

Level 3 Award in Coding and Logic (9628-09)

Version (3.0) April 2018

Qualification Handbook

Qualification at a glance

Industry area	IT Professional
City & Guilds number	9628
Age group	16+
Assessment	Online multiple choice test
Approvals	Approval application required. Please see www.cityandguilds.com for details.
Registration and certification	Registration and certification of this qualification is through the Walled Garden, and is subject to end dates.

Title and level	GLH	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Award in Coding and Logic	18	50	9628-09	603/0622/1

Version and date	Change detail	Section
2.0 September 2017	Test specification updated	4 Assessment
3.0 April 2018	Test specification updated	4 Assessment

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1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	This qualification is designed to support learners to develop a full range of underpinning knowledge that can be used in a variety of businesses and industries that demonstrate confidence and transferability in a Digital Technology Environment.
What does the qualification cover?	The primary role of an Infrastructure Technician is to provide support to internal and external customers, helping them to be productive when using technology to do their own jobs, by using tools to problem solve and troubleshoot non-routine problems. This qualification covers the features of a variety of coding and logic in order to provide support to users, improve productivity and to trouble shoot problems relating to infrastructure.
What opportunities for progression are there?	<p>This qualification is part of the Digital Industries Apprenticeship programme and is not offered as a standalone product.</p> <p>On achieving this qualification the learner will have completed a section of the knowledge element as part of their apprenticeship journey.</p>
Who did we develop the qualification with?	It was developed in collaboration with employers, sector experts and training providers using the Standard as the baseline. The Standards have been created by The Tech Partnership and their Employer Groups for the specific areas. The qualification embodies the required learning for an apprentice to have the opportunity to successfully gain the relevant knowledge for their chosen career path in a Digital Technology environment.
Is it part of an apprenticeship framework or initiative?	Yes – 9648 Infrastructure Technician

Structure

Learners must complete the single unit 309 to gain this qualification.

Total Qualification Time

Total Qualification Time (TQT) is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected for a learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification.

TQT is comprised of the following two elements:

- The number of hours which an awarding organisation has assigned to a qualification for Guided Learning, and
- an estimate of the number of hours a Learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by - but, unlike Guided Learning, not under the Immediate Guidance or Supervision of - a lecturer, supervisor, tutor or other, appropriate provider of education or training.

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2 Centre requirements

Approval

Fast Track Approval is offered to existing City & Guilds Centres offering the SASE framework for the Apprenticeship, Advanced Apprenticeship and/or Higher Apprenticeship for IT, Software, Web and Telecoms through City & Guilds. See the separate document on our website that provides details of the Fast Track Process and actions to be taken. Please note the Fast Track form will list the Apprenticeship package under 9648 which relates to the Apprenticeship Standards. The form will automatically approve centres to this qualification and the other knowledge qualifications that sit in the Apprenticeship Standard.

City & Guilds is offering the opportunity for existing City & Guilds centres delivering SASE framework for the Advanced and/or Higher Level Apprenticeship for IT, Software, Web and Telecoms with other Awarding Organisations to gain approval for these Apprenticeship Standards through the Common Approval Framework. See the separate document at www.cityandguilds.com which provides details of the New Programme Process and actions to be taken.

Centres that are not currently with City & Guilds will need to complete a Customer Application Form for the parent package 9648-03 and once accepted they will be asked to complete the Centre Approval Process. Please note that approval to the 9648 package will automatically approve you to this qualification and the other knowledge qualifications in this package - centres will not need to register onto the individual knowledge qualifications and therefore do not need direct approval. See the separate document on our website that provides details of the New Centre Approval Process and actions to be taken.

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

Resource requirements

Resources

Please see the individual unit information for any resources required.

Centre staffing

Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the areas for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

While the Assessor/Verifier (A/V) units/TAQA are valued as qualifications for centre staff, they are not currently a requirement for these qualifications. However, City & Guilds encourage trainers and assessors to qualify to the current TAQA standard. Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Continuing Professional Development (CPD)

Centres are expected to support their staff in ensuring that their knowledge and/or practice remains current. This includes currency within the occupational area and of best practice in delivery, mentoring, training, assessment and quality assurance. It should also take account of any national, international policy and legislative developments.

Internal quality assurance is key to ensuring that the assessment of evidence for units is of consistent and appropriate quality. They should:

- be occupationally competent or technically knowledgeable in the area for which they are internally quality assuring
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training
- have a CV available demonstrating relevant experience and any qualifications held.

In certain circumstances, City & Guilds will recognise non-accredited learning and experience as equivalent as follows:

- If the Internal Quality Assurer does not hold a qualification they must be able to demonstrate evidence of working to their own organisation's internal quality assurance standards which clearly link to V1/TAQA or other equivalent standards for internal quality assurance.

Learner entry requirements

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that learners have the potential and opportunity to gain the qualifications successfully and that they have the full engagement of the employers for the full programme.

Age restrictions

City & Guilds cannot accept any registrations for learners under 16 as these qualifications are not approved for learners under 16.

3 Delivering the qualification

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 qualifications
- any units they have already completed, or credit they have accumulated which is relevant to the qualifications
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the learner fully understands 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.

Recording documents

Learners and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds endorses several ePortfolio systems, including our own, Learning Assistant, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: www.cityandguilds.com/eportfolios.

City & Guilds has developed a set of *Recording forms* including examples of completed forms, for new and existing centres to use as appropriate. Recording forms are available on the City & Guilds website.

Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by learners and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.

4 Assessment

Summary of assessment methods

Candidates must:

- successfully complete one assessment for the mandatory unit

Assessment Types

Unit	Title	Assessment method	Where to obtain assessment materials
309	Coding and Logic	Multiple Choice questions – online evolve test.	www.cityandguilds.com

Assessment strategy

Test Specifications

The way the knowledge is covered by each test is laid out in the table below:

Assessment type: Multiple-choice online test

Assessment conditions: Invigilated examination conditions

Number of questions: 20

Pass mark: 13/20 (65%)

Grading: Pass/Fail

Outcome	Topic	No of items
1. Understand the features and applications of a range of coding and logic used in support roles	The learner will be able to describe scripting at the command line when supporting server administration. <ul style="list-style-type: none"> Unix Shell (e.g. Bash) PowerShell Batch scripting 	6
	The learner will be able to recognise the features and benefits of the following language types <ul style="list-style-type: none"> low level (e.g. assembler, machine code) high level <ul style="list-style-type: none"> procedural (e.g. scripting, SQL, Visual Basic) object orientated (e.g. Java, C#) event driven 	2
	The learner will be able to describe the functions of each stage of application lifecycle management (ALM) <ul style="list-style-type: none"> application development phases <ul style="list-style-type: none"> requirements design build service management phases <ul style="list-style-type: none"> deploy 	2

	<ul style="list-style-type: none"> o operate o optimise • application management 	
	<p>The learner will be able to recognise the practical applications of:</p> <ul style="list-style-type: none"> • algorithms • flow of control <ul style="list-style-type: none"> o branching o looping o iteration • data structures <ul style="list-style-type: none"> o high level (e.g. objects, arrays) o strings o integers o floating point 	4
	<p>The learner will be able to recognise the fundamental elements of website development, including commonly used language frameworks.</p> <ul style="list-style-type: none"> • Environment <ul style="list-style-type: none"> o Web server o Web browser o Database o Other (e.g. identity store, document store) • Development tools/options <ul style="list-style-type: none"> o Coding web pages using text files o Content management systems (e.g. WordPress, Joomla and Drupal) • Web page elements <ul style="list-style-type: none"> o CSS o HTML/XML o Scripting (e.g. PHP, JavaScript, jQuery, node.js, Ruby) • Security <ul style="list-style-type: none"> o Secure data transit (HTTPS/SSL) o Authentication and authorisation o Certificates 	6
	Total	20

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience, or qualifications which have already been achieved, to contribute to a new qualification.

For this qualification, RPL is not allowed.

5 Administration

Quality assurance

Internal quality assurance

Registered centres must have effective quality assurance systems to ensure optimum delivery and assessment of qualifications. Quality assurance includes initial centre registration by City & Guilds and the centre's own internal procedures for monitoring quality. Centres are responsible for internal quality assurance and City & Guilds is responsible for external quality assurance.

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 must have appropriate teaching and vocational knowledge and expertise.

Access arrangements

We can make arrangements so that learners with disabilities, special educational needs and temporary injuries can access the assessment. These arrangements must be made before the examination. For example, we can produce a Braille paper for a learner with visual impairment.

Language of examinations

We will provide this specification in English only.

Other issues

European Dimension

City & Guilds has taken account of the 1988 Resolution of the Council of the European Community in preparing this specification and associated specimen units.

Environmental Education

City & Guilds has taken account of the 1988 Resolution of the Council of the European Community and the Report Environmental Responsibility: An Agenda for Further and Higher Education 1993 in preparing this specification and associated specimen units.

Avoidance of bias

City & Guilds has taken great care in the preparation of this specification and specimen units to avoid bias of any kind.

6 Units

Availability of units

The unit information can be found in this document.

Structure of the units

These units each have the following:

- City & Guilds reference number
- Title
- Level
- Guided learning hours (GLH)
- Learning outcomes, which are comprised of a number of topics

Centres must deliver the full breadth of the range. Specialist equipment or commodities may not be available to all centres, so centres should ensure that their delivery covers their use.

Unit 309 Coding and Logic

LEVEL:	3
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GLH:	18
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What is this unit about?

This unit provides learners with the knowledge to recognise the features of a variety of coding and logic in order to provide support to users, improve productivity and to trouble shoot problems relating to infrastructure.

The primary role of an Infrastructure Technician is to provide support to internal and external customers, helping them to be productive when using technology to do their own jobs, by using tools to problem solve and troubleshoot non-routine. The Infrastructure Technician sets people up on systems and provides support when they need it, rectifying issues to maintain the organisations productivity.

Upon completion, learners studying this unit will have gained the knowledge to support the competencies of an Infrastructure Technician. Specific competencies supported by this unit include being able to undertake the following tasks:

- Read error logs to help in rectifying system and process failures.
- Utilise command line scripting to support server administration tasks.
- Discuss how each stage of the application lifecycle management process can impact business systems.
- Discuss how the software certificate system can potentially impact on business use of software 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 outcomes

In this unit, learners will be able to

- 1 Understand the features and applications of a range of coding and logic used in support roles and applications of a range of coding and logic used in support roles
-

Topics

- 1.1 Command line scripting
- 1.2 Coding and language
- 1.3 Application lifecycle management
- 1.4 Algorithms and data structures
- 1.5 Web page development

Depth

In this learning outcome the learner will explore the fundamental similarities and differences between a range of coding and logic to include a brief overview of how different versions developed.

Topic 1.1

The learner will be able to describe scripting at the command line when supporting server administration.

- Unix Shell (e.g. Bash)
- PowerShell
- Batch scripting

Topic 1.2

The learner will be able to recognise the features and benefits of the following language types

- low level (e.g. assembler, machine code)
- high level
 - o procedural (e.g. scripting, SQL, Visual Basic)
 - o object orientated (e.g. Java, C#)
 - o event driven

Topic 1.3

The learner will be able to describe the functions of each stage of application lifecycle management (ALM)

- application development phases
 - requirements
 - design
 - build
- service management phases
 - deploy
 - operate
 - optimise
- application management

Topic 1.4

The learner will be able to recognise the practical applications of:

- algorithms
- flow of control
 - branching
 - looping
 - iteration
- data structures
 - high level (e.g. objects, arrays)
 - strings
 - integers
 - floating point

Topic 1.5

The learner will be able to recognise the fundamental elements of website development, including commonly used language frameworks.

- Environment
 - Web server
 - Web browser
 - Database
 - Other (e.g. identity store, document store)
- Development tools/options
 - Coding web pages using text files
 - Content management systems (e.g. WordPress, Joomla and Drupal)
- Web page elements
 - CSS
 - HTML/XML
 - Scripting (e.g. PHP, JavaScript, jQuery, node.js, Ruby)

- Security
 - o Secure data transit (HTTPS/SSL)
 - o Authentication and authorisation
 - o Certificates

Guidance for delivery

Actual development of code is not required for achievement of this unit, however it may enhance and embed the knowledge that is required for unit achievement.

Learners are only expected to recognise languages that are explicitly stated in the unit. Other languages that may be required by their organisation or employer can be included in the learning but will not be assessed.

This unit can be taught either within or outside of the workplace or organisation as appropriate, providing the learner with paper based, or hands on practical exercises and case studies representative of the Infrastructure Technician competencies in operation.

Learners should be encouraged to explore and use as wide a range of hardware and software as possible, this should also include researching and utilising new and emerging technologies where available.

Equipment

Below is an indicative list, not an exhaustive list.

Desktop Virtualisation Software

- Oracle VirtualBox
- VMWare Player
- Hyper-V on Windows 8.1 Pro or Higher

ISO/binaries of Server Operating Systems

- Windows OS
- Ubuntu (or other versions of desktop Linux)

Employer engagement

Employer engagement is essential in order to maximise the value of learners' experience. A partnership approach should be adopted where possible with employers with whom the consortium has links, and with employers used for work experience placements.

When delivering the learning, the organisation or employer should aim to maintain contact with the wider industry to help with keeping the examples of legislation, policies and codes of practice used in the taught content, up to date. Mentors/tutors should also undertake regular CPD activities in the industry to maintain knowledge of current industry practice.

1. Local branches of BCS The Chartered Institute for IT can often provide access to local employers, since many members will be senior practitioners and leaders in organisations that employ IT professionals. The BCS has an extensive branch network of volunteers operating across the UK, Channels Islands and Isle of Man. <http://www.bcs.org/category/5897>
2. Invite local businesses to visit the delivery centre to talk about their experience in using Digital Technology for IT system support, especially in respect of their dealing with coding and logic issues and processes. Ask the students to identify aspects of the IT support practices of local business that may be considered 'good practice'.

3. The Computing/IT faculty of every university will have links to employers in the local economy and their faculty staff may be willing to introduce delivery centres to major employers of IT skilled graduates and apprentices. Such links should be developed by FE colleges so as to better understand the skills needs and career options for IT practitioners at all levels from school leaver to graduate (i.e., think of how your learners can develop their career beyond the FE stage, and open their eyes to a full career).

4. Tech Partnership, the UK sector skills council for the IT/Telecoms industry, have an extensive list of small/medium sized employers of IT skilled apprentices and college leavers. They also provide a wealth of free resources for FE colleges to enable better engagement with local employers.
<https://www.thetechpartnership.com/>

5. The Computing Technology Industry Association (CompTIA) is a non-profit, international trade association representing more than 2,000 members, 3,000 academic and training partners and tens of thousands of registered users spanning the entire information communications and technology (ICT) industry. Anyone can sign up to become a registered user and gain access to a vast library of resources that includes cutting edge research into technology trends from the UK and around the world.

Suggested learning resources

Books

Bash Pocket Reference Published by: O'Reilly, 2016 ISBN: 978-1491941591	Robbins A
Learn Windows PowerShell in a month of lunches Published by: Manning Publications, 3rd edition 2016 ISBN: 978-1617294167	Jones D, Hicks J
Widows PowerShell Cookbook Published by: O'Reilly, 2013 ISBN: 978-1449320683	Holmes L
The Linux Command Line: A Complete Introduction Published by: No Starch Press, 2012 ISBN: 978-1593273897	Shotts W

Journals and magazines

Websites

<https://technet.microsoft.com/en-us/virtuallabs/>
<http://www.learnshell.org/>
http://www.tutorialspoint.com/execute_bash_online.php

Appendix 1 Relationships to other qualifications

Links to other qualifications

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

Literacy, language, numeracy and ICT skills development

This qualification can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills Wales – see www.cityandguilds.com/esw

Appendix 2 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.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues.

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
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

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

- **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.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification.

Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates

- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Appendix 3 Useful contacts

UK learners

General qualification information

E: learnersupport@cityandguilds.com

International learners

General qualification information

F: +44 (0)20 7294 2413

E: intcg@cityandguilds.com

Centres

Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results

F: +44 (0)20 7294 2413

E: centresupport@cityandguilds.com

Single subject qualifications

Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change

F: +44 (0)20 7294 2413

F: +44 (0)20 7294 2404 (BB forms)

E: singlesubjects@cityandguilds.com

International awards

Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports

F: +44 (0)20 7294 2413

E: intops@cityandguilds.com

Walled Garden

Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems

F: +44 (0)20 7294 2413

E: walledgarden@cityandguilds.com

Employer

Employer solutions, Mapping, Accreditation, Development Skills, Consultancy

T: +44 (0)121 503 8993

E: business@cityandguilds.com

Publications

Logbooks, Centre documents, Forms, Free literature

F: +44 (0)20 7294 2413

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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. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. 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 is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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