Pearson
BTEC Awards for the Level 3 Infrastructure Technician Apprenticeship Standard

Specification

BTEC Specialist qualifications

Pearson BTEC Level 3 Award in Networking and Architecture

Pearson BTEC Level 3 Award in Mobile and Operating Systems

Pearson BTEC Level 3 Award in Cloud Services

Pearson BTEC Level 3 Award in Coding and Logic

Pearson BTEC Level 3 Award in Business Processes

First teaching September 2018

Edexcel, BTEC and LCCI qualifications

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked. For further information, please visit our qualification websites at www.edexcel.com, www.btec.co.uk or www.lcci.org.uk. Alternatively, you can get in touch with us using the details on our contact us page at qualifications.pearson.com/contactus

About Pearson

Pearson is the world's leading learning company, with 35,000 employees in more than 70 countries working to help people of all ages to make measurable progress in their lives through learning. We put the learner at the centre of everything we do, because wherever learning flourishes, so do people. Find out more about how we can help you and your learners at qualifications.pearson.com

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1   Introducing BTEC Specialist qualifications

What are BTEC Specialist qualifications?

BTEC Specialist qualifications are work-related qualifications available from Entry level to Level 3 in a range of sectors. They give learners the knowledge, understanding and skills they need to prepare for employment in a specific occupational area. The qualifications also provide career development opportunities for those already in work.

BTEC Specialist qualifications put learning into the context of the world of work, giving learners the opportunity to apply their research, skills and knowledge in relevant and realistic work contexts. This applied, practical approach means learners develop the knowledge, understanding and skills they need for career progression or further study. As such, these qualifications are well suited to support the delivery of the Apprenticeship Standards.

The qualifications may be offered as full-time or part-time courses in schools, colleges, training centres and through employers.

Sizes of BTEC Specialist qualifications

For all regulated qualifications, Pearson specifies a total estimated number of hours that learners will require to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve tutors and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.

In addition to guided learning, other required learning directed by tutors or assessors includes private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

As well as TQT and GLH, qualifications can also have a credit value – equal to one tenth of the TQT, rounded to the nearest whole number.

TQT and credit values are assigned after consultation with employers and training providers delivering the qualifications.

BTEC Specialist qualifications are generally available in the following sizes:

- Award – a qualification with a TQT value of 120 or less
  (equivalent to a range of 1–12 credits)

- Certificate – a qualification with a TQT value in the range of 121–369
  (equivalent to a range of 13–36 credits)

- Diploma – a qualification with a TQT value of 370 or more
  (equivalent to 37 credits and above).

2 Qualifications summary and key information

Qualification title	Pearson BTEC Level 3 Award in Networking and Architecture
Qualification Number (QN)	603/3820/9
Regulation start date	01/12/2018
Operational start date	01/12/2018
Approved age ranges	16–18 Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see *Section 6 Access and recruitment*.
Total Qualification Time (TQT)	64 hours
Guided Learning Hours (GLH)	38 hours
Assessment	External assessment – on screen test
Grading information	The qualification and units are at a Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Guide for Centres to Enrolling onto Qualifications (see Section 6 Access and recruitment).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding hub. The Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Qualification title	**Pearson BTEC Level 3 Award in Mobile and Operating Systems**
Qualification Number (QN)	603/3825/8
Regulation start date	01/12/2018
Operational start date	01/12/2018
Approved age ranges	16–18 Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see *Section 6 Access and recruitment*.
Total Qualification Time (TQT)	87 hours
Guided Learning Hours (GLH)	51 hours
Assessment	External assessment – on screen test
Grading information	The qualification and units are at a Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Guide for Centres to Enrolling onto Qualifications (see Section 6 Access and recruitment).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding hub. The Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Qualification title	Pearson BTEC Level 3 Award in Cloud Services
Qualification Number (QN)	603/3822/2
Regulation start date	01/12/2018
Operational start date	01/12/2018
Approved age ranges	16–18 Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see Section 6 Access and recruitment.
Total Qualification Time (TQT)	92 hours
Guided Learning Hours (GLH)	54 hours
Assessment	External assessment – on screen test
Grading information	The qualification and units are at a Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Guide for Centres to Enrolling onto Qualifications (see Section 6 Access and recruitment).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding hub. The Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Qualification title	Pearson BTEC Level 3 Award in Coding and Logic
Qualification Number (QN)	603/3823/4
Regulation start date	01/12/2018
Operational start date	01/12/2018
Approved age ranges	16–18 Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see Section 6 Access and recruitment.
Total Qualification Time (TQT)	33 hours
Guided Learning Hours (GLH)	19 hours
Assessment	External assessment – on screen test
Grading information	The qualification and units are at a Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Guide for Centres to Enrolling onto Qualifications (see Section 6 Access and recruitment).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding hub. The Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Qualification title	Pearson BTEC Level 3 Award in Business Processes
Qualification Number (QN)	603/3821/0
Regulation start date	01/12/2018
Operational start date	01/12/2018
Approved age ranges	16–18 Please note that sector-specific requirements or regulations may prevent learners of a particular age from embarking on this qualification. Please see Section 6 Access and recruitment.
Total Qualification Time (TQT)	89 hours
Guided Learning Hours (GLH)	53 hours
Assessment	External assessment – on screen test
Grading information	The qualification and units are at a Pass grade.
Entry requirements	No prior knowledge, understanding, skills or qualifications are required before learners register for this qualification. However, centres must follow the Pearson Guide for Centres to Enrolling onto Qualifications (see Section 6 Access and recruitment).
Funding	Qualifications eligible and funded for post-16-year-olds can be found on the funding hub. The Skills Funding Agency also publishes a funding catalogue that lists the qualifications available for 19+ funding. The Apprenticeship funding rules can be found at www.gov.uk

Centres will need to use the Qualification Number (QN) when they seek public funding for their learners. The qualification title, qualification titles and QN will appear on each learner's final certificate. Centres should tell learners this when recruiting them and registering them with Pearson. There is more information about certification in our *UK Information Manual,* available on our website, qualifications.pearson.com

3 Qualification purpose

Qualification objectives

This specification covers the following five qualifications:

- Pearson BTEC Level 3 Award in Networking and Architecture
- Pearson BTEC Level 3 Award in Mobile and Operating Systems
- Pearson BTEC Level 3 Award in Cloud Services
- Pearson BTEC Level 3 Award in Coding and Logic
- Pearson BTEC Level 3 Award in Business Processes

These qualifications are designed for learners to develop the knowledge and understanding they require for their job role as an Infrastructure Technician and to achieve the mandatory knowledge modules to complete the on-programme element of the Infrastructure Technician apprenticeship.

These qualifications give learners the opportunity to:

- develop knowledge related to IT infrastructure
- develop technical knowledge and understanding in programming and logic, networking, operating systems, business processes and cloud services
- achieve Level 3 qualifications
- develop their own personal growth and engagement in learning.

Apprenticeships

These five qualifications are a mandatory requirement within the Level 3 Apprenticeship Standard for Infrastructure Technicians. Learners must achieve all five qualifications (or equivalent vendor qualifications) before progressing to the end-point assessment.

The equivalent vendor qualifications are listed below.

Networking & Architecture:

CCNA1

- MTA Networking Fundamentals
- Network +
- A+
- CIW Network Technology Associate

Mobile and Operating Systems:

- CCNA Security
- MCP Managing and Maintaining Windows 8
- MCP Configuring Windows 8
- MTA Mobility and Devices Fundamentals
- Security +
- Mobile +
- CIW Internet business Associate
- CIW Mobile Application Development

Cloud Services

MTA Server Admin

- Enabling Office 365 Services
- Enabling Office 365 Identities and Requirements
- MTA Cloud Fundamentals
- Install Configure Windows Server 2012
- Administration of Windows Server 2012
- Configure Advanced Windows Server 2012 Services

Coding and Logic

- MTA Software Development Fundamentals
- App Development

Business Processes

- CIW Internet Business Associate
- ITIL Foundation Level

Progression opportunities

Learners who achieve these qualifications and have met all other specified requirements of the Apprenticeship Standard can progress to achieving the full Apprenticeship certification that confirms competency in the job role stated on the previous page.

With further training and development, learners can progress to more senior or complex job roles such as Senior Infrastructure Technician or Network Administrator. They can also progress on to level 4 apprenticeships as Troubleshooters or Network Engineers.

Industry support and recognition

These qualifications content is based on the requirements set out in the apprenticeship standards issued by the Tech Partnership

The qualifications are recognised by:

- Employers: IBM, Capgemini, Microsoft®, Cisco, BT, HP, The Royal Signals, Lowe and Partners, QinetiQ, Weboo, 4Ps Marketing, Fujitsu, Accenture, Atos, CGI, Visa, Contentive, Thales, Ticketmaster®, NCA, Virgin Media.

- Professional organisation/s: BCS Chartered Institute for IT.

- Standards Setting Body: The Tech Partnership.

These qualifications are supported by Digital Skills UK.

4 Qualification structures

Pearson BTEC Level 3 Award in Network and architecture

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1
Minimum number of GLH that must be achieved	38

Unit number	Mandatory unit	Level	Guided learning hours
1	Network and architecture	3	38

Pearson BTEC Level 3 Award in Mobile and Operating Systems

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1
Minimum number of GLH that must be achieved	51

Unit number	Mandatory unit	Level	Guided learning hours
2	Mobile and Operating Systems	3	51

Pearson BTEC Level 3 Award in Cloud Services

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1
Minimum number of GLH that must be achieved	54

Unit number	Mandatory unit	Level	Guided learning hours
3	Cloud Services	3	54

Pearson BTEC Level 3 Award in Coding and Logic

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1
Minimum number of GLH that must be achieved	19

Unit number	Mandatory unit	Level	Guided learning hours
4	Coding and Logic	3	19

Pearson BTEC Level 3 Award in Business Process

The learner will need to meet the requirements outlined in the table below before Pearson can award the qualification.

Minimum number of units that must be achieved	1
Minimum number of GLH that must be achieved	53

Unit number	Mandatory unit	Level	Guided learning hours
5	Business Process	3	53

5 Centre resource requirements

As part of the approval process, centres must make sure that the resource requirements below are in place before offering the qualification.

General resource requirements

- Centres must have appropriate physical resources (for example IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.

- Staff involved in the delivery must have relevant expertise and occupational experience.

- There must be systems in place that ensure continuing professional development (CPD) for staff delivering the qualification.

- Centres must have appropriate health and safety policies in place that relate to the use of equipment by learners.

- Centres must deliver the qualifications in accordance with current equality legislation. For further details on Pearson's commitment to the Equality Act 2010, please see *Section 6 Access and recruitment*. For full details of the Equality Act 2010, visit www.legislation.gov.uk

6   Access and recruitment

Our policy on access to our qualifications is that:

- they should be available to everyone who is capable of reaching the required standards

- they should be free from barriers that restrict access and progression

- there should be equal opportunities for all wishing to access the qualifications.

Centres must ensure that their learner recruitment process is conducted with integrity. This includes ensuring that applicants have appropriate information and advice about the qualification to ensure that it will meet their needs.

Centres should review applicants' prior qualifications and/or experience, considering whether this profile shows that they have the potential to achieve the qualification.

We refer centres to our Pearson *Equality and diversity policy*, which can be found in the support section of our website, qualifications.pearson.com

Prior knowledge, skills and understanding

No prior knowledge, understanding, skills or qualifications are required for learners to register for this qualification.

Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Pearson's *Equality and diversity policy* document requires all learners to have equal opportunity to access our qualifications and assessments and that our qualifications are awarded in a way that is fair to every learner.

We are committed to making sure that:

- learners with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic

- all learners achieve the recognition they deserve from undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

For learners with disabilities and specific needs, the assessment of their potential to achieve the qualification must identify, where appropriate, the support that will be made available to them during delivery and assessment of the qualification. Please see *Section 8 Assessment* for information on reasonable adjustments and special consideration.

7 Programme delivery

Centres are free to offer these qualifications using any mode of delivery that meets learners' and employers' needs. It is recommended that centres make use of a wide range of training delivery methods, including direct instruction in classrooms, simulated demonstrations, research or applied projects, e-learning, directed self-study, field visits and role play. Whichever mode of delivery is used, centres must make sure that learners have access to the resources identified in the specification and to the subject specialists delivering the qualifications.

Centres must adhere to the Pearson policies that apply to the different models of delivery. Our *Collaborative and consortium arrangements for the delivery of vocational qualifications policy* document is available on our website.

Those planning the programme should aim to enhance the vocational nature of the qualification by:

- spending time with employers to better understand their organisational requirements and the methods of training that are most suitable, taking into consideration their available resources and working patterns

- collaborating with employers to ensure that learners have opportunities in the workplace to implement the knowledge and skills developed through the training programme

- developing up-to-date and relevant teaching materials that make use of scenarios relevant to the sector and relevant occupation

- giving learners the opportunity to apply their learning in realistic practical activities

- having regular meetings with employers to discuss learner progress, providing feedback and agreeing how any issues will be resolved

- developing projects or assessments with input from employers

- making full use of the variety of experience of work and life that learners bring to the programme.

Where legislation is taught, centres must ensure that it is current and up to date.

Where a qualification is externally assessed, it is essential that learners have covered all of the qualification content before they are tested.

For further information on the delivery and assessment of the new Apprenticeships please refer to the *Apprenticeship Funding Rules*, at: www.gov.uk/government/collections/sfa-funding-rules

8 Assessment

The table below gives a summary of the assessment methods used in for these qualifications.

Qualifications	Assessment method
All qualifications	External assessment (onscreen test)

External assessments for these qualifications will be available in English only.

A learner taking the qualifications may be assessed in British or Irish Sign Language where it is permitted for the purpose of reasonable adjustment.

Further information on the use of language in qualifications is available in our *Use of Languages in Qualifications Policy* document, available on our website at: qualifications.pearson.com

For further information on access arrangements, please refer to *Reasonable adjustments* later in this section.

External assessment

The table below gives information about the type and availability of external assessments that are available for these qualifications. Centres should check this information carefully together with the relevant qualification specifications and the sample assessment materials so that they can timetable learning and assessment periods appropriately.

Pearson BTEC Level 3 Award in Networking and Architecture	
Unit title	Networking and Architecture
Type of assessment	Onscreen test using items such as multiple choice, multiple response
Length of assessment	The external assessment will be 35 minutes
Number of questions/marks	20
Assessment availability	On demand
First assessment availability	March 2019

Pearson BTEC Level 3 Award in Mobile and Operating Systems	
Unit title	Mobile and Operating Systems
Type of assessment	Onscreen test using items such as multiple choice, multiple response
Length of assessment	The external assessment will be 35 minutes
Number of questions/marks	20
Assessment availability	On demand
First assessment availability	March 2019

Pearson BTEC Level 3 Award in Cloud Services	
Unit title	Cloud Services
Type of assessment	Onscreen test using items such as multiple choice, multiple response
Length of assessment	The external assessment will be 35 minutes
Number of questions/marks	20
Assessment availability	On demand
First assessment availability	March 2019

Pearson BTEC Level 3 Award in Coding and Logic	
Unit title	Coding and Logic
Type of assessment	Onscreen test using items such as multiple choice, multiple response
Length of assessment	The external assessment will be 35 minutes
Number of questions/marks	20
Assessment availability	On demand
First assessment availability	March 2019

Pearson BTEC Level 3 Award in Business Processes	
Unit title	Business Processes
Type of assessment	Onscreen test using items such as multiple choice, multiple response
Length of assessment	The external assessment will be 35 minutes
Number of questions/marks	20
Assessment availability	On demand
First assessment availability	March 2019

Pearson sets and marks the external assessments.

The external assessment assesses all the learning outcomes in the units to meet the standard specified by the related assessment criteria. All the content in each unit is mandatory for the assessments and will be sampled across different versions of the assessment over time. Therefore, it is essential that learners have full knowledge of the unit content before being entered for the onscreen test.

Centres need to make sure that learners are:

- fully prepared to sit the external assessments

- entered for the tests at appropriate times, with due regard for resit opportunities as necessary.

Information about registering learners for the test and the systems requirements for delivering the onscreen tests is available on our website.

Sample assessment materials

Each externally assessed unit has a set of sample assessment materials (SAMs). The SAMs are there to provide an example of what the external assessment will look like in terms of the feel and level of demand of the assessment.

SAMs show the range of possible question types that may appear in the actual assessments and give a good indication of how the assessments will be structured.

While SAMs can be used for practice with learners, as with any assessment the content covered and specific details of the questions asked will change in each assessment.

A copy of each of these assessments can be downloaded from the qualification page on our website.

Resits

Learners who take the onscreen test and do not perform as expected are allowed the opportunity to resit the assessment. Opportunities for resits are purely at the centre's discretion. Centres will need to ensure that learners are fully prepared against any identified areas of weakness before resitting the assessment.

Administrative arrangements for external assessment

Access arrangements requests

Access arrangements are agreed with Pearson before an assessment. They allow learners with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

Access arrangements should always be processed at the time of registration.

Learners will then know what type of arrangements are available in place for them.

Granting reasonable adjustments

For external assessment, a reasonable adjustment is one that Pearson agrees to make for an individual learner. A reasonable adjustment is defined for the individual learner and informed by the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, including:

- the needs of the learner with the disability

- the effectiveness of the adjustment

- the cost of the adjustment; and

- the likely impact of the adjustment on the learner with the disability and other learners.

An adjustment may be judged unreasonable and not approved if it involves unreasonable costs, timeframes or affects the integrity of the assessment.

Special consideration requests

Special consideration is an adjustment made to a learner's mark or grade after an external assessment to reflect temporary injury, illness or other indisposition at the time of the assessment.

An adjustment is made only if the impact on the learner is such that it is reasonably likely to have had a material effect on that learner being able to demonstrate attainment in the assessment.

Centres are required to notify us promptly of any learners who they believe have been adversely affected and request that we give special consideration. Further information can be found in the special requirements section on our website.

Conducting external assessments

Centres must make arrangement for the secure delivery of external assessments. All centres offering external assessments must comply with the Joint Council for Qualifications (JCQ) document *Instructions for the Conduct of Examinations (ICE)*. The current version of this document is available on our website.

Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications and/or may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actual or attempted malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where malpractice or attempted malpractice has been proven.

Malpractice may occur or be suspected in relation to any unit or type of assessment within a qualification. For further details on malpractice and advice on preventing malpractice by learners, please see Pearson's *Centre Guidance: Dealing with Malpractice in vocational qualifications*, available on our website.

The procedures we ask you to adopt vary between units that are internally assessed and those that are externally assessed.

External assessment

External assessment means all aspects of units that are designated as external in this specification, including preparation for tasks and performance. For these assessments, centres must follow the JCQ procedures set out in the latest version of the Joint Council for Qualifications (JCQ) document *Suspected Malpractice in Examinations and Assessments, Policies and Procedures* (available on the JCQ website, www.jcq.org.uk).

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

Learner malpractice

The head of centre is required to report incidents of suspected learner malpractice that occur during Pearson examinations. We ask centres to complete JCQ Form M1 (www.jcq.org.uk/malpractice) and email it with any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc.) to the Investigations Processing team at candidatemalpractice@pearson.com

The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

Teacher/centre malpractice

The Head of Centre is required to inform Pearson's Investigations Team of any incident of suspected malpractice by centre staff, before any investigation is undertaken. The Head of Centre is requested to inform the Investigations Team by submitting a JCQ M2(a) form (downloadable from www.jcq.org.uk/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff, anonymous informants), the Investigations team will conduct the investigation directly or may ask the Head of Centre to assist.

Incidents of maladministration (errors in the delivery of Pearson qualifications that may affect the assessment of learners) should also be reported to the Investigations team using the same method.

Heads of Centres/Principals/Chief Executive Officers or their nominees are required to inform learners and centre staff suspected of malpractice of their responsibilities and rights, please see 6.15 of the Joint Council for Qualifications (JCQ) document *Suspected Malpractice in Examinations and Assessments, Policies and Procedures*.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results/certificates while an investigation is in progress. Depending on the outcome of the investigation, results and/or certificates may not be released or they may be withheld.

We reserve the right to withhold certification when undertaking investigations, audits and quality assurances processes. You will be notified within a reasonable period of time if this occurs.

Sanctions and appeals

Where malpractice is proven, we may impose sanctions or penalties.

Where learner malpractice is evidenced, penalties may be imposed such as:

- mark reduction for affected external assessments
- disqualification from the qualification
- debarment from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures we may impose sanctions such as:

- working with centres to create an improvement action plan

- requiring staff members to receive further training

- placing temporary blocks on the centre's certificates

- placing temporary blocks on registration of learners

- debarring staff members or the centre from delivering Pearson qualifications

- suspending or withdrawing centre approval status.

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from the Head of Centre (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in our *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy* document*,* available on our website, qualifications.pearson.com. In the initial stage of any aspect of malpractice, please notify the Investigations Team (via pqsmalpractice@pearson.com) who will inform you of the next steps.

9 Recognising prior learning and achievement

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences in and outside the workplace, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

The The Apprenticeship standard lists vendor qualifications that suitable to show equivalent achievement of each qualification in this specification. The equivalent vendor qualifications are listed in the Essential information for tutors and assessors section of each unit and can be used as evidence of the gateway requirement for the Apprenticeship.

10 Centre recognition and approval

Centres that have not previously offered BTEC Specialist qualifications need to apply for, and be granted, centre recognition as part of the process for approval to offer individual qualifications.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by a new qualification and the conditions for automatic approval are met.

Centres offering mandatory qualifications for the new Apprenticeship Standards must be listed on the Skills Funding Agency's Register of Training Organisations and have a contract to deliver the new Apprenticeship Standards.

Guidance on seeking approval to deliver BTEC qualifications is given on our website.

Approvals agreement

All centres are required to enter into an approval agreement with Pearson, in which the Head of Centre or principal agrees to meet all the requirements of the qualification specification and to comply with the policies, procedures, codes of practice and regulations of Pearson and relevant regulatory bodies. If centres do not comply with the agreement, this could result in the suspension of certification or withdrawal of centre or qualification approval.

11 Quality assurance of centres

Quality assurance is at the heart of vocational qualifications. The centre delivers BTEC qualifications. The centre will use quality assurance to make sure that their managers and delivery staff are standardised and supported. Pearson uses quality assurance to check that all centres are working to national standards. It gives us the opportunity to identify and provide support, if needed, to safeguard certification. It also allows us to recognise and support good practice.

For the qualifications in this specification, the Pearson quality assurance model will follow the process below:

- an annual visit to the centre by a Centre Quality Reviewer to review centre-wide quality assurance systems.

12 Units

Each unit in the specification is set out a similar way. This section explains how the units are structured. It is important that all tutors, assessors, internal verifiers and other staff responsible for the programme review this section.

Units have the following sections.

Unit number

The number is in a sequence in the specification. Where a specification has more than one qualification, numbers may not be sequential for an individual qualification.

Unit title

This is the formal title of the unit that will appear on the learner's certificate.

Level

All units and qualifications have a level assigned to them. The level assigned is informed by the level descriptors defined by Ofqual, the qualifications regulator.

Guided Learning Hours (GLH)

This indicates the number of hours of activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study. Units may vary in size.

Pearson has consulted with users of the qualification and has assigned a number of hours to this activity for each unit.

Unit introduction

This is designed with learners in mind. It indicates why the unit is important, what will be learned and how the learning might be applied in the workplace.

Learning outcomes

The learning outcomes of a unit set out what a learner knows, understands or is able to do as the result of a process of learning.

Assessment criteria

The assessment criteria specify the standard the learner is required to meet to achieve a learning outcome.

Unit content

This section sets out the required teaching content of the unit and specifies the knowledge and understanding required for achievement of the unit. It enables centres to design and deliver a programme of learning that will enable learners to achieve each learning outcome and to meet the standard determined by the assessment criteria.

Where it is designed to support apprenticeships, the unit content is informed by the knowledge and understanding requirements of the relevant Apprenticeship Standard.

Relationship between unit content and assessment criteria

All the content in each unit is mandatory for the assessments and will be sampled across different versions of the assessment over time. Learners can be tested on any aspect of the content.

Learners should be asked to complete summative assessment only after the teaching content for the unit or learning outcomes has been covered.

Legislation

Legislation cited in the units is current at time of publication. The most recent legislation should be taught and assessed internally.

Essential information for tutors and assessors

This section gives information to support delivery and the implementation of assessment. It contains the following sub-sections.

Essential resources – lists any specialist resources needed to deliver the unit. The centre will be asked to make sure that these resources are in place when it seeks approval from Pearson to offer the unit. Assessment – for externally assessed qualifications, this section gives details of the format, structure and any specific conditions of the external assessments.

Unit 1:

Networking and Architecture

Level:	**3**
Unit type:	**Mandatory for Pearson BTEC Level 3 Award in Networking and Architecture**
Assessment type:	**External**
Guided learning hours:	**38**

Unit introduction

Networks are a key part of any organisation's IT systems and are critical to many organisations' ability to do business. An infrastructure technician is expected to have a good theoretical understanding of network and architecture and be able to install, configure and troubleshoot internal networks and access to the internet.

This qualification covers basic computer hardware and software architecture, network addressing (including relevant numerical skills with binary numbers), network media (cabled and wireless) and the hardware required for connections, security and the maintenance procedures used to keep the network running.

Learning outcomes		Assessment criteria	
1	Understand the basic hardware and software of computer systems	1.1	Identify the purpose of basic hardware components in a computer system
		1.2	Describe the purpose of basic software elements of a computer system
2	Understand numerical skills for network addressing	2.1	Identify the characteristics of common (IP) addresses
		2.2	Apply binary conversion and arithmetic
		2.3	Apply subnetting to different IP addresses
3	Understand network connectivity and media	3.1	Explain the purpose and characteristics of different types of cable
		3.2	Explain the purpose and characteristics of wireless systems, antennas and devices
		3.3	Describe the use of test equipment used for wired and wireless networks
4	Understand how to configure and maintain a secure network	4.1	Identify the purpose of networking devices
		4.2	Describe the purpose and characteristics of networking technologies
		4.3	Describe how to support and maintain network security
5	Understand maintenance practices and processes	5.1	Identify how different tools are used in network maintenance and performance monitoring
		5.2	Describe methods of managing local storage

Content

What needs to be learned
Learning outcome 1: Understand the basic hardware and software of computer systems

Identify the purpose of basic hardware components in a computer system

Components

- CPU

- RAM

- BIOS/UEFI

- Motherboard

- Bus architecture (ePCI, PCI)

- Permanent storage (magnetic hard drive, Solid State Drive (SSD), firmware, portable storage)

- Expansion cards (graphics, network)

Types of devices

- Servers (email, file, web, print)

- Desktop

- Mobile devices (smartphones, tablets, laptops)

- Terminals

Describe the purpose of basic software elements of a computer system

- Operating systems:

    o kernel

    o user interface

    o device management

    o memory management

    o file system (NTFS, FAT32)

- Applications:

    o databases

    o security utilities (antivirus, firewall)

What needs to be learned
Learning outcome 2: Understand numerical skills for network addressing

Identify the characteristics of common (IP) addresses

- IP version 4 addressing principles
    - dotted decimal format
    - classes (A-D)
    - public and private addresses
    - address categories (default gateway, loopback address, broadcast address)
- IP version 6 address representation (full and abbreviated representations)
    - Format (prefix, subnet ID, interface ID)

Apply binary conversion and arithmetic

- Binary to decimal, decimal to binary conversion (up to eight bits)

Apply subnetting to different IP addresses

- subnet masks
- subnets (number of hosts, number of networks, starting and ending IP addresses)

What needs to be learned
Learning outcome 3: Understand network connectivity and media

Explain the purpose and characteristics of different types of cable

- Types of cable characteristics (transmission speed, segment length) and connectors

    o coaxial, F-type connector

    o twisted pair (shielded/unshielded)

    o cat 1-6 cables, RJ 45 connector (straight-through cable, crossover cables, rollover cables)

    o fiber optic (multi-mode, single mode)

    o standards (10BaseT, 100BaseT, 1000BaseT)

Explain the purpose and characteristics of wireless systems, antennas and devices

- Directional, omnidirectional, multiple-input multiple-output (MIMO)

- Point-to-point, point-to-multi point

- Wireless access points, routers and endpoint device

- Bluetooth® connectivity

- Standards (802.11 a, 802.11 b, 802.11 g, 802.11 n, 802.11 AC)

    o speed

    o security

    o coverage

Describe the use of test equipment used for wired and wireless networks

- Cable tester

- Loopback

- Continuity tester

- Tone probe

- Wire map tester

- Wireless locator/Wi-Fi analyser

- Wireless heat map

- Optical time-domain reflexometer (OTDR)

What needs to be learned
Learning outcome 4: Understand how to configure and maintain a secure network

Identify the purpose of networking devices

- Servers
- Domain controllers
- Firewalls
- Routers
- Switches
- Wireless access point
- Wireless routers

Describe the purpose and characteristics of networking technologies

- Active Directory (AD), Lightweight Directory Access Protocol (LDAP)
- Dynamic Host Configuration Protocol (DHCP)
- Domain Name System (DNS)
- Network address translation (NAT)
- Access control (rights and permissions)
- Common networking ports:
  - o HTTP (80)
  - o HTTPS (443)
  - o POP3 (110)
  - o FTP (21)
  - o IMAP (143)
  - o DHCP (67/68)
  - o SMTP (25)
  - o DNS (53)

Describe how to support and maintain network security

- Access control (rights and permissions)
- Password policies
- Encryption
- Virtual private network (VPN)
- Virtual local area network (VLAN)
- Configuring security devices and software

What needs to be learned
Learning outcome 5: Understand maintenance practices and processes

Identify how different tools are used in network maintenance and performance monitoring

- Software utilities:
    - o ping (loopback address, default gateway, local hosts)
    - o tracert
    - o ipconfig (/renew, /release, /all)
    - o netstat
    - o nslookup
- Command-line interface (CLI)
- System logs
- System monitor
- Network monitor
- Maintenance records (help desk records, job sheets, fault logs, CRM)
- Knowledge base
- Updates (automatic, manual, server updates services):
    - o remote assistant
    - o remote desktop

Describe methods of managing local storage

- Disk quotas
- Mapping drives
- Disk cleanup
- Redundant array of independent disks (RAID 0, RAID 1, RAID 5, RAID 10)
- Rights and permissions

Essential information for tutors and assessors

Essential resources

There are no special resources needed for this qualification.

Suggested reading/resources

Lammie T – *CompTIA Network+ Study Guide: Exam N10-007* (Sybex, 2018)
ISBN 978-1119432258

Odom W – *CCENT/CCNA ICND1 100-105 Official Cert Guide* (Cisco Press, 2016)
ISBN 978-1587205804

Vendor qualifications

The standard has listed the following vendor qualifications as suitable for achievement in this element of the standard:

- CCNA 1

- MTA Network Fundamentals

- Network +

- A +

- CIW Network Technology Associate

Essential information for assessment

This unit is externally assessed through an onscreen test. Pearson will set and mark this test. The test lasts for 35 minutes and is worth 20 marks. The assessment is available on demand.

The test assesses all of the learning outcomes. The questions in the test are based on each assessment criterion and its associated unit content.

The test consists of the following types of items: 20 multiple-choice items. Items in the test will not necessarily be sequenced in the order of the criteria in the unit. Test items will not rely on or directly follow on from another test item. Test items may use colour images/diagrams/graphs for the context of the question or for the answer options.

A Pass grade is determined by learners achieving a defined cut score for the test.

Unit 2: Mobile and Operating Systems

Level:	**3**
Unit type:	**Mandatory for Pearson BTEC Level 3 Award in Mobile and Operating Systems**
Assessment type:	**External**
Guided learning hours:	**51**

Unit introduction

Operating systems are the most important piece of software of any computer system, be it standalone, networked, desktop or mobile. It is the role of the operating system to provide a user interface that allows hardware effectively and often without the user aware of the process.

This qualification covers how operating systems work for desktop and mobile devices as well how to install and how an infrastructure technician can use them effectively when supporting users and optimising systems.

Learning outcomes		Assessment criteria	
1	Know the principles of mobile and desktop systems	1.1	Identify the characteristics of platforms
		1.2	Describe the characteristics of open source and proprietary operating systems
		1.3	Explain the considerations when choosing operating systems and platforms
		1.4	Describe the use of native applications and tools within operating systems
2	Understand how to deploy, configure and securely integrate desktop devices	2.1	Describe how to configure computer hardware
		2.2	Describe the process of installing and optimising operating systems
		2.3	Explain the types of operating system tests and their purpose
3	Understand how to deploy, configure and securely integrate mobile devices	3.1	Explain the considerations when deploying remote and mobile communications technology
		3.2	Describe how to improve the security of mobile communications and mitigate risks
		3.3	Describe the processes involved when providing remote assistance for mobile devices

Content

What needs to be learned
Learning outcome 1: Know the principles of mobile and desktop systems

Identify the characteristics of platforms

- Desktop (thin client, cloud-delivered, conventional)

- Mobile (tablets, smartphone)

- Server (email, web, file, DNS, NAT, DHCP)

- Virtualised (docker, remote hypervisor, local desktop)

Describe the characteristics of open source and proprietary operating systems

- Open source operating systems (Linux, Ubuntu, Samba)

- Proprietary operating systems (Windows, Mac OSX)

Explain the considerations when choosing operating systems and platforms

- Usage (commercial, personal, public, governmental)

- System aims

- User needs

- Cost

- Performance

- Compatibility

- Available resources (hardware, software, connectivity, legacy systems)

Describe the use of native applications and tools within operating systems

- Native applications (text editors, app stores, browsers, command line, maps, messaging)

- Tools (disk clean-up, disk check, defragmentation, power settings, display settings, file manager, security, accessibility)

What needs to be learned
Learning outcome 2: Understand how to deploy, configure and securely integrate desktop devices

Describe how to configure computer hardware

- Investigate system requirements

- Evaluate compatibility

- Plan and prepare safe installation

- Install and test installation

Describe the process of installing and optimising operating systems

- Licencing requirements (multi-user, single-user, free-to-use, time-limited, feature-limited, cloud-based, virtualisation-based)

- Evaluate system compatibility (storage, memory, bandwidth, processor performance)

- Operating system for installation methods (USB boot, CD/DVD boot, PXE boot, image casting, remote download and install)

- Install, configure and test the operating system

- Secure operating system (storage encryption, admin access, user access, rights allocation, firewall, anti-malware, password policy)

Explain the types and purpose of testing operating systems

- Compliance to original specification (test plan, iterative testing, test logs)

- Vulnerability and penetration testing (assessment, plan, test)

- Usability and accessibility tests (testing with users with disabilities, different technical skills)

- Performance and load testing (testing for stress, normal performance, response times)

What needs to be learned

Learning outcome 3: Understand how to deploy, configure and securely integrate mobile devices

Explain the considerations when deploying remote and mobile communications technology

- Managing remote delivery of apps (deployment times, rollout of updates, scalable security issue resolution)

- Organisational deployment and deletion app policy

- Cloud app delivery (network connectivity, bandwidth, data plan)

- Secure deployment methods (encrypted delivery, device authentication, user authentication)

- Managing bring your own device (BYOD) policy, device trust, user trust, trust repudiation)

Describe how to improve the security of mobile communications and mitigate risks

- Risks:
    - ο loss and theft of devices
    - ο BYOD
    - ο malware management
    - ο data loss
    - ο social engineering

- Mitigation:
    - ο Remote deletion of apps and data
    - ο Secure VPN connection
    - ο Encryption and encoding
    - ο Authentication, authorisation and accounting (AAA) of remote devices
    - ο Wireless security and issues with public hotspots (3G, 4G and 5G, bluetooth security)

Describe the processes involved when providing remote assistance for mobile devices

- Initial contact/support request (email, phone call, ticket system, live chat)

- Obtaining user permissions (access system, view data, alter settings, add/remove applications and files)

- Establishing secure remote access (webpage/hyperlink, pre-installed application, altering system security settings, ensuring reliable connection method)

- Diagnosis of problem

- Resolution of problem

- Ethical practice when viewing remote data

Further information for tutors and assessors

Essential resources

There are no special resources needed for this qualification.

Vendor qualifications

The standard has listed the following vendor qualifications as suitable for achievement in this element of the standard:

- CCNA Security

- MCP Managing and Maintaining Windows 8

- MCP Configuring Windows 8

- MTA Mobility and Devices Fundamentals

- Security +

- Mobile +

- CIW Internet Business Associate

- CIW Mobile Application Development

Essential information for assessment

This unit is externally assessed through an onscreen test. Pearson will set and mark this test. The test lasts for 35 minutes and is worth 20 marks. The assessment is available on demand.

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A Pass grade is determined by learners achieving a defined cut score for the test.

Unit 3: Cloud Services

Level:	3
Unit type:	**Mandatory for Pearson BTEC Level 3 Award in Cloud Services**
Assessment type:	**External**
Guided learning hours:	**54**

Unit introduction

Cloud services are any service made available to users on demand via the internet from a cloud computing provider's server, as opposed to being provided from a company's own on-premises server. Every day more organisations are switching to cloud services in order to improve or enhance their business.

This qualification will explore the fundamentals of cloud services and the delivery models deployed within them, as well as the practical element of setting up cloud services. It will explore the features of effective cloud security and apply accepted security protocols to real-life scenarios. As organisations require a disaster recovery plan to ensure their data can be recovered even in the worst-case situations and this qualification gives an understanding of how to formulate and maintain a disaster recovery plan.

It is important that all IT professionals have a good understanding of cloud services and how to enforce cloud security methods to defend systems against increasingly sophisticated attacks.

Learning outcomes		Assessment criteria	
1	Understand the fundamentals of cloud services	1.1	Identify characteristics of cloud services
		1.2	Explain the benefits, drawbacks, functionality and control levels of types of delivery model
		1.3	Explain the benefits, drawbacks, functionality and features of types of deployment model
		1.4	Describe the types of DNS records that are used in cloud services
2	Understand cloud security	2.1	Identify the characteristics of passwords
		2.2	Describe the configuration and management of passwords
		2.3	Describe the management of users and groups in cloud services
		2.4	Describe how to manage cloud identities
		2.5	Describe the types of security threat to cloud services and their characteristics
		2.6	Explain how different methods mitigate security threats
3	Understand cloud technologies	3.1	Describe the setup and configuration of virtual machines
		3.2	Explain the benefits and drawbacks of virtual machines
		3.3	Identify the benefits of cloud-based applications
4	Understand cloud backup and recovery methods	4.1	Identify the features of a cloud backup policy
		4.2	Describe the steps of a disaster recovery plan

Content

What needs to be learned
Learning outcome 1: Understand the fundamentals of cloud services

Identify characteristics of cloud services

- On-demand usage

- Ubiquitous access

- Multi-tenancy

- Resiliency

- Measured usage

- Elasticity/scalability

Explain the benefits, drawbacks, functionality and control levels of types of delivery model

- IaaS (infrastructure as a service)

- PaaS (platform as a service)

- SaaS (software as a service)

- DaaS (data as a service)

Explain the benefits, drawbacks, functionality and features of types of deployment model

- Public

- Community

- Private

- Hybrid

Describe the types of DNS records that are used in cloud services

- Types of DNS records and their characteristics:

    ○ A record

    ○ CNAME record

    ○ TXT record

    ○ AAAA record

    ○ MXENTRY record

What needs to be learned
Learning outcome 2: Understand cloud security

Identify the characteristics of passwords

- Features of good passwords
  - changed regularly
  - more than eight characters long
  - unique for each service
  - not using personal data
  - combination of alphanumeric characters, cases and symbols

Describe the configuration and management of passwords

- Multi-factor authentication:
  - possession-based:
    - security device
    - smartphone
  - biometric:
    - fingerprint scanner
    - face recognition
    - voice recognition
  - knowledge-based:
    - password
    - pin code
    - previously-set personal questions/answers
- Automated password resets:
  - reasons:
    - less time-consuming for users and support staff
    - able to carry out 24/7
    - can indicate trends and help identify training opportunities
    - records unsuccessful resets that may be hacking attempts, helping to identify potential security threats

What needs to be learned

- Password policy and policy enforcement:
  - ο password history policy
  - ο minimum password age policy
  - ο maximum password age policy
  - ο complexity requirements policy (length, combination of characters)

Describe the management of users and groups in cloud services

- Create security groups
- Configure security groups
- Cloud connectivity
- Invite/edit/remove users
- Manage application access
- Check login statistics

Describe how to manage cloud identities

- Identity provisioning (on-boarding and off-boarding)
- Identity management (across multiple organisations, services, devices)

Describe the types of security threat to cloud services and their characteristics

- Insider threats (malicious and accidental)
- Denial-of-service (DoS) attacks:
  - ο SYN flood
  - ο HTTP flood
  - ο distributed denial-of-service (DDoS) attack
- Insecure application programming interfaces (APIs)
- Malware:
  - ο spyware
  - ο worms
  - ο trojans
  - ο viruses
  - ο adware
  - ο ransomware

What needs to be learned
Explain how different methods mitigate security threats
• Computer usage policies
• Staff training
• Access rights/permissions
• Regular password resetting
• Malware software/malware checking
• Certification of APIs
• Collaboration of user knowledge/experience
• Using white/grey hat hackers
• SYN cookies
• Collection of reverse proxies

What needs to be learned
Learning outcome 3: Understand cloud technologies

Describe the setup and configuration of virtual machines

- Types of virtual machines and their characteristics:
  - ο application
  - ο desktop (virtual desktop infrastructure (VDI))
  - ο hardware (hypervisor)
  - ο network
  - ο storage
- Resource allocation (host, operating system (OS), memory, storage, CPU, network)
- Configuration (resource group names, network names, subnet network name, storage account name)

Explain the benefits and drawbacks of virtual machines

- Benefits (familiar interfaces, high availability, scalability, easy cloning, fast backup and recovery)
- Drawbacks (security, potential downtime, oversubscription)

Identify the benefits of cloud-based applications

- Automated application updates
- Availability on multiple devices/platforms - increased productivity
- Collaboration
- Reduces hardware costs
- Version control
- File compatibility
- Security
- Support
- Automated saving

What needs to be learned
Learning outcome 4: Understand cloud backup and recovery methods

Identify the features of a cloud backup policy

- Location (onsite, offsite)

- Types of backup (full, partial, differential, mirror, incremental)

- Frequency

Describe the steps of a disaster recovery plan

- Steps in a disaster recovery plan:

  o identify personnel (who monitors sales and cash flow, who makes decisions on business relocations, who can access the secure systems and who oversees each department to manage restoration of operations)

  o assess risks and impacts on each part of the organisation

  o provide step-by-step protocols (where the plan is to be found, what to do in the event of a disaster and who to contact)

  o identify new location and equipment (where staff can work if unable to open normal place of work, what technology is available, supplier for hardware and software)

  o identify backup locations (personnel involved, backup policies and disk of restore)

  o provide emergency communications (who to contact, how to contact and key messages)

  o agree timescales, service-level agreement (SLA)

- Process of maintaining a disaster recovery plan

  o keeping information up to date

  o testing protocols

  o mitigating risks

Further information for tutors and assessors

Essential resources

There are no special resources needed for this qualification.

Suggested reading/resources

Textbooks

Erl T – Cloud Computing: Concepts, Technology & Architecture (Prentice Hall, 2013) ISBN 978-0133387520

Kavis M J – *Architecting the Cloud* (Wiley, 2014) ISBN 978-1118617618

Rafaels R – *Cloud Computing from Beginning to End* (CreateSpace Independent Publishing Platform, 2015) ISBN 978-1511404587

Website

www.http://whatiscloud.com   Guide to Cloud Computing

Vendor qualifications

The standard has listed the following vendor qualifications as suitable for achievement in this element of the standard:

- MTA Server Admin
- Enabling 365 Services
- Enabling Office 365 Services
- Enabling 365 Identities and Requirements
- MTA Cloud Fundamentals
- Install Configure Windows Server 2012
- Administration of Windows Server
- Configure Advance Server 2012 Services

Essential information for assessment

This unit is externally assessed through an onscreen test. Pearson will set and mark this test. The test lasts for 35 minutes and is worth 20 marks. The assessment is available on demand.

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Unit 4: Coding and Logic

Level:	**3**
Unit type:	**Mandatory for Pearson BTEC Level 3 Award in Coding and Logic**
Assessment type:	**External**
Guided learning hours:	**19**

Unit introduction

The aim of this qualification is to ensure that learners understand a variety of coding and logic to enable them to carry out the role of Infrastructure Technician efficiently. This role includes the support of both internal and external customers, and focuses on the improvement of productivity through the use of technology, by using tools to problem solve and to troubleshoot IT infrastructure-related issues.

In this qualification you will gain the technical knowledge and understanding they require for the role. They will be able to understand the use of command line scripting to support server administration tasks, discuss how each stage of the application lifecycle management can impact business systems. They will also identify key factors in web page development.

Learning outcomes		Assessment criteria	
1	Understand algorithms, data structures and application lifecycle management (ALM)	1.1	State common uses of algorithms
		1.2	Describe how and when to use data structures
		1.3	Describe the ordered phases of application lifecycle management (ALM)
2	Understand how to create command line scripting	2.1	Explain the benefits of command line scripting
		2.2	Describe the uses of command line scripting
		2.3	Interpret command line scripts
3	Understand web development	3.1	Describe the components of web page development
		3.2	Describe uses of web protocols

Content

What needs to be learned
Learning outcome 1: Understand algorithms, data structures and application lifecycle management (ALM)

State common uses of algorithms

- Sorting (records, user groups, files)

- Searching (records, user groups)

- Pattern matching (files, data)

- Hashing (encoding)

Describe how and when to use these data structures

- Objects (state, behaviour)

- Arrays (1 dimensional, 2 dimensional)

- Stacks (LIFO)

- Queues (FIFO)

Describe the ordered phases of application lifecycle management (ALM)

- Requirements specification:

   ○ understand problem (problem definition, client requirements)

   ○ investigate and analyse (document the problem)

- Development:

   ○ design (functional and non-functional elements, user interface, design specification)

   ○ create solution (using coding to create the required solution)

- Testing:

   ○ debug and test (functional and non-functional testing, interface testing, fixing bugs)

   ○ documentation (user guide, technical manual)

- Deployment:

   ○ service management phase (deploy, operate, refine)

- Maintenance:

   ○ application management (monitor, optimise)

What needs to be learned
Learning outcome 2: Understand how to create scripting at command line

Explain the benefits of command line scripting

- Automation of repetitive tasks

- Consistency of code

- Portability of code

- Reliability of code

- Efficiency of code

- Reusability of code

- Creation of batch files

Describe the uses of command line scripting

- To partition disks

- To perform file and directory operations

- To change the ownership of files and directories

- To run diagnostics on file systems, networking, processes, security

- To map network folders, resources and printers

- To manage user accounts (creation, changing properties, deleting, changing rights)

- To create user groups

- To schedule tasks and processes:

    ο compressing and decompressing files

    ο installing utilities and applications

    ο updating operating systems and applications

Interpret command line scripts

Powershell:

- Pwd

- ls

- Cd

- Mkdir

- Rmdir

- Rm

- Touch

What needs to be learned

- Man
- Cp
- Mv
- Locate
- Chmod
- Hostname

Bash:

- Man
- Chmod
- Grep
- Ls
- Cp
- rm
- Cd
- Touch
- Mkdir
- Mv
- Kill
- Echo

Windows:

- Copy
- Del
- Find
- Mkdir
- Move
- Path
- Rmdir
- Ren
- Start
- Subst
- Taskkill
- Tree
- Xcopy

What needs to be learned
Learning outcome 3: Understand web development

Describe the components of web page development

- *Functions of web architecture:*
    - ο web server (hosts the website)
    - ο web client (displays web pages)
    - ο database (stores the data, manipulates data through queries using SQL)
- *Web page elements:*
    - ο CSS
    - ο HTML
    - ο XML
    - ο client and server-side scripting (PHP, JavaScript, jQuery, node.js, Ruby)
    - ο static web content
    - ο dynamic web content
    - ο cookies
    - ο session data storage
- *Describe the uses of web protocols:*
    - ο Hypertext Transfer Protocol (HTTP), GET, POST requests
    - ο Hypertext Transfer Protocol Secure (HTTPS/SSL)
    - ο File Transfer Protocol (FTP)

Further information for tutors and assessors

Essential resources

Learners will need access to practical resources and have the opportunity to work as an IT Technician apprentice providing first-line support to customers. Suitable technology must be made available. Simulators or multimedia tools can be used for learners to gain experience before handling 'live resources'.

Suggested reading/resources

Textbooks

Jain H – *Data Structures and Algorithms Using PHP 7* (CreateSpace Independent Publishing Platform, 2017) ISBN-13 978-1546375357

Robbins A – *Bash Pocket Reference* (O'Reilly, 2016) ISBN 978-1491941591

Shotts Jr. W E – *The Linux Command Line: A Complete Introduction* (W Pollock, 2012) ISBN 978-1593273897

Journal

www.journals.elsevier.com/journal-of-network-and-computer-applications/

Websites

https://www.w3schools.com

https://technet.microsoft.com

https://campustechnology.com

http://www.tutorialspoint.com

Vendor qualifications

The standard has listed the following vendor qualifications as suitable for achievement in this element of the standard:

- MTA Software Development Fundamentals
- App Development

Essential information for assessment

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Unit 5: Business Processes

Level:	**3**
Unit type:	**Mandatory for Pearson BTEC Level 3 Award in Business Processes**
Assessment type:	**External**
Guided learning hours:	**53**

Unit introduction

This qualification will explore the business processes used within IT infrastructure and will cover a range of topics that can be applied to the workplace. Learners will have the opportunity to apply various processes to the workplace such as security, help desk practices and IT policy. They will develop the range of business skills required for dealing with both customers and internal colleagues when working in an IT infrastructure technician role.

Learning outcomes		Assessment criteria	
1	Understand IT systems, platforms and security	1.1	Identify the purpose and features of IT systems and platforms used in an organisation
		1.2	Identify IT security procedures in the workplace
2	Understand working confidentially and organisational IT requirements	2.1	Describe how the elements of the CIA (confidentiality, integrity, availability) Triad help to protect data and information
		2.2	Describe the policies and procedures required to support IT infrastructure
		2.3	Describe the steps of a disaster recovery plan
		2.4	Describe confidential working procedures
3	Understand organisation-al operating procedures, legislation and IT business skills	3.1	Identify the purpose of standard operating procedures
		3.2	Identify the key principals of current IT legislation
		3.3	Explain the skills required by an infrastructure technician to support an organisation
4	Understand the software lifecycle and document management processes	4.1	Describe the stages within software lifecycles
		4.2	Identify how document management processes are used within business processes

Content

What needs to be learned
Learning outcome 1: Understand IT systems, platforms and security

Identify the purpose and features of IT systems and platforms used in an organisation

- Cross-functional
- Desktop applications
- Messaging systems
- Document management
- HR systems, human resource information system (HRIS)
- Sales/marketing, Customer Relationship Manager (CRM)
- Finance systems, Enterprise Resource Planner (ERP)
- Production flow systems (continuous, intermittent)
- Network support (remote access, asset management, troubleshooting)
- Help desk systems (fault management, troubleshooting)

Identify IT security procedures in the workplace

- Anti-malware checks
- Scheduling regular backups
- Authentication of credentials
- Password management and enforcement
- Patching software
- Configuration and setup of hardware and software
- Minimising human error
- Identifying and mitigating internal/external threats

What needs to be learned

Learning outcome 2: Understand working confidentially and organisational IT requirements

Describe how the elements of the CIA Triad (confidentiality, integrity, availability) help to protect data and information

Types of information that should be protected (employee information, management information, organisational information)

- Confidentiality
  - o authentication (multi-factor, two factor)
  - o no confidential information left out on desks
  - o not leaving confidential information visible on screens
  - o non-repudiation
  - o non-disclosure agreements (NDA)
  - o non-compete clauses
  - o safe storage of information: (locked rooms, password-protected drives, controlled access)
- Integrity:
  - o encryption
  - o firewalls
  - o backups
  - o access control (permissions, geolocation, time-restricted logon, concurrent logons, device filtering)
  - o reporting (whistleblowing, escalation, information commissioner)
- Availability:
  - o backups
  - o redundancy (Redundant Array of Independent Disks (RAID) devices, clustering, cloud)
  - o bandwidth
  - o planned downtime
  - o upgrades/patches

Describe the policies and procedures required to support IT infrastructure

- Acceptable use policy
- Security policy

What needs to be learned

- Disaster recovery policy

- Capacity planning and planned downtime

- Asset management

- Service level agreements (SLAs)

- IT service management (ITSM):

  ○ service strategy (portfolio management, financial management, demand management)

  ○ service design (availability management, capacity management, IT service-level management, continuity management, information security management, supplier management, service catalogue management)

  ○ service transition (change management, service asset and configuration management, knowledge management, release and deployment management, service validation and testing, evaluation, transition planning and support)

  ○ service operation (event management, incidence management, problem management, request fulfilment, access management, help desk functions)

  ○ continual service improvement (service measurement, service reporting, service improvement)

Describe the stages of a disaster recovery plan.

- Stages of a business continuity and disaster recovery plan:

  ○ prioritisation of business restoration

  ○ preventative measures

  ○ test plan

  ○ planned maintenance

  ○ recovery strategies

  ○ IT systems

  ○ backup of data

  ○ transfer of services

Identify confidential working procedures:

- Password protection (user accounts, folders, files)

- Password policy (complexity, frequency of change)

- Clear desk policy

- Locking computer screens

What needs to be learned
• Safe internet use (phishing, trusted websites, avoiding shoulder surfing)
• Safe use of public networks
• Encryption of portable devices
• Information security (secure drives, cloud storage, e-mail encryption, print facility)

What needs to be learned

Learning outcome 3: Understanding organisational operating procedures, legislation and IT business skills

Identify the purpose of standard operating procedures

- To provide a set of step-by-step instructions
- To help workers carry out complex tasks
- To improve efficiency
- To ensure uniformity
- To reduce miscommunications
- To ensure quality
- To ensure compliance with standards/regulations

Identify the key principals of current IT legislation

- Data protection (lawful processing of data, role and responsibilities of individuals and organisations)
- Computer misuse (misuse of data, misuse of equipment, misuse of systems)
- Equality and diversity legislation (equality of access to services and equipment)

Explain the skills required by an infrastructure technician to support an organisation

- Business skills (customer/stakeholder management):
  - communication skills (oral, written, face-to-face, managing expectations, building rapport)
  - time management skills (prioritisation, planning, collaboration)
  - working to SLAs (compliance to contractual obligations, meeting expectation)
- Technical skills:
  - analytics (trend analysis, fault analysis, user profiling)
  - testing (tool selection, methodologies)
  - design (methodologies, requirements gathering, prototyping)
  - hardware/software (configuration, installation, testing)
  - fault logging (escalation, prioritisation)

What needs to be learned

Learning outcome 4: Understand the software lifecycle and document management

Describe the stages within software lifecycles

- The Waterfall Model

  o analysis (gather data, interoperate data, identify need, identify purpose, establish feasibility)

  o design (user interface, functional and user specifications)

  o implementation (programming, documentation, progress monitoring)

  o testing (user acceptance testing, functionality, security)

  o deployment (installation, changeover, handover)

  o maintenance (bug fixes, updates, monitoring)

- Agile methods

  o scoping and prioritising projects (project definition, duration, feasibility, scope, resources required)

  o requirements for initial sprint (stakeholder meetings, project requirements, scheduling/project timeline, select team, allocate resources, define responsibilities)

  o construction and iteration (produce first iteration of product, working product containing minimum features, user/client feedback)

  o release iteration into production (product testing, fault fixing, product enhancement/development, produce/update system and user documentation, release current iteration)

  o production and ongoing support (bug fixing, user training, product enhancement)

  o retirement (identify retirement criteria, remove/retire digital product, introduce replacement)

Identify how document management processes are used within business processes

- Backup strategy (archive, full, partial, incremental, differential)

- Centralised storage (cloud, network)

- Version control (naming conventions, file types, update history, publication)

- Access control (password protection, classification, encryption)

- Watermarking (copyright, draft, confidential)

- Collaboration tools (mark-up, track changes, commenting, acceptance)

Further information for tutors and assessors

Essential resources

There are no special resources needed for this qualification.

Suggested reading/resources

Textbooks

Fleck B – *802.11 Security* (O'Reilly Media; 1 edition, 27 Dec. 2002) ISBN 0596002904

Iqbal, M and Nieves, M – *ITIL Service Strategy* (Stationery Office 30 May 2007)
ISBN 0113310455

Website

https://www.gov.uk/data-protection

Vendor qualifications

The standard has listed the following vendor qualifications as suitable for achievement in this element of the standard:

- CIQ Internet Business Associate
- ITIL Foundation Level

Essential information for assessment

This unit is externally assessed through an onscreen test. Pearson will set and mark this test. The test lasts for 35 minutes and is worth 20 marks. The assessment is available on demand.

The test assesses all of the learning outcomes. The questions in the test are based on each assessment criterion and its associated unit content.

The test consists of the following types of items: 20 multiple-choice items. Items in the test will not necessarily be sequenced in the order of the criteria in the unit. Test items will not rely on or directly follow on from another test item. Test items may use colour images/diagrams/graphs for the context of the question or for the answer options.

A Pass grade is determined by learners achieving a defined cut score for the test.

13 Further information and useful publications

To get in touch with us, visit our 'Contact us' pages:

- Edexcel, BTEC and Pearson Work-based Learning contact details: qualifications.pearson.com/en/support/contact-us.html

- books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk

Key publications:

- Guide to recruiting with integrity and enrolling learners onto qualifications (Pearson)

- *Access Arrangements and Reasonable Adjustments* (Joint Council for Qualifications (JCQ))

- *Supplementary guidance for reasonable adjustment and special consideration in vocational internally assessed units* (Pearson)

- *Suspected Malpractice in Examinations and Assessments, Policies and Procedures* (JCQ)

- *Collaborative and consortium arrangements for the delivery of vocational qualifications policy* (Pearson)

- *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy* (Pearson)

- *Equality and diversity policy* (Pearson)

- *Recognition of Prior Learning, policy and process* (Pearson)

- *UK Information Manual* (Pearson)

- *BTEC Quality Assurance Handbook*

- *Centre Guide to Managing Quality* (Pearson)

- *Use of languages in qualifications policy* (Pearson).

All of these publications are available on our website.

Publications on the quality assurance of BTEC qualifications are also available on our website.

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please visit our website.

Additional resources

If you need further learning and teaching materials to support planning and delivery for your learners, there is a wide range of BTEC resources available.

Any publisher can seek endorsement for their resources and, if they are successful, we will list their BTEC resources on our website.

14 Professional development and training

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered on our website.

The support we offer focuses on a range of issues, such as:

- planning for the delivery of a new programme

- planning for assessment and grading

- developing effective assignments

- building your team and teamwork skills

- developing learner-centred learning and teaching approaches

- building in effective and efficient quality assurance systems.

The national programme of training we offer is on our website. You can request centre-based training through the website or you can contact one of our advisers in the Training from Pearson UK team via Customer Services to discuss your training needs.

BTEC training and support for the lifetime of the qualifications

Training and networks: our training programme ranges from free introductory events through sector-specific opportunities to detailed training on all aspects of delivery, assignments and assessment. We also host some regional network events to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region.

Regional support: our team of Curriculum Development Managers and Curriculum Support Consultants, based around the country, are responsible for providing advice and support in centres. They can help you with planning and curriculum developments.

To get in touch with our dedicated support teams please visit our website.

Your Pearson support team

Whether you want to talk to a sector specialist, browse online or submit your query for an individual response, there's someone in our Pearson support team to help you whenever – and however – you need:

- Subject Advisors: find out more about our subject advisor team – immediate, reliable support from a fellow subject expert

- Ask the Expert: submit your question online to our Ask the Expert online service and we will make sure your query is handled by a subject specialist.

Please visit our website at: qualifications.pearson.com/en/support/contact-us.html

Mapping of the Level 3 Infrastructure Technician Apprenticeship Standard to the qualification content

The grid below maps the knowledge, skills and behaviours (KSBs) of the Level 3 Infrastructure Technician Apprenticeship to the content covered in the Pearson BTEC Knowledge Modules for the Level 3 Infrastructure Technician Apprenticeship Standard.

KEY

\# indicates coverage of the knowledge, skills or behaviours in the qualification.

A blank space indicates no coverage of the knowledge, skills or behaviours in the qualification.

BTEC Specialist qualifications		Networking and Architecture	Mobile and Operating Systems	Cloud Services	Coding and Logic	Business Processes
	Works both independently and as part of a team and following the organisations standards; competently demonstrating an ability to communicate both in writing and orally at all levels using a range of tools and demonstrating strong interpersonal skills and cultural awareness when dealing with colleagues, customers and client during all tasks					X
	Demonstrates the necessary skills and behaviours to securely operate across all platforms and areas of responsibilities in line with organisational guidance, legislation					X

BTEC Specialist qualifications	Networking and Architecture	Mobile and Operating Systems	Cloud Services	Coding and Logic	Business Processes
Effectively operate a range of mobile devices and securely add them to a network in accordance with organisations policies and procedures		X			
Effectively records, analyses and communicates data at the appropriate level using an organisation's standard tools and processes and to all stakeholders within the responsibility of the position					X
Applies structure techniques to common and non-routine problems, testing methodologies and troubleshooting and analyses problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required					X
Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems					X
Interprets and follows IT legislation to securely and professionally work productively in the work environment					X
Optimises the performance of hardware, software and network systems in line with business requirements	X	X	X	X	

BTEC Specialist qualifications	Networking and Architecture	Mobile and Operating Systems	Cloud Services	Coding and Logic	Business Processes
Can explain the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive)					X
Working Knowledge of a range of cabling and connectivity, the various types of antennas and wireless systems and IT test equipment	X				
Understands maintenance processes and applies them in working practices					X
Understands and applies the basic elements and architecture of computer systems	X				
Understands where to apply the relevant numerical skills e.g Binary	X				
Understand the relevant networking skills necessary to maintain a secure network	X				
Understand the similarities, differences and benefits of current Operating Systems available		X			

BTEC Specialist qualifications	Networking and Architecture	Mobile and Operating Systems	Cloud Services	Coding and Logic	Business Processes
Understands how to operate remotely and how to deploy and securely integrate mobile devices		X	X		
Understanding and working knowledge of Cloud and Cloud Services			X		
Understands the importance of disaster recovery and how a disaster recovery plan works and their role within it			X		X
Understands the similarities and differences between a range of coding and logic				X	
Understands and complies with business processes					X
Working knowledge of business IT skills relevant to the organisation					X