group policy objects (Microsoft)
- local policies
- network policies

#### Topic 2.4

Learners will configure the services provided by a server based OS, including

- static IP address
- install server roles
  - DNS
  - DHCP
  - directory services eg AD, LDAP

#### Topic 2.5

Learners will be able to administer users, including

- create users
- apply policies and permissions to users
- delete users
- reset user passwords
- share resources

### Learning outcome

#### 3. Optimise a server

#### Topics

3.1 Monitor server performance

3.2 Routine maintenance

#### Topic 3.1

Learners will be able to monitor and gather information on a server's performance using

- tools
- logs
- alerts

#### Topic 3.2

Learners will carry out routine server maintenance procedures

- create restore points
- apply updates
- back up data
  - full backup
  - differential backup
  - incremental backups
  - data restoration

### Guidance for delivery

It is expected that learners studying this unit will have the pre-requisite knowledge delivered in the *Principles of digital technology, IT security and networking concepts* units. This unit builds upon the concepts of these units.

This unit could be taught alongside the *Operating Systems* unit as this would allow the learners to investigate the interactions between servers and clients on a network.

This unit has a practical element throughout and can be taken in a physical lab environment or by using virtual environments. These environments could be used to enable learners to undertake a practical scenario based approach to implementing and configuring a network with centralised administration.

To ensure that the unit is given a real world perspective, tutors could consider getting your centre's IT Manager to speak about server systems and how they are implemented or you may involve your local branch of the British Computer Society (BCS) to provide you with external speakers.

In topic 1.1. Tutors should ensure that learners are made aware of the commonly used RAID standards such as

- RAID 0 (Stripe set)
- RAID 1 (Mirror set)
- RAID 5 (Striped with distributed parity)
- RAID 10 (Striped set with mirroring)

When discussing the virtual services provided by servers learners should be made aware of the use of virtual hard drives, virtual memory, virtual networks, checkpoints, physical to virtual, virtual to physical.

## Suggested learning resources

### Books

Microsoft Windows Server Administration Essentials Published by John Wiley & Sons, 2011 ISBN 978-1118016862	Carpenter, T
CentOS System Administration Essentials Published by Packt Publishing, 2014 ISBN 978-1783985920	Mallet, A
Introducing Windows Server 2012 R2 Technical Overview Published by Microsoft Press, 2013 ISBN 978-0-7356-8278-8 Can be downloaded for free from <a href="http://www.microsoftvirtualacademy.com/ebooks">http://www.microsoftvirtualacademy.com/ebooks</a>	Tulloch, M

### Websites

Windows Server Administration Fundamentals  
<https://www.microsoftvirtualacademy.com/en-US/training-courses/windows-server-administration-fundamentals-8477>

GNU [www.gnu.org/distros/free-distros.en.html](http://www.gnu.org/distros/free-distros.en.html)

TechNet Virtual Labs

<https://technet.microsoft.com/en-us/virtuallabs/>

Windows Server 2012 R2 and  
Windows Server 2012

<https://technet.microsoft.com/library/hh801901.aspx>

CentOS Wiki

<http://wiki.centos.org/>



URN	F/507/7275
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is to develop the learners understanding of the concepts involved in providing services to businesses and end users using cloud computing.

The learner will explore cloud computing and the services that are provided and the organisations responsible for governance. This will enable them to justify the selection of services to meet specific requirements of businesses and end users. Once they have an understanding of the concepts involved learners will be able to configure the relevant settings to allow access to remote data via the cloud.

The learner may be introduced to this unit by asking themselves questions such as

- What is the cloud?
- What is virtualisation?
- What services are provided on the cloud?

### Learning outcomes

In this unit, learners will be able to

1. Understand cloud computing
2. Understand the service models available and their governance

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand cloud computing

#### Topics

- 1.1 The differences between virtualisation and cloud computing
- 1.2 Benefits offered by cloud computing
- 1.3 Characteristics of cloud computing
- 1.4 Types of models used to deliver cloud services
- 1.5 Configure access

#### Topic 1.1

Learners understand the differences between virtualisation and cloud computing.

#### Topic 1.2

Learners will understand the benefits offered by cloud computing, including

- availability of data when and where required
- reduced hardware requirements eg servers
- positive impact on the environment

#### Topic 1.3

Learners will understand the characteristics of cloud computing

- managed by the provider
- flexible resources assignment
- on-demand self-service
- network accessibility eg mobility
- resource pooling
- rapid deployment
- standardised interfaces

#### Topic 1.4

Learners understand the different models that can be used to deliver cloud based services, including

- private
- hybrid
- public
- community

#### Topic 1.5

Learners will be able to configure data access including

- cloud storage settings
- data encryption options

## Learning outcome

### 2. Understand the service models available and their governance

#### Topics

##### 2.1 Types of service models

##### 2.2 Governance of the cloud

#### Topic 2.1

Learners will understand the advantages and disadvantages of using different service models

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)
- Business Processes as a Service (BPaaS)

#### Topic 2.2

Learners know the organisations responsible for the governance of the cloud, including

- Cloud Security Alliance (CSA)
- Cloud Standards Customer Council (CSCC)
- Distributed Management Task Force (DMTF)
- IEEE Standards Association
- ISO/IEC 27001:2013
- National and International legislation

## Guidance for delivery

Learners should be encouraged to investigate different service providers and platforms and explore the types of cloud services (IaaS, PaaS, and SaaS). This could be facilitated through the use of scenarios requiring them to access data from remote locations. These scenarios could be used to investigate how cloud computing could be implemented to provide a solution.

They should also explore the governance of the cloud and how legislation impacts where services are being provided across international borders.

### Learning outcome 1

In topic 1.1 learners should be aware of the differences between Virtualisation and cloud computing. The definitions of each are provided below

- Virtualisation is software that separates the physical infrastructure to create dedicated resources
- Cloud computing is the delivery of shared computing resources, software or data as a service via the Internet

In topic 1.2 learners should be made aware of the positive impacts on the environment such as the use of large data centres which tend to have more efficient energy and environmental controls in place.

### Learning outcome 2

In topic 2.2 the learners will be assessed on the organisations involved in the governance of cloud computing however, they should have a basic knowledge of the roles of these organisations.

## Suggested learning resources

### **Books**

Cloud Computing Law  
Published by OUP Oxford, 2013  
ISBN-10 0199671680  
ISBN-13 978-0199671687

Millard, C

Cloud Computing Theory and Practice  
Publisher Morgan Kaufmann, 2013  
ISBN-10 0124046274  
ISBN-13 978-0124046276

Marinescu, D C.

### **Websites**

Gov.uk

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/350986/Cloud\\_Security\\_Guidance\\_\\_Standards\\_and\\_Definitions.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/350986/Cloud_Security_Guidance__Standards_and_Definitions.pdf)

Gov.uk

<https://www.gov.uk/government/publications/implementing-the-cloud-security-principles>

URN	J/507/7276
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is to develop the learners understanding of the concepts involved in troubleshooting networks.

The learner will explore the tools and techniques that can be used to gather information regarding network issues. This will enable them to explain the implications of using specified tools and techniques to gather information regarding network issues.

By reviewing the information gathered the learner will be able to make informed decisions about the likely cause of the issue, recommend and implement a solution.

The learner may be introduced to this unit by asking themselves questions such as

- How do I identify issues with networks?
- What tools can I use to troubleshoot networks?
- What skills do I require to support networks?
- How do I rectify a fault on a network?
- What information do I need to record?

### Learning outcomes

In this unit, learners will be able to

1. Understand network troubleshooting processes
2. Perform troubleshooting procedures

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand network troubleshooting processes

## Topics

- 1.1 Considerations when troubleshooting networks
- 1.2 Troubleshooting methods
- 1.3 Troubleshooting tools

### Topic 1.1

The learner understands the considerations that must be taken into account when troubleshooting networks, including

- minimising the disruption to services
- user notifications eg planned maintenance
- data integrity
- individual responsibility and authority
- knowledge and skills within the support department

### Topic 1.2

The learner is able to evaluate different troubleshooting methods that can be employed on networks including

- visual inspection
- substitution
- replication
- remote access

### Topic 1.3

The learner understands the software and hardware tools used for troubleshooting

- software
  - third party software eg anti-virus, systems audits
  - Command Line Interface (CLI) commands eg ping, traceroute
  - recovery disks including live Operating Systems
  - built in system utilities eg system logs
- hardware
  - cable testers

## Learning outcome

### 2. Perform troubleshooting procedures

## Topics

- 2.1 Using troubleshooting tools
- 2.2 Rectify and record faults

### Topic 2.1

The learner will identify issues when using troubleshooting tools including

- software
  - third party software eg anti-virus, systems audits
  - CLI commands eg ping, traceroute
  - recovery disks including live Operating Systems
  - built in system utilities eg System logs
- hardware
  - cable testers

### **Topic 2.2**

The learner will be able to rectify faults in networks, including

- patch cables
- Network Interface Card (NIC)
- device drivers
- corrupted Operating Systems
- misconfigured wireless devices

The learner will be able to record information relevant to the fault and steps undertaken as part of the troubleshooting process, including

- description of fault eg information provided by end user
- fault identification eg fault identified following troubleshooting
- tools used
- actions taken eg rectification/escalation

## **Guidance for delivery**

Learners should be exposed to the theoretical and practical aspects of troubleshooting and rectifying faults on a simple network. They should be encouraged to research the various methods that can be used to troubleshoot issues with networks and any limitations of the methods identified.

Tutors should be aware that there are variations in the syntax used in Windows and Linux based Operating Systems.

In order for learners to fully explore the troubleshooting process they should have access to a stand-alone network (wired or wireless) to minimise the potential impact on the main organisational network. This network should consist of at least three pre-configured work stations.

Learners should be exposed to a variety of hardware and software issues to allow them to undertake practical troubleshooting tasks. When recording faults paper based or software methods can be used.

This unit can be taught alongside the Networking Concepts' unit as it expands upon concepts developed in that unit. The concepts of using the CLI would be expanded on in the server administration and network Operating Systems units.

## **Suggested learning resources**

### **Books**

Mike Meyers Comptia Network+ Guide to Managing and Troubleshooting Networks,  
(Exam N10-006) Meyers, M & Orsaria, A  
Published by McGraw -Hill Education, 4<sup>th</sup> edition, 2015  
ISBN-100071844600  
ISBN-13 978-0071844604

### **Websites**

Techopedia

<http://www.techopedia.com/definition/29989/network-troubleshooting>

Network Know-How

[http://cdn.ttgtmedia.com/searchNetworking/downloads/networkknowhow\\_ch17.pdf](http://cdn.ttgtmedia.com/searchNetworking/downloads/networkknowhow_ch17.pdf)

Homework Market

[http://www.homeworkmarket.com/sites/default/files/q1/24/09/cover-chapter\\_12\\_1.pdf](http://www.homeworkmarket.com/sites/default/files/q1/24/09/cover-chapter_12_1.pdf)

### **Equipment**

- Cable testers
- faulty patch cables
- faulty NIC card
- live Operating Systems
- workstation with a corrupted Operating system
- device drivers for relevant hardware



URN	L/507/7277
Level	2
GLH	60

### What is this unit about?

The purpose of this unit is to provide the learners with underpinning knowledge required to allow them to develop programs. The theories taught will be further refined in the Application Development units.

Learners will be encouraged to explore techniques, tools and strategies for developing programs in a variety of languages and using different styles of development.

Learners might ask themselves these questions

- What is a program?
- What is coding?
- How do I code?
- How do I make sure my program works?

### Learning outcomes

In this unit, learners will be able to

1. Understand the software development life cycle
2. Understand paradigms and programming languages
3. Understand how data is used in a program
4. Understand program flow and control
5. Understand software testing, debugging and publishing

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand the software development life cycle

## Topics

#### 1.1 Software development life cycle

#### 1.2 Life cycle models

##### Topics 1.1

Learners will understand the stages of the software development life cycle, including

- requirements gathering and analysis
- design
- implementation or coding
- testing
- deployment
- maintenance

##### Topics 1.2

Learners will understand life cycle models and advantages and disadvantages of each, including

- Waterfall
- RAD
- Agile

## Learning outcome

### 2. Understand paradigms and programming languages

## Topics

#### 2.1 Development paradigms

#### 2.2 Programming languages

##### Topic 2.1

Learners will understand different paradigms used for software development and the advantages and disadvantages of using each, including

- event-driven
- procedural
- object oriented

##### Topic 2.2

Learners know languages associated with different paradigms, including

- event driven eg Visual Basic (VB)
- procedural eg C++
- object oriented eg Java, C#

Learners will understand the difference between the terms “platform independent” and “platform dependent”.

Learners will understand the differences between interpreted and compiled development languages

- interpreted
  - deals with a single instruction at a time
  - no intermediate object code is generated
  - memory requirement is less
  - errors are displayed for each instruction (if errors present)
- compiled
  - deals with entire program
  - intermediate object code is generated
  - memory requirement is greater
  - errors are displayed after the entire program is compiled (if errors present)

## Learning outcome

### 3. Understand how data is used in a program

## Topics

#### 3.1 Data storage and operators

#### 3.2 Programming conventions

### Topic 3.1

Learners will know different data type options used for storing data, including

- numeric
  - integer
  - real/float
- alphanumeric
  - character
  - number
  - symbol
- logical
  - Boolean

Learners will understand how data is handled in a program and the structures used to store data in memory by assigning values to structures, including

- variables
- arrays
- strings
- constants

Learners understand operators used to control arithmetic and logical processes, including

- arithmetic
  - addition +
  - subtraction -
  - multiplication \*
  - division /
  - modulus %
- logical

- less than <, greater than >, less and greater coupled with equality <=, >=
- equality ==
- AND
- OR
- NOT

### Topic 3.2

Learners must understand programming conventions and why they are used, including

- commenting to assist understanding of
  - the purpose of parts of the programming
  - the purpose of algorithms
  - accessibility and maintenance
- consistent naming style
- use of white space
- use of indentation

Learners must understand the importance of using naming conventions, including

- consistency
- house style
- clarity
- allows reuse of code

## Learning outcome

### 4. Understand program flow and control

#### Topics

- 4.1 Fundamental techniques
- 4.2 Modular development
- 4.3 Validation strategies
- 4.4 File handling

### Topic 4.1

Learners must understand fundamental constructs used to model processes that are used in the development of the software, including

- sequence
- selection
  - if .. else if .. else
  - switch/ select
- iteration
  - for .. next
  - while .. do
  - repeat .. until

Learners must understand how Pseudocode and flowcharts are used in developing programs.

Learners must know the purpose of command/reserved words within program languages.

### Topic 4.2

Learners must understand different modular design approaches and their advantages and disadvantages, including

- classes and objects
- subroutines
- imported structures
  - libraries
  - directives

#### Topic 4.3

Learners must understand the use of validation strategies to ensure successful operation of the program, including

- testing user entered data
  - error handling
  - user input
- testing valid, invalid and edge-case data

#### Topic 4.4

Learners will understand file handling operations, including

- open
- read
- write
- close

Learners will understand the purpose of structured data files, including

- XML
- JSON

### Learning outcome

#### 5. Understand software testing, debugging and publishing

##### Topics

5.1 Test planning

5.2 Error types and debugging

5.3 Software publishing

#### Topic 5.1

Learners must know the elements that should be included in a test plan

- item to test
- expected outcome
- actual outcome
- fault diagnosis
- actions taken to resolve
- follow-up action required

#### Topic 5.2

Learners must understand the main types of errors that occur in programs, including

- logic
- syntax
- runtime

Learners will understand debugging features found in the Integrated Development Environment (IDE)

- breakpoint
- step through/over
- step into
- variable watch

### Topic 5.3

Learners will understand why programs are packaged for distribution.

## Guidance for delivery

The focus of this unit is on the development of programs for execution on systems. The learner should acquire an understanding of the core programming concepts such as paradigm, operators and constructs that are transferrable across commonly used development platforms.

When delivering this unit there is no requirement to use any particular software development system or to focus on any particular programming language.

In learning outcome 4 learners should be able to create simple pseudocode and flowchart models to consolidate the theoretical learning in topic 4.1

Learners will need to understand how recursive techniques are used to solve simple problems such as generation of factorial(!) values or numbers in a Fibonacci sequence.

Centres may find it useful to prepare code files that allow learners to use the techniques described in Topics 5.1 and 5.2.

## Suggested learning resources

### Books

Programming for Beginners with C++ Published by CreateSpace independent publishing platform, 2015 ISBN10 1511806982 ISBN13 9781511806985	Compton, K.
Python Programming for the Absolute Beginner Jan 2010 Course Technology PTR ISBN10 1435455002 ISBN13 9781435455009	Dawson, M.
Visual Basic A Beginner's Tutorial Published by Brainy Software Inc., 2014 ISBN10 0992133025	Ky, J.

IBN13 9780992133023

***Journals and magazines***

- PC Pro Magazine

***Websites***

Fundamentals of Programming with C#

<http://www.introprogramming.info/wp-content/uploads/2013/07/Books/CSharpEn/Fundamentals-of-Computer-Programming-with-CSharp-Nakov-eBook-v2013.pdf>

Code

[www.code.org](http://www.code.org)

Codeacademy

[www.codecademy.com](http://www.codecademy.com)

URN	Y/507/7279
Level	2
GLH	60

### What is this unit about?

The purpose of this unit is for learners to use a range of skills to complete the development of a software application.

Success in application development for commercial clients, others and for the developer's own purposes depend on a careful, systematic approach and the regular recording of intentions to use particular features, data or strategies.

This unit builds on the skills developed in unit 209 Principles of software development.

### Learning outcomes

In this unit, learners will be able to

1. Define the software requirements and strategies
2. Create program specification documentation
3. Create and test the applications



## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

#### 1. Define the software requirements and strategies

### Topics

- 1.1 Language and development environment specification
- 1.2 Life cycle model specification
- 1.3 Deployment strategy specification

#### Topic 1.1

Learners will specify a development language and development system in order to create an application. The decision made must be based on the target platform, eg Windows, .Net, Java runtime. Learners will understand language selection criteria based on platform and framework suitability.

Learners will understand the characteristics of languages, including

- VB .Net
- C
- Objective C
- C++
- C#
- Python

#### Topic 1.2

Learners will specify a life cycle model to be used for application development eg Agile, RAD, prototyping, spiral, waterfall

#### Topic 1.3

Learners will know methods for deployment of completed applications and understand target platforms for deployment.

### Learning outcome

#### 2. Create program specification documentation

### Topics

- 2.1 User controls
- 2.2 Data structures definitions
- 2.3 Test plan specification
- 2.4 Create specifications

#### Topic 2.1

Learners will understand controls used for input and output in the applications system. For example, controls could include

- menu systems
- text input controls

- button controls
- list box items
- combo box selection controls

#### **Topic 2.2**

Learners will understand data types and structures to be used in the program and creation of data flow diagrams, showing how data will be transferred between parts of the system.

#### **Topic 2.3**

Learners will understand how to create test plans in the form of the Test Log.

#### **Topic 2.4**

Learners will create specification for user interface controls, data structures and test plans.

### **Learning outcome**

#### **3. Create and test the applications**

#### **Topics**

3.1 Application development

3.2 Application testing

3.3 Evaluate application

#### **Topic 3.1**

Learners will understand characteristics of good practice used in the production of applications, including

- commenting to assist understanding of
  - the purpose of parts of the programming
  - the purpose of algorithms
  - accessibility and maintenance
- consistent naming style
- use of white space
- use of indentation
- validation techniques
  - error handling
  - user input

Learners will develop an application using languages and specified structures.

#### **Topic 3.2**

Learners will test applications in line with test plans.

#### **Topic 3.3**

Learners will review application, making judgments on strengths and weaknesses identified and making recommendations for improvements.

## Guidance for delivery

When delivering this unit, centres may use any software development system.

Learners will enrich their understanding by having an awareness of the characteristics of a variety of programming languages and software development environments. It is likely that learners within a cohort will focus on one particular system.

URN	L/507/7280
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners to be able to design, develop and test applications for mobile devices.

Learners will understand types of platforms and devices used to run mobile applications and their relationships with manufacturers.

Mobile devices have to access data frequently and learners will learn about options used to store the data in different situations.

Learners will understand the importance of testing and will complete a test plan for their developed application.

Learners might ask themselves these questions

- What are the development options for mobile applications?
- How do specific device features affect the mobile application being developed?
- What do I need to consider when designing and developing a mobile application?
- How do I test my mobile application?

### Learning outcomes

In this unit, learners will be able to

1. Understand key features of mobile applications
2. Plan and design mobile applications
3. Develop and test mobile applications

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand key features of mobile applications

#### Topics

- 1.1 Operating Systems (OS) and devices
- 1.2 Interaction controls
- 1.3 Data options
- 1.4 Security

##### Topic 1.1

Learners will understand the current range of OS used on mobile devices such as tablets and mobile phones. Learners will know which OS may be installed on devices offered by different manufacturers or organisations.

Learners will understand the form factors used on different mobile devices, taking into consideration the physical characteristics of the device including

- screen sizes
- screen ratios
- screen resolutions

##### Topic 1.2

Learners will understand controls used to interact with devices and how a user would interact with controls, including

- lists
- menus
- options
- navigation actions
- zoom and pan control

##### Topic 1.3

Learners will understand options for storing data both locally and remotely

Learners will understand simple data structures, including

- Extensible Markup Language (XML)
- Comma Separated Values (CSV)
- JavaScript Object Notation (JSON)

##### Topic 1.4

Learners will understand the purpose of implementing security features

- biometrics eg fingerprint
- username and password
- two-factor authentication
- Online authentication services eg OAUTH, Open ID

- pin codes
- gesture authentication

## Learning outcome

### 2. Plan and design mobile applications

#### Topics

2.1 Planning mobile applications

2.2 Designing mobile applications

##### Topic 2.1

Learners will understand different environments where mobile applications are used

- business eg retail, promotions, payments, loyalty systems
- lifestyle eg games, social interaction, communication
- educational eg research, information

Learners will understand the considerations to be taken into account when planning mobile applications, including

- type of mobile application eg native, web based, hybrid
- purpose of application
- platform for development
- intended audience
- security eg user authentication
- development timeline including
  - start
  - milestones
  - testing
  - documentation
  - release
  - evaluation

##### Topic 2.2

Learners will design the user experience (UX) for the intended application, showing

- data entry controls eg text boxes
- action controls eg buttons
- navigation controls eg command toolbars
- colours and style

## Learning outcome

### 3. Develop and test mobile applications

#### Topics

3.1 Application development

3.2 Application testing

### Topic 3.1

Learners will develop an application for a specified platform and device that includes user authentication.

### Topic 3.2

Learners will understand deployment methods, including

- app stores
- sideloading

Learners will produce a test plan that is suitable for testing the mobile application they have developed. The test plan should include

- items to test
- expected outcomes
- actual outcomes
- actions required
- responsibility for actions
- timescale for completion of actions

Learners will be able to test the mobile application using the test plan and record the results.

## Guidance for delivery

When delivering this unit, centres may use any software development system.

Centres may not have access to devices on which applications can be installed for testing and use, and may therefore use emulation of the application in a simulated environment. However there are a number of vendor organisations that may be willing to provide resources that help support delivery of this unit.

Learners' understanding of structured data in topic 1.3 can be reinforced by creating data structures with 2 levels of depth. For example, learners might create a data structure for a training course and the students studying it.

Topic 1.4 will focus on the reasons for implementing security and not on how each type of security works in detail.

Where required, the centre can allow for hand-drawn sketches to be used for design in learning outcome 2 if annotations are included and facilities exist to convert the designs to an electronic format.

## Suggested learning resources

### Books

Android app development for dummies  
Published by John Wiley and Sons, 3<sup>rd</sup> edition, 2015

Burton, M

ISBN-101119017920

ISBN-13978-1119017929

iOS App Development for Dummies

Feiler, J

Published by John Wiley and Sons, 2014

ISBN-101118871057

ISBN-13978-1118871058

### **Websites**

Apple Start developing apps today

<https://developer.apple.com/library/ios/referencelibrary/GettingStarted/RoadMapiOS/>

Android Building your first app

<https://developer.android.com/training/basics/firstapp/index.html>

Windows Windows Dev Center

<https://dev.windows.com/en-us/>



URN	R/507/7281
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners' to understand the concepts of using Hyper-Text Mark-up Language (HTML), Cascading Style Sheets (CSS) and JavaScript.

Learners will develop webpages using HTML and enhance their pages using CSS and JavaScript. They will be able to apply styles to a set of pages and apply interactivity using JavaScript.

Learners may be introduced to this unit by asking themselves questions such as

- What is a web page?
- What language is used to create a web page?
- How do I apply styles to my web pages?
- How do I make my webpage interactive?

### Learning outcomes

In this unit, learners will be able to

1. Use HTML tags to create a web page
2. Apply Cascading Style Sheets (CSS) to HTML
3. Enhance websites using JavaScript

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Use HTML tags to create a web page

#### Topics

##### 1.1 HTML tags and tools

##### 1.2 Create a web page

#### Topic 1.1

Learners will understand the tools used to write and edit HTML code

- text based editors
- WYSIWYGs
- web authoring software

Learners will understand the differences between HTML<sub>4</sub> and HTML<sub>5</sub> for example the way in which HTML<sub>5</sub> addresses cross platform compatibility and accessibility issues.

Learners will understand how HTML tags are constructed.

#### Topic 1.2

Learners will use elements, content and media HTML tags to create a web page

- elements
  - <!DOCTYPE>
  - <html>
  - <head>
  - <title>
  - <body>
- content
  - <p>
  - headings <h<sub>1</sub>> to <h<sub>6</sub>>
  - <a href="..." > </a>
  - <ul> and <li>
  - <main>
- media
  - 
  - <video>
  - <audio>
  - <canvass>

Learners will be able to manipulate the attributes relating to images, video, audio, and hyperlinks.

Learners will be able to divide a web page up into logical sections using the <div> and <span> tags.

## Learning outcome

### 2. Apply Cascading Style Sheets (CSS) to HTML

## Topics

### 2.1 Cascading Style Sheets

### 2.2 Apply styles using CSS

#### Topic 2.1

Learners will understand how CSS is used to apply styles.

Learners will understand how CSS can be used to create responsive web pages eg media queries.

#### Topic 2.2

Learners will create and link a CSS to format an HTML web page, including selectors and attributes

- selectors
  - element selector
  - id selector
  - class selector
- attributes
  - background colour and images
  - font colour (using hexadecimal and RGB)
  - font-family
  - font-size
  - font-style
  - padding
  - margin
  - block and inline
  - float
  - clear
  - relative
  - left
  - top

## Learning outcome

### 3. Enhance websites using JavaScript

## Topics

### 3.1 JavaScript

### 3.2 Implement JavaScript

#### Topic 3.1

Learners will understand how JavaScript can be used to improve user interaction with a webpage.

Learners will understand the concept of a variable and an array (list) in JavaScript.

#### Topic 3.2

Learners will be able to use JavaScript to change attributes when a user interacts with an element eg text and image, including

- change the background color
- change the style of an object eg colour, size, weight
- change the position on the page

## Guidance for delivery

This course is best delivered through practical sessions in conjunction with on-line tutorials (see learning resources). Learners should be engaged in the creation of web pages from the outset and become familiar with editing HTML, CSS and JavaScript files as well as loading them into a browser.

It is possible to run the course on a personal computing device (without internet connection) by using a JavaScript-enabled browser (such as Internet Explorer or Chrome) and a simple text editor (such as Notepad or Notepad++). This approach will give learners a solid foundation and understanding in website creation.

For learning outcome 3 tutors should provide learners with samples of JavaScript code to edit in order to enable them to investigate the attributes that can be changed.

## Suggested learning resources

### **Websites**

W3schools	<a href="http://www.w3schools.com/tags/default.asp">http://www.w3schools.com/tags/default.asp</a>
Codeacademy	<a href="http://www.codecademy.com">http://www.codecademy.com</a>

URN	Y/507/7282
Level	2
GLH	30

### What is this unit about?

The explosion of devices and platforms has meant that both businesses and individuals have even more choice about the software that they can use. It is critical that such software is tested to ensure that they do not cause harm (eg for medical software) or cause any loss of data and finance.

In this unit, learners will develop an understanding of the core principles of software testing. Learners will explore the testing methodologies used to identify various types of software errors that may occur.

Learners will develop an understanding of testing tools and will proactively test software applications using structured documentation and processes.

Learners may be introduced to this unit by asking themselves questions such as

- Why do I need to test software?
- How do I test software?
- What tools exist to help me test software?
- How do I document the testing process?

### Learning outcomes

In this unit, learners will be able to

1. Understand software testing fundamentals
2. Understand testing in the software development life cycle
3. Understand the software testing process

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand software testing fundamentals

#### Topics

- 1.1 Reasons for software testing
- 1.2 Principles of testing
- 1.3 Testing process

##### Topic 1.1

Learners understand the purpose of software testing, including

- To ensure reliable software delivery
- To test user interaction
- To ensure stability eg Bugs, system conflicts
- To ensure compatibility eg Operating systems, hardware, device drivers
- To mitigate causing harm eg to a person, environment or organisation

##### Topic 1.2

Learners understand the principles of software testing, including

- testing shows presence of defects
- exhaustive testing is impossible
- testing should be started as early as possible
- defect clustering – a small number of software modules usually contain most of the defects or is responsible for most of the operational failures
- pesticide paradox - if the same tests are repeated over again, then the same set of test cases will no longer find any new defects
- testing is context dependent
- absence of errors fallacy – testing does not help if the system is unusable and does not meet user needs and expectations

##### Topic 1.3

Learners understand the testing process, including

- test planning and control
- test analysis and design
- test implementation and execution
- evaluating exit criteria and reporting
- test closure activities

## Learning outcome

### 2. Understand testing in the software development lifecycle

#### Topics

- 2.1 Testing in life cycle models

## 2.2 Levels of testing

## 2.3 Test types

### Topic 2.1

Learners will understand how testing forms part of life cycle models, including

- v-model
- iterative

### Topic 2.2

Learners will compare different levels of testing, including

- component testing
- integration testing
- system testing
- acceptance testing
  - alpha/beta testing

### Topic 2.3

Learners will understand the purpose of different test types, including

- functional testing
- non-functional testing
- structural testing
- regression testing
- maintenance testing

## Learning outcome

### 3. Understand the software testing process

#### Topics

#### 3.1 Testing techniques and tools

#### 3.2 Software testing documentation

#### 3.3 Perform tests

### Topic 3.1

Learners will understand the stages of debugging software, including

- start with a problem
- isolate the source of the problem
- fix the problem

Learners know the testing techniques used to test software, including

- black box
  - use case
- white box
- experience-based

Learners will understand the types of tools used for supporting software testing including

- tools that are used directly in software testing
  - test execution

- test data generation
- results comparison
- tools that help in managing the testing process
- monitoring tools

### Topic 3.2

Learners will understand the purpose and structure of documentation used in software testing

- test design specification
  - test plan (consists of inputs, pre-conditions, expected results)
  - test procedure (specifies the sequence of actions to carry out the test)

### Topic 3.3

Learners will be able to test software and produce documentation

- overview of software issues
- test design specification
- results
- any issues that occur (outside of the testing process)

## Guidance for delivery

Whilst this unit is largely theoretical learners should be encouraged to practice these techniques within the scope of the unit. A key element of this is the testing process and learners will have to understand the theory and the practices delivered in this unit to become confident in development environments. Learners should follow good practices when testing software and document their findings throughout the testing process.

Learners should also be exposed to a range of software errors and shown real life examples of the potential consequences of having software that contains errors or bugs. Tutors could prepare resources containing bugs and errors to allow a variety of debugging and testing techniques.

Software development software often includes built-in testing tools. The centre should consider using an industry-standard Integrated Development Environment (IDE) such as Microsoft Visual Studio, Eclipse studio, Atmel studio, XCode, and Android studio SDK.

## Suggested learning resources

### Books

Continuous Delivery Reliable Software Releases Through Build,  
Test and Deployment Automation  
Published by Pearson 27 Jun 2010  
ISBN-10 0321601912, ISBN-13 978-0321601919

Wesley, A

Software Testing An ISTQB-BCS Certified Tester Foundation



Guide 3rd edition  
Published by BCS, 2015  
ISBN-10 1780172990  
ISBN-13 978-1780172996

Samaroo, A & Thompson, G

### **Websites**

Software Testing Fundamentals	<a href="http://softwaretestingfundamentals.com/">http://softwaretestingfundamentals.com/</a>
BBC	<a href="http://www.bbc.co.uk/education/guides/z8n3d2p/revision">www.bbc.co.uk/education/guides/z8n3d2p/revision</a>
Microsoft	<a href="https://msdn.microsoft.com/en-us/library/cc188960.aspx">https://msdn.microsoft.com/en-us/library/cc188960.aspx</a>
All Things Quality	<a href="http://www.allthingsquality.com/p/testing-terms-glossary.html">http://www.allthingsquality.com/p/testing-terms-glossary.html</a>
ISTQB®	<a href="http://software-testing.pl/en/basics-of-software-testing/seven-testing-principles-by-istqb">http://software-testing.pl/en/basics-of-software-testing/seven-testing-principles-by-istqb</a>

URN	D/507/7283
Level	2
GLH	60

### What is this unit about?

The aim of this unit is for learners to have a thorough understanding of the principles of website development. Learners begin by exploring the various components of website architecture, including hardware, software and protocols, before analysing the changing functionality of websites.

Learners are then introduced to a range of technologies used in the development of websites. These include markup and programming languages, API's and database technologies.

Learners will explore design considerations and principles undertaken by commercial website developers. This includes both usability and visual features and the identification of constraints prior to the production of website design document.

Finally learners will gain an understanding of the different standards that apply to website design as well as investigating key legal issues.

Learners may be introduced to this unit by asking themselves questions such as

- What are the key components of website architecture?
- How has the functionality of websites evolved?
- What should I consider when designing websites?
- What languages are used in the development of websites?

### Learning outcomes

In this unit, learners will be able to

1. Understand website architecture and components
2. Understand the technologies used to build and operate websites
3. Understand creative media used on websites
4. Understand the principles of website design

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1 Understand website architecture and components

## Topics

1.1 Hardware and software components

1.2 Internet protocols

1.3 Types of website functionality

#### Topic 1.1

Learners understand the hardware and software components which enable Internet and website functionality.

##### Hardware components

- servers
  - web
  - proxy
  - mail
- routers
- access devices eg smartphones, tablets
- modems
- connections
  - wired
  - wireless

##### Software components

- browsers eg Google chrome, Internet explorer, Firefox, Safari
- web server software eg Apache, Microsoft Internet Information Server (IIS)
- host control panel eg Cpanel
- web authoring software
- client software
  - file transfer
  - email

#### Topic 1.2

Learners understand different protocols in relation to the Internet

- HTTP
- HTTPS
- FTP
- TCP/IP

#### Topic 1.3

Learners understand different website functionality and the changing impact on the user experience

##### Web 1.0

- read only web (static)

- basic shopping cart development
- Web 2.0
- read, write, publish (dynamic) eg blogs, social media
- Web 3.0
- read, write, execute
    - semantic markup
    - web services

## Learning outcome

### 2. Understand the technologies used to build and operate websites

#### Topics

- 2.1 Markup languages
- 2.2 Website programming languages
- 2.3 The role databases play in website development
- 2.4 Content Management Systems (CMS)

#### Topic 2.1

Learners understand the differences between markup languages used to produce websites and their uses

- markup languages
  - HTML eg 4 and 5
  - XHTML
  - XML
- uses
  - static
  - dynamic
  - CMS
  - databases

#### Topic 2.2

Learners understand the role website programming languages play in the development of websites. They will also be able to explain the differences between client side and server side website programming languages.

- client side
  - Javascript
  - Vbscript
  - Python
  - Dart
- server side
  - PHP
  - ASP (.net)
  - JSP
  - Ruby (on rails)

Learners can define the term Application Programming Interface (API) and explain why they are used.

### Topic 2.3

Learners understand the different database scripting languages and their uses in websites, including

- PHP
- ASP
- JSP

Learners can also identify the common languages used in website databases including

- Visual basic
- MySQL

Learners understand the uses of common types of database driven websites

- e-commerce
- e-learning
- social media

### Topic 2.4

Learners will understand the purpose of a CMS and be able to identify the advantages of using a CMS

- easily editable content
- it allows multiple users
- it can improve site maintenance
- design changes are easy to make
- accessibility - site can be updated from any location

## Learning outcome

### 3. Understand creative media used on websites

#### Topics

3.1 Vector and Raster based graphics

3.2 File formats and their characteristics

3.3 Creative media sources

### Topic 3.1

Learners will understand the differences between Vector and Raster based graphics and explain when they would be used

- quality
- scalability
- file size

### Topic 3.2

Learners will understand file formats commonly used on websites and be able to describe their characteristics

- images
  - .bmp
  - .jpeg
  - .png
  - .webp
  - .wmf

- audio
  - .mp3
  - .ogg
- video
  - .mp4
  - .flv
  - .mxf

### Topic 3.3

Learners will be able to identify sources of creative media for use on websites

- users own material
- stock photos and audio
- videos from video sharing websites
- web templates

## Learning outcome

### 4 Understand the principles of website design

#### Topics

- 4.1 Design factors affecting website usability
- 4.2 Visual appeal considerations
- 4.3 Design constraints
- 4.4 The website design document

#### Topic 4.1

Learners understand the factors that affect website usability, including

- accessibility (computer, smartphone, tablet)
- reliability
- accuracy
- speed
- security
  - data
  - payments
- languages
- functionality
  - search
  - links
  - navigation and structure

#### Topic 4.2

Learners will understand the importance of creating visual appealing websites in order to engage site visitors

- page layout
- colour scheme
- font
  - size
  - type
- images and graphics
- animation
- sound / videos

- branding

### Topic 4.3

Learners understand common design constraints in the development of websites

- physical constraints eg object can't be fixed into one place on the screen unlike printed documents, pop up boxes
- psychological constraints eg through the use of symbols (text, icons, sounds), conventions, mapping

### Topic 4.4

Learners will understand the content that should be included in a website design document and its importance when planning the website

- statement of purpose
- content outline
- experiential flowchart
- interface mockups/storyboards
- media inventory
- legislation
  - EU Cookie law
- standards
  - W3C
- implementation
- summary

Learners will be able to produce a website design document and provide justification for their selection criteria.

## Guidance for delivery

The majority of content in this unit is theoretical and its aim is to give learners a firm grounding in website design principles. The knowledge gained from this unit will feed directly into the following unit Design and Create Websites.

The learners should be exposed to a number of content management systems and explore their characteristics. These could include systems such as Wordpress, Joomla and Moodle

## Suggested Learning Resources

### Books

CSS secrets Better solutions to everyday web design problems  
Published by O'Reilly Media, 2015  
ISBN 10-1449372635  
ISBN 13-9781449372637

Verou, L

Web Design All-in-One for Dummies

Jenkins, S

Published by John Wiley and Sons, 2013

ISBN 10-1118404106

ISBN 13-9781118404102

### **Websites**

Blog Basics	<a href="http://blogbasics.com/what-is-a-blog/">http://blogbasics.com/what-is-a-blog/</a>
Digital Law	<a href="http://www.digitallawuk.com">http://www.digitallawuk.com</a>
Webeden	<a href="http://www.webeden.co.uk/blog/creative-ideas/web-design/web-design-essentials-constraints/">http://www.webeden.co.uk/blog/creative-ideas/web-design/web-design-essentials-constraints/</a>
Tutsplus	<a href="http://code.tutsplus.com/articles/top-10-most-usable-content-management-systems--net-6493">http://code.tutsplus.com/articles/top-10-most-usable-content-management-systems--net-6493</a>
Theme forest	<a href="http://www.themeforest.net">http://www.themeforest.net</a>



URN	H/507/7284
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners to investigate what is meant by the term social media and understand common social media channels.

Learners will be able to describe personal and business uses of social media and investigate the risks and implications of their use. Finally, learners will explore the ethical implications associated with using social media and understand what a digital footprint is.

Learners may be introduced to this unit by asking themselves questions such as

- What can social media be used for?
- What are the risks of using social media?
- How do businesses use social media?
- What is a digital footprint and how can I improve mine?

### Learning outcomes

In this unit, learners will be able to

1. Understand social media
2. Understand business use of social media
3. Understand implications of using social media

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand social media

## Topics

### 1.1 Social media channels

### 1.2 Uses of social media

#### Topic 1.1

Learners understand the advantages and disadvantages of using different social media channels

- social networks
- bookmarking sites
- social news
- media sharing
- micro blogging
- messaging
- forums

#### Topic 1.2

Learners understand how social media channels are used by individuals and organisations

- individuals
  - meeting new people
  - keeping in touch
  - sharing interests
  - sharing media
  - commenting on products and services
- organisations
  - networking
  - marketing
  - engaging with customers/potential customers to increase business presence

## Learning outcome

### 2. Understand business use of social media

## Topics

### 2.1 Social media content for business

### 2.2 Analyse content

#### Topic 2.1

Learners understand the information that should be included in a content plan for businesses developing/using social media channels, including

- aims and objectives
- target audience

- financial resources
- type of content to be included
- content linking to business products
- publishing timescales
- social media channel to be used
- timeframe
- legal/ethical constraints
- original/curated content

Learners must understand considerations to take into account when creating social media content for businesses, including

- content plan
- human resources/skills available in the business
- technical constraints
- accessibility
- type of media to be used

### Topic 2.2

Learners understand the tools required to analyse the content on business social media channels.

Learners will use tools to analyse the content of business social media channels and they will produce a report outlining their findings, including

- effectiveness of the content that is being posted
- current/emerging trends
- linked content eg links from other sites
- types of content eg media
- content linked to seasonal events

## Learning outcome

### 3. Understand implications of using social media

#### Topics

- 3.1 Risks associated with social media
- 3.2 Consequences of inappropriate use of social media
- 3.3 Ethical Implications of social media

### Topic 3.1

Learners understand the risks associated with using social media channels

- grooming
- fraud
- harassment eg trolling
- cyber bullying
- phishing
- sexting
- inability to retract information posted online
- identity theft

Learners understand methods used to maintain a positive digital footprint

- accuracy of content
- maintain own privacy eg site settings
- maintain a positive image eg use of appropriate language, behaviour and images
- review footprint and take corrective action if required ie request inappropriate posts to be removed

### **Topic 3.2**

Learners understand the consequences of inappropriate use of social media

- imprisonment
- fine
- cautions
- inclusion on sex offender registers
- job loss
- loss of reputation
- removed from social media sites

### **Topic 3.3**

Learners can describe the ethical implications of using social media, including

- misuse of work time
- misuse of business resources
- disclosure of confidential/non-public information
- harassment
- endorsements without prior approval
- maintaining privacy of others

## **Guidance for delivery**

In topic 3.1 learners are introduced to the term Digital Footprint and should understand both the importance of and how to maintain a positive Digital Footprint. They could be encouraged to search their own Digital Footprint and analyse the impact that this information could have on their personal standing in the future eg entrance to higher education and potential employers.

## **Suggested Learning Resources**

### ***Books***

Social media marketing all-in-one for dummies

Zimmerman, J & Ng, D

Published by John Wiley and sons, 2015

ISBN-10 1118951352

ISBN-13 9781118951354

### ***Websites***

BBC Future <http://www.bbc.com/future/tags/socialmedia>

CEOP Centre [https://www.thinkuknow.co.uk/11\\_13/Need-advice/Ready-for-social-networking/](https://www.thinkuknow.co.uk/11_13/Need-advice/Ready-for-social-networking/)

URN	M/507/7286
Level	2
GLH	60

### What is this unit about?

This unit brings together the theoretical elements from across the pathway to enable learners to design and create fully functioning websites.

Learners will begin by exploring different types of websites and analysing how they work, appear and function.

Learners will develop a range of design techniques that allow them to plan the layout of websites.

Learners will then implement designs using appropriate techniques before uploading the websites. Finally learners will implement a testing plan and review the performance of the website.

Learners may be introduced to this unit by asking themselves questions such as

- How are professional websites designed and created?
- How can I enhance a website?
- How do I add user functionality to a website site?
- How do I review the performance of a website?

### Learning outcomes

In this unit, learners will be able to

1. Understand the content of websites
2. Design Websites
3. Create websites
4. Test and evaluate websites

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand the content of websites

## Topics

#### 1.1 Functions of websites

#### 1.2 Factors to consider when designing websites

##### Topic 1.1

Learners will understand the functions of different types of website

- e-commerce
- information only websites
- social media
- government websites

##### Topic 1.2

Learners will understand the factors to be considered when developing websites for different purposes.

- E-commerce website
- conducting transactions eg credit card, escrow
- providing access to promotions eg discounts, special offers
- gathering information on site users eg cookies, sign up forms, newsletters
- ease of navigation for users

##### Information websites

- ease of navigation for users
- reliability of information
- currency of information

##### Social media websites

- target audience
- links to existing social networks
- site user profiles eg cookies, sign up forms, newsletters
- engagement with users eg blogs, images, posts
- ease of navigation for users

## Learning outcome

### 2. Design Websites

## Topics

### 2.1 Keywords

### 2.2 Design websites

#### Topic 2.1

Learners will understand the impact search engine optimisation and the use of keywords has on website design, including

- what keywords and why they are important
- how keywords are used by search engines

Learners can define keywords associated with the content of a website, including

- define keywords for specific content/websites
- use keywords to inform decisions on page content

#### Topic 2.2

Learners will be to use a range of website design tools to create graphical representations of websites, including

- storyboards
- digital mashup / mood boards
- site map/structure

## Learning outcome

### 3. Create websites

## Topics

### 3.1 HTML5 and CSS

### 3.2 Website enhancement

### 3.3 Website hosting

#### Topic 3.1

Learners will understand the tools used to write and edit HTML code

- text based editors
- WYSIWYGs
- web authoring software

Learners are able to create webpages using HTML 5 and CSS, including HTML 5

- headings
  - colours
- fonts
  - type
  - weight
  - colour
- alignment
- hyperlinks



- audio
- images
- video
- canvas
- page formatting
  - colour
  - images

## CSS

- selectors
  - element selector
  - id selector
  - class selector
- attributes
  - background colour and images
  - font colour (using hexadecimal and RGB)
  - font-family
  - font-size
  - font-style
  - padding
  - margin
  - block and inline
  - float
  - clear
  - relative
  - left
  - top

### Topic 3.2

Learners are able to improve website appearance and functionality by applying website enhancement techniques, including

- user input
  - forms
- simple client side scripts using javascript

### Topic 3.3

Learners are able to choose a website hosting service for the webpages that have been created taking into consideration

- type of site eg ecommerce, personal
- costs
- user interaction eg databases
- storage
- traffic expectations

## Learning outcome

### 4 Test and evaluate websites

## Topics

#### 4.1 Test websites

#### 4.2 Evaluate websites

##### **Topic 4.1**

Learners understand the importance of undertaking thorough testing on websites.

They will create and implement test plans on websites and record the findings, including

- links and navigation
- content
- expected outcomes
- browser interpretation including cross platform compatibility

##### **Topic 4.2**

Learners will evaluate the tools and techniques selected, the finished product and recommend ways in which they can be enhanced

- design
- meeting user requirements
- fitness for purpose eg keywords, usability, navigation, images, content
- what could have been done differently?

### **Guidance for delivery**

This unit will provide learners with an understanding of how websites are designed. They should be encouraged to explore the design and layout of different websites. This would best be delivered by visiting case study examples, both good and bad of existing websites.

Learners will design and create websites using appropriate industry standard techniques. Scenario based case studies should be used to allow simulation of real clients. Centres could encourage links with local employers, charities, other organisations in order to gain experience of designing websites. In learning outcome 3 is learners will implement their design using appropriate techniques. When creating websites learners may use any tools available within the centre including web authoring packages such as Dreamweaver. Centres should ensure that learners are able to upload their completed websites to an external site.

Learners should be able to devise a test plan to ensure the website functions as planned. The information gathered should be used as the basis for the evaluation of the website.

### **Suggested Learning Resources**

#### ***Books***

PHP, MySQL, JavaScript and HTML5 All-in-one For Dummies    Suhring, S, Valade J  
Published by John Wiley and Sons, 2013  
ISBN 111821370X

ISBN 9781118213704

### **Websites**

Angel Fire	<a href="http://www.angelfire.com/super/badwebs">www.angelfire.com/super/badwebs</a>
HTML5 Tutorial	<a href="http://www.html-5-tutorial.com">www.html-5-tutorial.com</a>
Code academy	<a href="http://www.codeacademy.com">http://www.codeacademy.com</a>
W3schools	<a href="http://www.w3schools.com/tags/default.asp">http://www.w3schools.com/tags/default.asp</a>

URN	F/507/7289
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners to develop an understanding of the hosting options available for websites and the metrics used to measure the interaction with websites. The learner will explore the various features of web hosting packages and their uses.

The learner will explore different metrics that are used by analytical tools to gather information on search engine optimisation. The information gathered could be used to inform the optimisation of a website to improve its ranking.

Learners will investigate different methods and platforms that can be used to promote interaction with a website using the various tools and techniques available.

The learner may be introduced to this unit by asking themselves questions such as

- What is a domain name?
- How do I know which web hosting company to use?
- What tools are available to analyse websites?
- How are meta tags used?
- How can I promote a website?

### Learning outcomes

In this unit, learners will be able to

1. Understand web hosting
2. Understand search engine optimisation processes
3. Understand website analytics processes
4. Understand website promotion methods

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand web hosting

## Topics

- 1.1 Differences between web hosting and internet service provider
- 1.2 Use of domain names
- 1.3 Considerations when selecting a web hosting service

### Topic 1.1

Learners understand the role of and the differences between an internet service provider and a web hosting service

### Topic 1.2

Learners will understand the considerations when selecting domain names, their structure and where to purchase and register them.

Selection considerations

- brandable domain name eg one that represents a brand
- discoverable domain name eg one that contains business keywords

Structure

- prefix
- subdomain
- name
- extension eg .com .co .uk .org

### Topic 1.3

Learners will understand the features that influence the selection of a web hosting service, including

- storage capacity eg 10GB
- bandwidth eg unlimited
- database interaction eg MySQL
- database size limitations eg 500MB
- secure interactions eg Secure Sockets Layer (SSL)
- backup and restore options
- email mailboxes
- location of web server eg UK based
- support eg 24 hour helpline or email support
- web authoring software

Learners will be able to select web hosting services to meet the requirements of different users eg sports club, local community, personal site.

## Learning outcome

### 2. Understand search engine optimisation processes

#### Topics

##### 2.1 Search engine optimisation

##### 2.2 Keywords and meta tags

##### 2.3 Crawlers and Robots.txt

##### 2.4 Search engine algorithms

#### Topic 2.1

Learners will understand the key aspects of search engine optimisation, including

- user considerations
  - user experience eg is the website easy to navigate?
  - content eg is the content original?
  - responsiveness eg does the website resize for mobile users?
  - performance eg website load times and speed
  - click throughs
- technical considerations
  - blog
  - internal links
  - backlinks
  - sitemaps
- search results
  - organic
  - sponsored

#### Topics 2.2

Learners will understand how keywords, tags and meta tags are used, including

- keywords
  - why keywords are important
  - keyword research eg keyword planner tool
  - keyword size
- tags
  - title tags
  - alt tags
  - heading tags eg H1, H2, H3
- meta tags
  - description
  - author
  - keywords

#### Topics 2.3

Learners will understand where web crawlers and robots.txt would be utilized.

#### Topics 2.4

Learners will understand ways in which search engines use algorithms to rank websites

- rules eg use of accessibility features, compatibility with mobile devices, currency of site, number of visits, content relevance
- page ranking

- indexing eg search results

## Learning outcome

### 3. Understand website analytics processes

#### Topics

- 3.1 Benefits of analysing a website
- 3.2 Methods of analysing a website

##### Topic 3.1

Learners will understand the benefits of analysing a website, including

- identifying issues with websites eg 404 errors, broken links
- identifying the audience
- bandwidth utilisation
- to maximise advertising campaigns eg referrals from other sites

Learners will understand the metrics used to gather information on interactions with websites, including

- location of visitor
- time spent on website
- entry method eg link from a social media website
- bounce rate
- exit page
- browser used eg internet explorer
- keywords used eg if a user accesses the website via a search engine
- traffic sources
- real time viewers
- 404 errors
- broken links

##### Topic 3.2

Learners will know the different methods used to analyse websites, including

- software eg analytical tools
- visual checks
- physical link checks

Learners will be able to use analytical tools to gather information on websites and summarise the findings

## Learning outcome

### 4. Understand website promotion methods

#### Topics

- 4.1 Using sponsored adverts
- 4.2 Methods of promotion

#### Topic 4.1

Learners will understand different elements used in sponsored advertising to promote websites, including

- pay per click
- ad types
- ad structure eg description, destination URL
- campaigns
- bid settings
- ad targeting
- sitelinks

#### Topic 4.2

Learners will understand the methods of website promotion, including

- social media
- blogs
- video blogs
- podcasting
- backlinks
- email marketing

### Guidance for delivery

Learners should research web hosting packages. They should be able to consolidate their understanding of this by comparing a number of providers and the services they provide, making recommendations for a hosting package to meet specified requirements.

Learners should be encouraged to analyse existing websites search performance and examine how keywords relate to searches for their local area. For example "Restaurants in London". This will allow learners to develop an understanding of real life contexts for search engine optimisation. Learners should be made aware of the benefits in relation to search engine optimisation, for example the percentage increase year on year for online sales. A business could have an excellent website but without search engine optimisation no one can find the website online.

Learners should be encouraged to investigate emerging analytical tools and algorithms (eg Google webmasters blog) to allow them to establish trends.

Tutors should be aware of the various search engines that are used and provide an overview of each one. These could include Google, Bing and Yahoo.

Learners should be able to perform searches using a range of engines and document results based on keywords used. Learners should be encouraged to research the different methods of website promotion that exist and the context of when to use each type.

It would be beneficial to teach this unit alongside *the design and create a website* unit as it highlights factors that should be taken into account when developing and managing a website in order to reinforce the concepts being taught.



## Suggested learning resources

### **Books**

- How to Get to the Top of Google The Plain English Guide to Seo Kitchen, T  
Published by CreateSpace Independent Publishing Platform, 2013  
ISBN-10 1483952622  
ISBN-13 978-1483952628
- SEO 2015 & Beyond Search engine optimization will never be the same again! Dr Williams, A  
Published by CreateSpace Independent Publishing Platform, 4<sup>th</sup> edition, 2014  
ISBN-10 1505432723  
ISBN-13 978-1505432725

### **Websites**

- |                |   |
|----------------|---|
| Google         | <a href="https://adwords.google.com/KeywordPlanner">https://adwords.google.com/KeywordPlanner</a><br><a href="http://googlewebmastercentral.blogspot.co.uk/">http://googlewebmastercentral.blogspot.co.uk/</a><br><a href="http://www.google.com/analytics">http://www.google.com/analytics</a> |
| Hosting advice | <a href="http://www.hostingadvice.com/the-basics">http://www.hostingadvice.com/the-basics</a>   |
| 123-Reg        | <a href="https://www.123-reg.co.uk">https://www.123-reg.co.uk</a>   |
| Fasthosts      | <a href="https://www.fasthosts.co.uk">https://www.fasthosts.co.uk</a>   |
| Woorank        | <a href="https://www.woorank.com">https://www.woorank.com</a>   |

URN	T/507/7290
Level	2
GLH	30

### What is this unit about?

The purpose of this unit is for learners to develop an understanding of how to test a website and provide support to customers. Learners will explore the testing methodologies used and be able to identify any website errors that may occur.

Learners will develop an understanding of how to gather customer feedback on websites and methodologies for providing customer support.

The learner may be introduced to this unit by asking themselves questions such as

- Why would I test a website?
- What does an error code mean?
- What do I need to consider when testing a website?
- How can I obtain customer feedback?
- How can I keep customers informed?

### Learning outcomes

In this unit, learners will be able to

1. Understand website testing methodologies
2. Understand website errors
3. Understand how to provide customer support

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

### 1. Understand website testing methodologies

## Topics

#### 1.1 Reasons for testing a website

#### 1.2 Testing a website

##### Topic 1.1

Learners will know the reasons for testing a website, including to

- identify and reduce errors
- ensure customer satisfaction
- ensure standards are met eg w3c (accessibility, navigation)
- gain feedback from visitors eg to improve user experience

##### Topic 1.2

Learners will understand the elements that should be investigated when testing a website, including

- functionality testing
  - Link
  - HTML
  - CSS
- usability testing
  - navigation eg buttons, boxes
  - content eg accuracy, currency, relevancy
- interface testing
  - web server configuration eg checking all errors codes are displayed
- compatibility testing
  - web browser
  - cross platform compatibility
  - accessibility eg use of alt tags
  - mobile
- performance testing eg page loading times
- security testing
  - admin only areas
  - password protected areas eg user logins
  - CAPTCHA

Learners will be able to carry out an audit of a website to ensure that it complies with W3C, accessibility and navigation standards.

## Learning outcome

### 2. Understand website errors

## Topics

## 2.1 Error codes

## 2.2 Using error pages

### Topic 2.1

Learners will understand the meaning of common error codes that are displayed if a website is not functioning as expected and be able interpret them, including

- information messages eg 101
- successful messages eg 201
- redirection messages eg 301
- client error messages eg 401
- server error messages eg 501

### Topic 2.2

Learners will understand the reasons for using custom error pages when designing a website

- users perspective
  - easy to understand error
  - non-technical jargon
- technical perspective
  - precise details of error
  - error source

## Learning outcome

### 3. Understand how to provide customer support

## Topics

### 3.1 Methods of gathering customer feedback

### 3.2 Methods of providing support

### Topic 3.1

The learner will know the methods of gathering customer feedback, including

- website analytic reports
  - page views
  - unique visits
- surveys
  - online website survey
  - offline email survey
  - online conference calls
- support records from
  - contact forms
  - live chat feedback
- social media eg mentions on Facebook or Twitter

### Topic 3.2

Learners will understand methods of providing customer support, including

- face to face
  - active listening
  - barriers to listening
- telephone

- email
  - importance of using targeted questions
  - importance of providing user friendly support
- support software eg support tickets/records

## Guidance for delivery

Learners should be encouraged to audit existing websites for compliance with standards to enable them to consolidate their theoretical knowledge using the considerations in topic 1.2.

Tutors could provide examples of websites that comply with standards, as well as those that are non-compliant in order to enable learners to make comparisons.

Tutors should make learners aware of the ways in which human computer interactions occur within websites and the considerations that must be made. Learners should also be aware of the potential impact of cross platform compatibility.

Learners should be given examples of error codes likely to be encountered when interacting with websites and they are expected to be able to interpret them. It would be useful to involve members of the helpdesk team when teaching this subject area. Learners could be encouraged to interact with the team in order to gain information on types of error codes, which ones have been encountered and the steps taken to resolve the issues.

Learners should be introduced to example methods of gathering feedback such as a live working contact form or an electronic survey again this area may be supported by the local helpdesk team.

## Suggested learning resources

### **Books**

Software Testing A Guide to Testing Mobile Apps, Websites, and Games      Garzone, M  
 Published by Createspace, 2014  
 ISBN-10 1503046796  
 ISBN-13 9781503046795

### **Websites**

Software testing help    <http://www.softwaretestinghelp.com/web-application-testing>  
 W3schools                [http://www.w3schools.com/tags/ref\\_httpmessages.asp](http://www.w3schools.com/tags/ref_httpmessages.asp)  
 Winthecustomer        <http://winthecustomer.com/crucial-customer-service-skills-digital-age/>

## Appendix 1      Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on [www.cityandguilds.com](http://www.cityandguilds.com).

### City & Guilds Centre Manual

This document provides guidance for organisations wishing to become City & Guilds approved centres, as well as information for approved centres delivering City & Guilds qualifications. It covers the centre and qualification approval process as well as providing guidance on delivery, assessment and quality assurance for approved centres.

It also details the City & Guilds requirements for ongoing centre and qualification approval, and provides examples of best practice for centres. Specifically, the document includes sections on

- the centre and qualification approval process
- assessment, internal quality assurance and examination roles at the centre
- registration and certification of candidates
- non-compliance and malpractice
- complaints and appeals
- equal opportunities
- data protection
- management systems
- maintaining records
- internal quality assurance
- external quality assurance.

### Our Quality Assurance Requirements

This document explains the requirements for the delivery, assessment and awarding of our qualifications. All centres working with City & Guilds must adopt and implement these requirements across all of their qualification provision. Specifically, this document

- specifies the quality assurance and control requirements that apply to all centres
- sets out the basis for securing high standards, for all our qualifications and/or assessments
- details the impact on centres of non-compliance

Our Quality Assurance Requirements document encompasses the relevant regulatory requirements of the following documents, which apply to centres working with City & Guilds

- Ofqual's General Conditions of Recognition

The **centre homepage** section of the City & Guilds website also contains useful information on

- **Walled Garden** how to register and certificate candidates on line
- **Events** dates and information on the latest Centre events
- **Online assessment** how to register for e-assessments.

## Useful contacts

<b>UK learners</b> General qualification information	<b>E learnersupport@cityandguilds.com</b>
<b>International learners</b> General qualification information	<b>E intcg@cityandguilds.com</b>
<b>Centres</b> Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	<b>E centresupport@cityandguilds.com</b>
<b>Single subject qualifications</b> Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	<b>E singlesubjects@cityandguilds.com</b>
<b>International awards</b> Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	<b>E intops@cityandguilds.com</b>
<b>Walled Garden</b> Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	<b>E walledgarden@cityandguilds.com</b>
<b>Employer</b> Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	<b>T +44 (0)121 503 8993</b> <b>E business@cityandguilds.com</b>

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If you have a complaint, or any suggestions for improvement about any of the services that we provide, email **feedbackandcomplaints@cityandguilds.com**

## About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

## City & Guilds Group

The City & Guilds Group operates from three major hubs London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Licence to Practice (land-based qualifications) and Learning Assistant (an online e-portfolio).

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## City & Guilds

1 Giltspur Street

London EC1A 9DD

[www.cityandguilds.com](http://www.cityandguilds.com)

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