T LEVEL

Technical Qualification in Digital Data Analytics

Specification

First teaching from September 2025

Version 1.0 – May 2025

T Level Technical Qualification in Digital Data Analytics (Level 3)

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About Pearson

We are the world's leading learning company operating in countries all around the world. We provide content, assessment and digital services to learners, educational institutions, employers, governments and other partners globally. We are committed to helping equip learners with the skills they need to enhance their employability prospects and to succeed in the changing world of work. We believe that wherever learning flourishes so do people.

This specification is Version 1.0

Contents

1   Introducing the qualification

T Level programme

T Levels are two-year, Level 3 study programmes that follow the study of GCSEs and Technical Awards and offer an alternative to A Levels and Apprenticeships.

T Levels combine classroom theory, practical learning and a minimum 315 hours of industry placement with an employer. The work placement ensures students have real experience of the workplace.

T Level programmes are developed in collaboration with employers so that the content meets the needs of industry and prepares students for work. T Levels provide the knowledge and experience needed to progress to highly skilled employment, an Apprenticeship or higher-level study, including university.

Understanding the Specification and Administrative Guide

This specification should be read in conjunction with the Administrative Guide for Delivery and Assessment. The specification contains all the information you need to teach the Technical Qualification, including content and assessment details. The Admin Guide contains the information and references you need to register as a Provider, register students and administer their results. It also contains grading information and information on resources.

What is the Technical Qualification (TQ)?

The *T Level Technical Qualification in Digital Data Analytics* is the main classroom-based element of the T Level. Students will learn using a curriculum that has been shaped by industry experts.

During the two-year programme, students will acquire the core knowledge that underpins each industry. They will develop occupationally specific skills that will allow them to enter skilled employment within a specific occupation.

Technical Qualification and Outline Content

The Outline Content for the *T Level Technical Qualification in Digital Data Analytics* has been produced by T Level panels of employers, professional bodies and Providers. It is based on the Apprenticeship Standards.

Pearson has used the Outline Content to form the basis of the Technical Qualification specification. This includes:

- elaboration of the Outline Content to produce a specification that gives Providers an accurate interpretation of what needs to be taught and assessed
- enabling students to achieve threshold competence in relation to the Occupational Specialism component
- the integration of English, maths and digital competencies.

English, maths and digital competencies

English, maths and digital competencies are signposted against Occupational Specialism content. This is because these competencies are best enhanced when students are developing the knowledge and skills they need for threshold competence. The signposting suggests the content areas where the competencies can best be developed by students in the course of their learning. The competencies are indicated by abbreviations (e.g. E1) and the explanation of the abbreviations is contained in Appendix 1.

Employer and Provider panels

Pearson engaged with employer and Provider panels throughout the development of the Technical Qualification. This ensured:

- the content gives students quality preparation to help them progress
- assessments are realistic and assess the knowledge and skills that are important to employers
- the Technical Qualification meets the needs of Providers.

Pearson is grateful to all university and further education lecturers, teachers, employers, professional body representatives and other individuals who have generously shared their time and expertise to help us develop these new qualifications.

Qualification purpose

This Technical Qualification is for T Level students who are undertaking the *T Level in Digital Data Analytics*. It is intended for students who want to progress to a career in the digital sector.

The purpose of the *T Level Technical Qualification in Digital Data Analytics* (Level 3) is to ensure students have the knowledge and skills needed to progress into highly skilled employment, an Apprenticeship or higher-level study, including university, within the specialist area of Digital Data Analytics.

At the end of the Technical Qualification, students are expected to demonstrate threshold competence, meaning that they have gained the core knowledge and skills related to Digital Data Analytics and are well placed to develop full occupational competence with additional development and support once in employment in the digital sector.

Student profile and progression

Students undertaking this Technical Qualification will be 16–19 years old and in full-time education.

The typical student has:

- a clear idea about the industry sector in which they wish to pursue a career
- an idea of the type of job role they would like to explore as a career.

This Technical Qualification aligns to the Level 3 Apprenticeships in Data Technician. The qualification therefore supports progression to entry-level job opportunities in Digital Data Analytics.

Job roles could include:

- Data Analytics Technician roles.

Alternatively, students could progress to Level 3 Apprenticeships such as those mentioned above to develop and gain certification of full occupational competence, or they could progress to higher-level Apprenticeships such as the Level 4 Data Analyst, depending on their skills and/or experience.

Where students may not have access to an Apprenticeship or would prefer a more academic route, they could progress to relevant Higher National Certificate (HNC) or Higher National Diploma (HND) programmes or degree programmes.

Students must check the entry requirements for each degree programme with the relevant higher education provider.

2 Qualification summary and structure

Summary

Qualification title	T Level Technical Qualification in Digital Data Analytics (Level 3)
Qualification number (QN)	610/5800/2
First teaching	September 2025
This qualification replaces	603/6902/4 T Level Technical Qualification in Digital Business Services
Total Guided Learning Hours (GLH)	1160 hours (530 hours core)
Total Qualification Time (TQT)	1300 hours (600 hours core)
Occupational Specialism(s)	Data Analytics Technician (630 GLH, 700 TQT)
Components and weighting	Core Paper 1 = 30% of core (15% of total) Core Paper 2 = 30% of core (15% of total) Core ESP = 40% of core (20% of total) Core Component = 50% of total Occupational Specialism = 50% of total
Recommended age range	16–19
Grading information	Core and Employer Set Project (ESP) components are graded A*–E or unclassified. The Occupational Specialism (OS) component is graded Pass, Merit, Distinction or Unclassified. The overall grading is on a scale of Pass, Merit, Distinction, Distinction* or Unclassified. The overall grade is awarded by the Institute for Apprenticeships and Technical Education (IfATE).

Qualification title	T Level Technical Qualification in Digital Data Analytics (Level 3)
Entry requirements	There are no formal prior learning requirements. It is the Provider's responsibility to ensure students recruited have a reasonable expectation of success. Students are most likely to succeed if they have qualifications at Level 2 (for example, five GCSEs at grade 4 and above including English and maths or a vocational Tech Award pass at Level 2). Students may demonstrate the ability to succeed in various ways. For example, they may have relevant work experience or may have shown specific aptitude through diagnostic tests or other non-educational experience.
Assessment	• The core and ESP components are externally set and marked by Pearson. • The OS components are set by Pearson. These are externally marked by Pearson.

Assessment Structure

The *T Level Technical Qualification in Digital Data Analytics* has two mandatory components.

1. Core component

This component covers the underpinning knowledge, concepts and skills that support threshold competence in the digital industry.

The content for the Core component is provided in *Section 3*.

Assessment component	Assessment method	Duration	Marks	Weighting	Timetable	Availability
Core Paper 1	Written examination	2 hours 15 minutes	90	30%	Set date/time	June/ November
Core Paper 2	Written examination	2 hours 15 minutes	90	30%	Set date/time	June/ November
Employer Set Project	Externally set project	14 hours 30 minutes	100	40%	Set date/time	May/ November

2. Occupational Specialism component

There is one Occupational Specialism component in this Technical Qualification.

These components cover the Occupational Specialism knowledge and skills required to demonstrate threshold competence for the specialism. The Occupational Specialism is assessed by a skills-related project that synoptically assesses the Performance Outcome skills and associated underpinning knowledge.

The content for the Occupational Specialism component is provided in *Section 4*.

Assessment component	Assessment method	Duration	Marks	Weighting	Timetable	Availability
Data Analytics Technician	Externally set project	47 hours 30 minutes	134	100%	Windowed	March to May

What does the qualification cover?

The Technical Qualification content has been designed from the Outline Content created by the Institute for Apprenticeships and Technical Education and the Digital T Level panel.

We have used the Outline Content to create the Technical Qualification specification and assessment, which have been validated by our own panel of employers and Providers to ensure they are appropriate for the progression routes identified.

Students learn about the following topics:

- Problem solving
- Introduction to analytics
- Emerging issues
- Legislation and regulatory requirements
- Business context
- Data
- Digital environments
- Security.

3   Core Component

The content of the Core component has the core skills mapped to where there are opportunities to develop them. The competencies and skills are not expected to be developed at every point where they are mapped, but using this guidance teachers will embed them into teaching to prepare students for the assessments in the Core component.

The core skills are assessed through the Employer Set Project. The core skills for this Core component are as follows:

1. Be able to reflectively evaluate
2. Communicate information clearly to a technical and non-technical audience
3. Work with stakeholders to consider options to meet requirements
4. Develop software/Create an artefact
5. Apply a logical approach to solving problems:
   - identify and resolve faults
   - propose a solution to a 'data' problem
6. Ensure activity mitigates risks to security.

Content

Core paper 1

Content area 1: Problem solving	
Students will solve digital data analytics problems that form a complete solution or a sub-part of a solution. Students will use problem-solving skills to analyse problems and to identify solutions that can be represented as systems, processes, relationships or organisations of data.	
1.1 Computational thinking	
1.1.1	Know the definition and understand the purpose of computational thinking.
1.1.2	Know when to use computational thinking.
1.1.3	Know and understand the benefits and drawbacks of using computational thinking.
1.1.4	Know the components of computational thinking: - decomposition - pattern recognition - abstraction - algorithmic design.
1.1.5	Know and understand the benefits and drawbacks of using the components of computational thinking.
1.1.6	Know and understand the purpose of decomposition.
1.1.7	Know the tasks of decomposition: - identify the main features of a problem - characterise each identified feature - break problems down into smaller, more manageable parts - break solutions down into smaller, more manageable parts.
1.1.8	Be able to use decomposition for problem solving.
1.1.9	Know and understand methods to represent decomposition: - block diagrams - information flow diagrams - flowcharts - written descriptions.
1.1.10	Be able to use methods to represent decomposition.
1.1.11	Know and understand the purpose of pattern recognition.

1.1.12	Be able to use pattern recognition for problem solving: • find and interpret trends and similarities within and between problems and processes • find and interpret common features between a given problem and existing solutions • make predictions and assumptions based on identified patterns.
1.1.13	Know and understand the purpose of abstraction.
1.1.14	Know and understand the tasks of abstraction: • identify information that is needed • filter out unnecessary details • hide details of internal workings.
1.1.15	Be able to use abstraction: • what inputs are needed • what the expected outputs and outcomes are • things that will vary • things that will remain constant • key actions the solution must perform • repeated processes the solution will perform.
1.1.16	Be able to use abstraction in problem solving.
1.1.17	Understand the interrelationships between components of computational thinking and make judgements about the suitability of using the components in digital data analytics.
1.2 Algorithmic design	
1.2.1	Know the definition and understand the characteristics and purpose of algorithms.

1.2.2	Know and understand methods to express algorithms:
	
	• flowcharts:
	   o terminators
	   o processes
	   o sub-processes
	   o decisions
	   o inputs/outputs
	   o arrows
	   o labels
	
	• written descriptions using hierarchical markers to indicate sequence.

1.2.3	Know and understand the benefits and drawbacks of expressing algorithms in flowcharts.
1.2.4	Know and understand the benefits and drawbacks of expressing algorithms in written descriptions.

1.2.5	Know and understand actions to control ordering of steps in algorithms:
	• sequence
	• selection
	• iteration.
1.2.6	Be able to determine the purpose of an algorithm and how it works.
1.2.7	Be able to determine the output of an algorithm given an input.
1.2.8	Be able to identify errors in an algorithm.
1.2.9	Be able to correct errors in an algorithm.
1.2.10	Be able to design algorithms and solutions that use actions.
1.3 Strategies	
1.3.1	Know the different approaches to solving problems and understand their purpose and when they are used:
	• top-down
	• bottom-up
	• modularisation.
1.3.2	Know the benefits and drawbacks of using the different approaches to solving problems.
1.3.3	Understand the purpose of root cause analysis and when it is used.
1.3.4	Know and understand approaches to root cause analysis:
	• five whys
	• failure mode and effects analysis (FMEA)
	• event tree analysis (ETA)
	• actions to take after using root cause analysis:
	o log
	o close
	o escalate to an appropriate manager, specialist or external third party.
1.3.5	Know and understand the process of the high-level problem-solving strategy:
	• define the problem
	• gather information
	• analyse the information
	• make a plan of action
	• implement a solution
	• review the solution.
1.3.6	Know the definition of a digital incident in incident management:
	• a single unplanned event
	• that disrupts service operations
	• that negatively impacts service quality.

1.3.7	Know the definition of a digital problem, in incident management, as the cause of the incident.
1.3.8	Know and understand the process of incident management: • detection: report, record, prioritise • response: identify owner, resolve and restore, record resolution • intelligence: record lessons, identify cause, share lessons.
1.3.9	Understand the interrelationships between problems and problem-solving strategies and make judgements about the suitability of strategies for solving the problems in digital data analytics.

Content area 2: Introduction to analytics
Students will analyse digital data analytics problems that may involve software, people, processes and data. Students will use a variety of tools and techniques when developing a complete solution or a sub-part of a solution.
2.1 Data selection – database

2.1.1	Standard data formats.
2.1.1.1	Know the standard data formats and understand their purpose and when they are used: • integer • decimal • text • Boolean • date/time • currency • blob.
2.1.1.2	Be able to use standard data formats.
2.1.2	SQL.
2.1.2.1	Know SQL commands, understand their purpose and when they are used to manipulate data: • select • where • between • and, or, not • order by, group by, count • like, wildcards • union, inner join, left join, right join.
2.1.2.2	Be able to develop SQL commands to manipulate data.
2.1.2.3	Be able to use SQL commands to manipulate data.

	2.2 Importing and exporting
2.2.1	Understand the purpose of saving data to and importing data from text-based files.
	2.3 Tabular data – spreadsheet
2.3.1	Field validation.
2.3.1.1	Know the definition of validation checks and understand the purpose and when each is used: • presence • length • range • type • format • check digit.
2.3.1.2	Be able to use validation checks to ensure data is fit for processing.
2.3.2	Interrogate tabular data.
2.3.2.1	Know techniques to interrogate data and understand their purpose and when they are used: • order by field • sort on a field(s) • filter on field(s).
2.3.2.2	Be able to use techniques to interrogate data.
2.3.3	Spreadsheet formulae and functions.
2.3.3.1	Know formulae and functions and understand their purpose and when they are used to manipulate data: • VLOOKUP, HLOOKUP • PIVOT TABLES • IF • SUMIFS • COUNTIFS • COUNTA • CONCATENATE • LEFT/RIGHT/MID • IF ERROR • AND • OR • NOT
2.3.3.2	Be able to use formulae and functions to manipulate data.

2.4 Functions and affordances of analysis software	
2.4.1	Know and understand the functions and affordances of database software.
2.4.2	Know and understand the functions and affordances of spreadsheet software.
2.4.3	Understand the interrelationships between functions and affordances of database and spreadsheet software and make judgements about the suitability of software for solving the problems in digital data analytics.
2.5 Cleaning datasets	
2.5.1	Know and understand the suitability of data: • fit for purpose • unfit for purpose.
2.5.2	Know and understand the errors in data that need cleaning: • incomplete values or erroneous values • differently typed, formatted or named fields • errors in the use of case • transposition errors • spelling errors.
2.5.3	Know and understand records unfit for processing: • blank, duplicates, out of date • out-of-date fields.
2.5.4	Know and understand that data can be decomposed and recomposed: • decomposed into constituent parts • recomposed so that the whole is fit for purpose.
2.5.5	Know and understand how to design processes: • handle errors in data • handle records unfit for processing • decompose data into constituent parts • recomposed to be fit for purpose.
2.5.6	Be able to design and use processes to clean datasets so they are fit for purpose.
2.6 Patterns and trends	
2.6.1	Know and understand the purpose of predictive data modelling: • identifying patterns • identifying trends.
2.6.2	Know the definition for regression, understand its purpose and when it is used.

2.6.3	Know and understand anomalies in data and the impact they have on data analysis:
	• outliers
	• skewed data.
2.6.4	Be able to use analysis techniques to find patterns and trends in datasets:
	• interrogating data
	• cleaning data
	• handling outliers
	• handling skewed data
	• applying regression.

2.7 Characterisation of datasets	
2.7.1	Know and understand the purpose of statistical measures of central tendency and when they are used:
	• mean
	• mode
	• median
	• weighted mean.
2.7.2	Know and understand the purpose of statistical measures of dispersion and when they are used:
	• minimum
	• maximum
	• range
	• standard deviation
	• variance
	• frequency counts.
2.7.3	Know and understand the purpose of statistical measures of position and when they are used:
	• quartiles
	• percentiles.
2.7.4	Know and understand descriptions of datasets:
	• the inputs of the cleaning process
	• the outputs of the cleaning process
	• patterns and trends
	• statistical measures.
2.7.5	Know formulae and functions and understand their purposes and when they are used:
	• statistical measures of central tendency
	• statistical measures of dispersion
	• statistical measures of position.
2.7.6	Be able to characterise datasets.

	2.8 Technical documentation	
2.8.1	Information flow diagrams.
2.8.1.1	Understand information flow diagrams and their purpose and when they are used.
2.8.1.2	Know and understand how information flow is expressed in information flow diagrams: • boxes • arrows • labels. See symbols in *Appendix 2*.
2.8.1.3	Be able to interpret information flow diagrams that represent systems.
2.8.1.4	Be able to create and complete information flow diagrams to represent systems.
2.8.2	Entity relationship diagrams (ERDs).
2.8.2.1	Understand ERDs, their purpose and when they are used.
2.8.2.2	Know and understand the characteristics of database schemas and their purpose: • tables • entities/records • attributes/fields • primary keys • foreign keys • composite keys • relationships • cardinality of relationships: 1:1, 1:M, M:M (one-to-one, one-to-many, many-to-many).
2.8.2.3	Know and understand how database schemas are expressed in ERDs. See symbols in *Appendix 2.*
2.8.2.4	Be able to interpret ERDs that express database schemas.
2.8.2.5	Be able to create and complete ERDs to represent database schemas.
2.8.3	Data flow diagrams (DFDs).
2.8.3.1	Understand DFDs, their purpose and when they are used.
2.8.3.2	Know and understand how data flow is expressed in DFDs: • data sources • data destinations • processes • data stores • arrows • labels. See symbols in *Appendix 2*.

2.8.3.3	Be able to interpret DFDs that represent systems.
2.8.3.4	Be able to create and complete DFDs that represent systems.
2.9 Testing	
2.9.1	Testing components.
2.9.1.1	Understand the reasons for testing individual components of a solution before putting them together in the final solution: • software • hardware • data • interfaces • resulting service (final product).
2.9.2	Testing methods.
2.9.2.1	Know a definition of testing methods and understand their purpose, benefits and drawbacks, and when they are used: • concept • unit • boundary • integration • performance • system • acceptance • usability • regression • load/stress • closed box • open box.
2.9.2.2	Be able to use testing methods.
2.9.3	Automation.
2.9.3.1	Know and understand the purpose of automation methods and when they are used: • macros • scripts.
2.9.4	Test data and test plan.
2.9.4.1	Know a definition for types of test data and understand the purpose of test data and when it is used: • valid • invalid • boundary • erroneous.
2.9.4.2	Be able to create test data.

2.9.4.3	Know and understand the steps and structure of a test plan and when it is used:
	• identifying tests to be carried out
	• describing the purpose of the identified test
	• identifying test data to be used
	• describing the expected results
	• recording actual results.
2.9.4.4	Know and understand methods to check the believability and accuracy of results:
	• logical reasoning:
	○ all relevant and appropriate inputs are included, without bias in selection
	○ results make sense in relationship to the inputs
	• verification by a subject matter expert
	• use of test plans.
2.9.4.5	Know and understand methods to confirm that errors are not introduced during cleaning:
	• sampling a range of fields that have been subject to cleaning
	• comparing the sample against the original.

Content area 3: Data
Students will develop fundamental knowledge and understanding of data relevant to digital data analytics in order to communicate with other professionals.
Students will understand how to store, access, quality-assure, manipulate, analyse and process data.
3.1 Data, information and knowledge

3.1.1	Know and understand the differences and relationships between:
	• data
	• information
	• knowledge.
3.1.2	Know and understand sources for generating data:
	• humans: surveys, forms
	• artificial intelligence (AI)/machine learning: dangers of feedback loop
	• sensors: temperature, accelerometer, vibration, sound, light, pressure
	• Internet of Things (IoT): smart objects (thermostats, lights, security camera, trackers)
	• transactions: customer data, membership, timing, basket.

3.1.3	Know and understand ethical data practices and the metrics to determine the value of data:
	• quantity
	• time frame
	• source
	• veracity.
3.1.4	Understand how organisations use data and information:
	• analysis to identify patterns
	• system performance analysis: load, outage, throughput, status
	• user monitoring: login/logout, resources accessed
	• targeted marketing: discounts, upselling
	• threat/opportunity assessment: competitors, security, compliance.
3.1.5	Understand the interrelationships between data, information and the way data is generated and make judgements about the suitability of data, information and the way data is generated in digital data analytics.
3.2 Methods of transforming data	
3.2.1	Know and understand methods of transforming data:
	• manipulating
	• analysing
	• processing.
3.3 Data taxonomy	
3.3.1	Know the definition of each category, understand its purpose, and understand that data is categorised as:
	• quantitative
	• qualitative.
3.3.2	Know the definition for structured data, understand its purpose and understand that quantitative data is structured.
3.3.3	Know the definition for unstructured data, understand its purpose and understand that qualitative data is unstructured.
3.3.4	Know the definition for each representation and understand the representations of quantitative data:
	• discrete values
	• continuous values
	• categorical values.
3.3.5	Know and understand the properties of qualitative data:
	• stored and retrieved only as a single object
	• codified into structured data.
3.3.6	Understand the interrelationships between data categories, data structure and transformation and make judgements about the suitability of data categories, data structure and transformation in digital data analytics.

	3.4 Data types
3.4.1	Know the definition of common data types and understand their purpose and when each is used: • integer • real • character • string • Boolean • date • Blob.
3.4.2	Understand the interrelationships between structured data, unstructured data and data type.
3.4.3	Understand the interrelationships between data type and data transformation.
3.4.4	Be able to make judgements about the suitability of using structured data, unstructured data, data types and data transformations in digital data analytics.
	3.5 Data formats
3.5.1	Know the definition of common data formats and understand their purpose and when each is used: • JSON • Text file • CSV • UTF-8 • ASCII • XML.
3.5.2	Understand the interrelationships between data format and data transformation and make judgements about the suitability of using data formats in digital data analytics.
	3.6 Structures for storing data
3.6.1	Understand the role of metadata in providing descriptions and contexts for data.
3.6.2	Know the definition of file-based directory-based structures and understand their purposes and when they are used.
3.6.3	Know the definition of hierarchy-based structure and understand its purpose and when it is used.
3.6.4	Understand the interrelationships between storage structures and data transformation.

3.7 Data dimensions and maintenance	
3.7.1	Know the definitions of the six Vs (dimensions) and understand the six Vs (dimensions) of Big Data and their impact on gathering, storing, maintaining and processing: • volume • variety • variability • velocity • veracity • value.
3.7.2	Know the definition of Big Data and understand that it has multiple dimensions.
3.7.3	Understand the impact of each dimension on how data is maintained and transformed.
3.7.4	Know the definitions of data quality assurance methods and understand their purpose and when each is used: • validation • verification • reliability • consistency • integrity • redundancy.
3.7.5	Know and understand factors that affect how data is maintained: • time • skills • cost.
3.7.6	Understand the interrelationships between the dimensions of data, quality assurance methods and factors that impact how data is maintained and make judgements about the suitability of maintaining, transforming and quality assuring data in digital data analytics.
3.8 Data systems	
3.8.1	Know the definition of data wrangling and understand its purpose and when it is used.
3.8.2	Know and understand the purpose of each step of data wrangling: • structure • clean • validate • enrich • output.

3.8.3	Know and understand the purpose of each core function of a data system:
	• input
	• search
	• save
	• integrate
	• organise (index)
	• output
	• feedback loop.
3.8.4	Know the types of data entry errors and understand how and why they occur:
	• transcription errors
	• transposition errors.
3.8.5	Know and understand methods to reduce data entry errors:
	• validation of user input
	• verification of user input by double entry
	• drop-down menus
	• pre-filled data entry boxes.
3.8.6	Know and understand the factors that impact implementation of data entry:
	• time needed to create the screens
	• expertise needed to create screens
	• time needed to enter the data.
3.8.7	Understand the relationship between factors that impact data entry and data quality and make judgements about the suitability of methods to reduce data entry errors in digital data analytics.
3.8.8	Understand the relationship between factors that impact implementation of data entry and make judgements about the suitability of implementing data entry in digital data analytics.
3.9 Data visualisation	
3.9.1	Know and understand data visualisation formats and when they are used:
	• graphs
	• charts
	• tables
	• reports
	• dashboards
	• infographics.
3.9.2	Know and understand the benefits and drawbacks of data visualisation formats based on:
	• type of data
	• intended audience
	• brief.

3.10 Data models	
3.10.1	Know the types of data models and understand how they organise data into structures: • hierarchical • network • relational.
3.10.2	Know and understand the factors that impact the selection of data models for organising data: • efficiency of accessing individual items of data • efficiency of data storage • level of complexity in implementation.
3.10.3	Understand the benefits and drawbacks of the models and make judgements about the suitability of the models in digital data analytics.
3.10.4	Be able to draw and represent data models: • hierarchical models with blocks, arrows and labels • network models with blocks, arrows and labels • relational models with tables, rows, columns and labels.
3.11 Data access across platforms	

3.11.1	Understand the features, purposes, benefits and drawbacks of accessing data across platforms:
	• permissions:
	  ○ authorisation
	  ○ privileges
	  ○ access rights
	  ○ rules
	• access mechanisms:
	  ○ role-based access (RBAC)
	  ○ rule-based access control (RuBAC)
	  ○ Application Programming Interfaces (API).

3.11.2	Know and understand the benefits and drawbacks of methods to access data across platforms.
3.11.3	Understand the interrelationships between data access requirements and data access methods and make judgements about the suitability of accessing data in digital data analytics.
3.12 Data analysis tools	

3.12.1	Know data analysis tools and understand their purpose and when they are used:
	• storing Big Data for analysis:
	  ○ data warehouse
	  ○ data lake
	  ○ data mart

	• analysis of data:
	 ○ data mining
	 ○ reporting
	• use of business intelligence gained through analysis:
	 ○ financial planning and analysis
	 ○ customer relationship management (CRM):
	  – customer data analytics
	  – communications.

3.12.2	Understand the interrelationships between data analysis tools and the scale of data.

Core paper 2

Content area 4: Legislation and regulatory requirements	
4.1 Legislation	

4.1.1	Understand the key points and implications for employers of the relevant health and safety legislation:
	• Health and Safety at Work Act:
	  ○ key points:
	    – provide a safe working environment
	    – ensure staff are properly trained
	    – adequate welfare provision
	    – provide relevant information, instruction and supervision
	• display screen equipment:
	  ○ implications for employers:
	    – conduct a display screen equipment workstation assessment
	    – reduce risks including making sure workers take breaks from display screen equipment work
	    – provide an eye test if an employee asks for one
	    – provide training and information for employees.

4.1.2	Understand the health and safety risks and preventative measures of working with digital systems:
	• possible risks:
	  ○ using display screen equipment
	  ○ health and safety requirements
	• methods of mitigating risk:
	  ○ adequate training
	  ○ safe working environment
	  ○ safe working practices.

4.1.3	Understand data security and protection legislation, including their effect on organisations and individuals:
	• Data Protection Act/General Data Protection Regulation:
	  ○ purpose of legislation
	  ○ eight principles.

4.1.4	Understand computer misuse legislation: • the principles of the Computer Miuse Act (CMA) 1990 • consequences for company and employee • employee awareness • types of crime covered by legislation.

4.1.5	Understand equality legislation:
	- the nine protected characteristics
	- types of discrimination:
	○ direct
	○ indirect
	○ harassment
	○ victimisation
	- where individuals are protected
	- when to take action against discrimination:
	○ time limits for claims.
4.1.6	Understand intellectual property legislation:
	- unregistered designs
	- registered designs
	- patents.
4.1.7	Understand the interrelationships between digital data analytics and digital legislation, and make judgements about the impact on organisations, society and individuals.
4.1.8	Know that international law applies to some offences:
	- international law in cyberspace
	- international law and surveillance.
4.2 Guidelines	
4.2.1	Know the sources of codes of conduct:
	- organisational
	- professional:
	○ British Computer Society (BCS)
	○ Institution of Analysts and Programmers (IAP)
	○ Chartered Institute of Information Security (CIISec)
	- governmental.
4.2.2	Understand how guidelines in codes of conduct influence professional behaviour:
	- ensuring individuals follow policies, procedures and legislation
	- ensuring quality of work:
	○ minimising risk to the public
	○ acting with competence and integrity
	- meeting deadlines
	- effective communication
	- maintaining confidentiality and trust.

4.2.3	Know the sources of digital industry standards:
	• International Organization for Standardization (ISO)
	• Web Content Accessibility Guidelines (WCAG)
	• World Wide Web Consortium (W3C®)
	• Internet Engineering Task Force (IETF)
	• British Standard (BS)
	• Institute of Electrical and Electronics Engineers (IEEE)
	• Payment Card Industry Security Standards Council (PCI SSC).
4.2.4	Understand the purpose of acceptable use policies (AUP):
	• purpose of AUP
	• typical content:
	○ permitted activities
	○ prohibited activities
	○ working practices including confidentiality
	○ communication etiquette including projecting correct organisation image
	○ sanctions/penalties.
4.2.5	Understand the importance of whistleblowing procedures.
4.2.6	Understand the interrelationships between digital data analytics and guidelines, and make judgements about the impact on organisations, society and individuals.

Content area 5: Business context	
5.1 Business environment	
5.1.1	Know the purpose and sectors of different types of organisations:
	• purpose of the organisation:
	○ providing a service
	○ providing a product
	• private sector:
	○ small or medium-sized enterprise (SME)
	○ large enterprise
	○ non-governmental organisation (NGO)
	• public sector
	• voluntary/charity:
	○ not for profit.
5.1.2	Know the names and definitions of different business models:
	• Business to Customer (B2C)
	• Business to Business (B2B)
	• Business to Many (B2M).

5.1.3	Know the different types of stakeholders:
	• internal stakeholders:
	o owners
	o directors
	o employees
	• external stakeholders:
	o customers/clients
	o suppliers
	o shareholders
	o outsourced services
	o investors/funders
	o government.

5.2 Digital value to organisations

5.2.1	Understand how digital systems are used to support key organisation areas:
	• sales and marketing:
	o better market research
	o better brand promotion, including social media
	o online selling
	o contextualising customer behaviour to personalise services offered
	o better customer retention
	o brand differentiation and values
	o use of analytical tools, including search and social media analytics
	• research, design and development:
	o provision of unique products and services
	• Human Resources:
	o staff records
	o performance management
	o training records
	• operations:
	o enhanced internal communication
	o automation of internal processes
	o automated manufacturing
	o remote working
	o intranet/shared workspaces
	o document sharing and online shared storage
	• management:
	o real-time monitoring of key performance indicators
	– sales
	– customers served
	– units measured
	– real-time location of assets

		• logistics:
		   ○ automated stock control
		• finance:
		   ○ reduced costs
		   ○ increased revenue
		   ○ better financial reporting via up-to-date information.

	5.2.2	Understand how digital systems are used to meet user needs and ensure quality of product/service:
		• appropriate and effective functionality:
		   ○ allows users to do all required tasks
		• reduction of pain points:
		   ○ response time (communication of expected response time, notification of change in response time)
		   ○ complexity of task
		• appropriate accessibility provision:
		• compatibility:
		   ○ with internal legacy systems
		   ○ with proposed future systems
		   ○ with external services
		• availability of service:
		   ○ minimise downtime
		   ○ future proofing for update
		• effective end user support:
		   ○ provision of digital support
		• ease of installation:
		   ○ provision of installation package.

5.3 Risk to organisations of using digital systems		

	5.3.1	Understand the potential risks to organisations when using digital systems:
		• security breaches:
		   ○ compromised confidentiality
		   ○ loss of integrity
		   ○ reduced availability
		• privacy breaches:
		   ○ personal information
		   ○ business information
		• regulatory and legal non-compliance
		• audience exclusion:
		   ○ biases
		   ○ poor user experience
		• emerging rival technologies

	• technical issues:
	    ○ reliance and system failure
	    ○ system not fit for purpose.

5.3.2	Understand the potential impact of risks to organisations when using digital systems: • legal action • fines • reputational damage • withdrawal of licence to practise • loss of business.
5.4 Technical change management	

5.4.1	Understand the internal factors that trigger change in organisations:
	• internal factors:
	    ○ organisational restructuring
	    ○ expansion
	    ○ downsizing
	    ○ new strategic objectives:
	        – diversification
	        – rebranding
	        – additional features or services.

5.4.2	Understand the external factors that trigger change in organisations:
	• political:
	    ○ change in government
	    ○ conflict
	    ○ shift in government priorities
	• economic:
	    ○ provision of new services
	    ○ recession
	    ○ inflation
	    ○ interest rates
	    ○ consumer trends
	    ○ new competitors
	    ○ entering new markets
	• social:
	    ○ changes in demographics
	    ○ market/social trends
	    ○ adapting to remote working
	    ○ cultural expectations

	- technological:
	     o emergence of new technologies
	     o retirement of obsolete technologies
	     o system failure
	     o zero-day vulnerabilities
	 - legal:
	     o new legislation
	     o changes to legislation
	 - environmental:
	     o sustainability issues
	     o pandemics
	     o natural disasters.

5.4.3	Understand how organisations can respond to change:
	 - new or amended policies
	 - new or amended business processes:
	     o change in staffing numbers
	     o change in delivery schedules
	     o change in opening hours
	 - new or amended products or services:
	     o completely new products or services
	     o next-generation products or services
	     o minor updates to existing products or services
	 - new or improved digital systems:
	     o back-end systems
	     o customer-facing systems
	 - improved training
	 - restructuring:
	     o change in management structure
	     o redrawing of boundaries.

5.4.4	Understand the processes, benefits and drawbacks of the change management process:
	 - identifying type of change:
	     o new system
	     o amendment to existing system
	 - role of change advisory board (CAB):
	     o prioritise change requests
	     o review change requests
	     o stages of approval

		o monitor change process:
		– collate and analyse data
		– check change is implemented
		– take action to accelerate change
		o provide feedback

o monitor change process:
  – collate and analyse data
  – check change is implemented
  – take action to accelerate change
o provide feedback

- identifying the changes to be made:
  o using SMARTER objectives (specific, measurable, achievable, realistic, time-bound, evaluated, reviewed)
- identifying impact of change:
  o measure/forecast positive and negative impact
  o analysis of positive and negative impact
- allocation of resources:
  o budget
  o time
  o staffing
  o hardware and software
- identifying and communicating potential risks and desired impact(s) to stakeholders:
  o gain acceptance
  o ensure compliance
- configuration of the new system or process:
  o integration with legacy systems
  o maintaining service during change
- importance of fully testing new systems:
  o reproducibility of results
  o test environment including hardware and software
- method of implementing change:
  o parallel
  o phased
  o direct
  o pilot
- documenting the change process:
  o ensuring requirement traceability, including responsibility and accountability
  o maintaining up-to-date information
  o recording of all decisions
  o retaining change documentation
  o user training manuals
- importance of rollback planning:
  o backup methodology
  o backup location
  o recover plan

	• identifying training needs:
	   ○ new training requirements
	   ○ refresher courses
	• identifying methods of monitoring progress:
	   ○ post-progress review
	• version control.

5.4.5	Understand the factors that determine the feasibility of a digital project:
	• benefits and drawbacks:
	   ○ financial savings
	   ○ cost of implementing change
	   ○ impact on processes, including productivity gains, improved communication and security
	   ○ provision of new products
	   ○ impact on company reputation
	• risks:
	   ○ resistance to change from workforce
	   ○ misuse of new systems
	   ○ inadequate support for new system
	   ○ inadequate knowledge of new system
	   ○ disruption caused by implementation of new systems
	• constraints:
	   ○ budget
	   ○ time
	   ○ human resources and technological resources.

Content area 6: Emerging issues
6.1 Impact of digital technologies

6.1.1	Understand how the increased reliance on digital systems impacts:
	• organisational culture:
	   ○ changes in communication methods (face to face, email, video calls)
	   ○ increased productivity and availability expectations
	   ○ increase in staff monitoring
	   ○ new working practices (remote/hybrid/in-office working)
	   ○ automation of services including the use of artificial intelligence (AI)
	• society:
	   ○ loss of jobs
	   ○ shift in skill requirements
	   ○ reduction in human decision making and loss of empathy
	   ○ privacy (digital footprint, surveillance)
	   ○ changing behaviours (loss of social skills, digital identity)
	   ○ access to wider social networks (personal and professional)

	- access to online services (government, commercial and entertainment) - potential isolation (lack of skill, equipment, connectivity, resistance to change) - improved access to information (professional and personal) - increased use of AI including generative AI (textual, graphical, video and audio) - globalisation: – access to global media sources.
6.1.2	Understand the importance of digital inclusion: - ensuring fair access to digital services: - suitable technologies (hardware and software) - connectivity - checking for bias within datasets - conforming to codes of best practice - public sector bodies' websites and mobile applications accessibility regulations: – key features and purpose.
6.1.3	Understand how end user characteristics affect the use of and inclusivity of digital systems: - age - skills: - digital - literacy - internal/external audience - cultural issues, including bias in digital systems - additional needs: - accessibility issues.
6.1.4	Know and understand the benefits of professional development: - increased industry and sector competence - increased employability potential and employment security - achieving access to knowledge of and adherence to industry standards.
6.2 Emerging technologies	
6.2.1	Understand how developments in technologies impact organisations, individuals and society: - storage media: - increased demand for storage - processing technologies: - quantum computing - Internet of Things: - edge computing - use within different contexts (industrial, smart city, domestic)

	- artificial intelligence:
	  ○ generative AI
	  ○ machine learning
	- extended reality:
	  ○ augmented reality
	  ○ virtual reality
	- open source software
	- blockchain
	- environmental:
	  ○ consumption of rare metals
	  ○ energy to produce electronic systems
	  ○ environmental impact of disposal
	- autonomous machines:
	  ○ self-driving cars
	  ○ robotic assembly lines.

6.2.2	Understand the interrelationships between digital and emerging technologies and make judgements about their impacts on organisations, society and individuals in digital data analytics.

Content area 7: Digital environments
7.1 Hardware

7.1.1	Understand the features and use of different types of physical computers: - personal computers - mobile devices (smartphones and tablets) - servers - embedded devices.

7.1.2	Understand the features and use of different types of hardware devices:
	- input devices
	- output devices
	- processors:
	  ○ number of cores
	  ○ clock speed
	  ○ cache size
	  ○ mobile processors
	- main memory:
	  ○ RAM (Random Access Memory)
	  ○ ROM (Read-only Memory)
	- secondary storage:
	  ○ magnetic
	  ○ solid state
	  ○ optical
	- motherboard

	- graphics processing units
	- network interface devices:
	   ○ PCI (Peripheral Component Interconnect)
	   ○ USB (Universal Serial Bus)
	- cooling:
	   ○ air cooling
	   ○ liquid cooling
	- sensors.

7.2 Software	

7.2.1	Understand the features and use of operating systems:
	- batch:
	   ○ non-interactive applications
	   ○ high volume
	   ○ scheduling
	- multitasking:
	   ○ concurrent execution of multiple tasks
	   ○ time-slicing
	   ○ interrupts
	- real-time operating system:
	   ○ monitoring and control applications
	   ○ transaction processing
	- network operating system:
	   ○ resource sharing
	   ○ user management
	   ○ communication
	- mobile operating system:
	   ○ smartphones and tablets
	   ○ lower processing requirements
	   ○ increased battery life.

7.2.2	Understand the features and use of common utilities: - file management - defragmenters - file compression - package managers - protection software - backup software.

7.2.3	Understand the features and use of common application software:
	• word processors
	• spreadsheets
	• databases
	• email
	• project management software.

7.3 Networks	
7.3.1	Understand the benefits and drawbacks of connecting devices to form networks.
7.3.2	Understand the features of different types of networks:
	• number of users
	• connection media
	• coverage area
	• network types:
	o Personal Area Network (PAN)
	o Local Area Network (LAN)
	o Metropolitan Area Network (MAN)
	o Wide Area Network (WAN).
7.3.3	Understand the features, characteristics, benefits and drawbacks of connectivity methods:
	• wired:
	o copper/ethernet
	o fibre-optic
	• wireless:
	o wireless access points.
7.3.4	Understand the features, benefits and drawbacks of the common network topologies:
	• star
	• mesh
	• tree
	• logical versus physical.
7.3.5	Understand the features, benefits and drawbacks of different network models:
	• client-server
	• thin client
	• peer-to-peer.

7.3.6	Understand the role of common components of a network:
	• server
	• client
	• router
	• network switch
	• internet connection/internet backbone.
7.3.7	Understand the seven-layer OSI (open systems interconnection) model, including the function and related protocols of each layer:
	• application layer
	• presentation layer
	• session layer
	• transport layer
	• network layer
	• data link layer
	• physical layer.
7.3.8	Understand the four-layer TCP/IP (transmission control protocol/internet protocol) model, including the function and related protocols of each layer:
	• application layer
	• transport layer
	• internet layer
	• network layer.
7.3.9	Understand the role of data packets in transmitting over a network:
	• contents and structure of a data packet
	• role of the components of a data packet
	• packet switching:
	o causes of packet loss
	• error handling:
	o cyclic redundancy check (CRC).
7.3.10	Understand the role of common network protocols:
	• web protocols:
	o HTTP
	o HTTPS
	• mail protocols:
	o SMTP
	o POP
	o IMAP
	• routing protocols:
	o RIP
	o OSPF

	application protocols:
	○ FTP
	○ SFTP
	○ DHCP
	○ DNS.
7.3.11	Understand the concepts of bandwidth and latency, and their effect on the performance of networks and connected systems.

7.4 Virtual environments	

7.4.1	Understand the role and characteristics of common virtual environment components:
	
	 • virtual machines:
	   ○ clients (virtual PC, virtual switch, virtual router)
	   ○ servers
	 • hypervisors:
	   ○ type 1
	   ○ type 2.

7.4.2	Understand the key features of virtual environments: • increased security • managed execution • sharing • aggregation • emulation • isolation • portability.
7.4.3	Understand the benefits of the use of virtual environments: • cost effectiveness for large environments • easy management • resilience • potentially lower carbon footprint • improved disaster recovery options • better testing environments • provision of education and training options.
7.4.4	Understand the drawbacks of the use of virtual environments: • extra hardware load • slower execution time • potential for false representation of performance.

7.5 Cloud environments	
7.5.1	Understand different types of cloud: • private • public.

7.5.2	Understand the benefits of the use of cloud:
	• portability
	• elasticity
	• fewer storage limitations
	• cost effectiveness.
7.5.3	Understand common cloud delivery models, their advantages and disadvantages, and the way in which responsibility and ownership of resources are distributed between the client and the cloud provider:
	• Infrastructure as a Service (IaaS):
	o client manages application software, system software (middleware and operating system), runtime, data and user accounts
	o cloud provider manages virtualisation and hardware (servers, network and storage)
	• Platform as a Service (PaaS):
	o client manages application software, data and user accounts
	o cloud provider manages virtualisation, hardware (servers, network and storage) and systems software (middleware and operating system) and runtime
	• Software as a Service (SaaS):
	o client manages user accounts and data
	o cloud provider manages virtualisation, hardware (servers, network and storage), systems software (middleware and operating system), runtime and application software.
7.6 Resilient digital environments	
7.6.1	Understand the benefits of resilient environments and the impact on organisations and clients:
	• increased security:
	o data security (storage and transfer)
	o reduce vulnerabilities
	• increased reputation:
	o protect brand/image
	o retain customer confidence
	• reduction in downtime.
7.6.2	Understand methods used to improve the resilience of digital environments:
	• software updates/upgrades:
	o planned updates/upgrades
	o patches in response to new vulnerabilities
	• hardware replacement:
	o rolling replacement plans
	o secure disposal
	• data and system redundancy

- device hardening:
  - removal of unneeded ports, applications, permissions and access
- backup systems and recovery procedures:
  - onsite
  - remote/offsite
  - cloud
- hot, cold and warm sites
- standard operating procedures:
  - effective staff training
  - induction
  - new digital systems
  - new or updated policies.

Content area 8: Security
8.1 Security risks

8.1.1	Know the type of confidential information held by organisations:
	 • Human Resources:
	  ○ salaries and benefits
	  ○ staff personal details
	 • commercially sensitive information:
	  ○ client details
	  ○ stakeholder details
	  ○ intellectual property
	  ○ sales numbers
	  ○ contracts
	 • access information:
	  ○ usernames
	  ○ passwords
	  ○ multi-factor authentication details
	  ○ personal identification number (PIN)
	  ○ access codes
	  ○ passphrases
	  ○ biometric data.

8.1.2	Understand why information must be kept confidential by organisations:
	 • salary and benefits:
	  ○ prevent competitors from offering higher wages to attract staff
	  ○ prevent employees from comparing salaries/demanding comparable pay
	 • staff details:
	  ○ protect privacy
	  ○ prevent competitors from contacting them directly

	- intellectual property: - prevent competitors from copying designs - client details: - prevent competitors from contacting clients - protect client privacy - sales numbers - access information: - prevent unauthorised access.
8.1.3	Understand the potential impact to an organisation of failing to maintain privacy and confidentiality: - non-compliance with regulations: - loss of licence to practise - loss of trust - damage to organisation's image - financial loss: - fines - refunds - loss of earnings/termination of contracts - legal action - reduced security.
8.2 Types of threats and vulnerabilities	
8.2.1	Understand potential technical threats and their impacts on organisations and individuals, including prevention and mitigation methods: - botnets - denial of service (DoS)/distributed denial of service (DDoS) - malicious hacking: - hacktivists/nation states/organised crime/individuals - password cracking/brute force - cross-site scripting - SQL injection - buffer overflow - malware: - viruses - worms - key loggers - ransomware - spyware - remote access trojans - social engineering: - phishing - spear phishing - smishing

		○ vishing
		○ pharming
		○ watering hole attacks
		○ USB baiting
		• domain name server attack/redirection of traffic
		• open/unsecured Wi-Fi networks.
8.2.2	Understand potential technical vulnerabilities to systems and data:	
	• inadequate security processes:	
	○ weak encryption	
	○ inadequate password policy	
	○ failure to use multi-factor authentication	
	• out-of-date components:	
	○ hardware	
	○ software (lack of support/compatibility with legacy systems, zero-day bugs)	
	○ firmware.	
8.2.3	Understand potential human threats, including prevention and mitigation methods, to systems and data:	
	• human error:	
	○ file properties	
	○ confirmation boxes	
	○ staff training	
	• malicious employee:	
	○ immediate removal from premises	
	○ suspend user accounts immediately	
	• disguised criminal:	
	○ accompany all visitors	
	○ check identification of visitors	
	• poor cyber hygiene:	
	○ locking all unattended machines	
	○ not writing down passwords	
	○ poor password management.	
8.2.4	Understand potential physical vulnerabilities, including prevention and mitigation methods, to systems, data and information, including:	
	• lack of access control:	
	○ entry control systems	
	• poor access control:	
	○ do not allow tailgating	
	○ use complex access codes	
	○ change codes regularly	
	○ monitor access areas	
	○ audit of staff access to secure areas	

	- nature of location: - protect against shoulder surfing - protect against the environment - protect against vandalism - poor system robustness: - rugged machines - natural disasters.
8.2.5	Understand the potential impact to an organisation of threats and vulnerabilities: - loss/leaking of sensitive data - unauthorised access to digital systems - data corruption - disruption of service - unauthorised access to restricted physical areas.
8.3 Threat mitigation	
8.3.1	Understand the purposes, processes, benefits and drawbacks of common threat mitigation techniques: - security settings: - hardware - software - anti-malware software: - function - actions - intrusion detection - encryption: - hashing - symmetric - asymmetric - user access policies - staff vetting - staff training - software-based access control - device hardening - backups: - type (full, incremental, differential) - safe storage - software updates - firmware/driver updates - air gaps - certification of APIs (application programme interfaces) - VPNs (virtual private networks) - multi-factor authentication (MFA)

	• password managers
	• port scanning
	• penetration testing:
	   ○ ethical hacking
	   ○ unethical hacking.

8.3.2	Understand processes and procedures that assure internet security and the reasons why they are used:
	• firewall configuration:
	   ○ rules for traffic (inbound and outbound)
	   ○ traffic type rules
	   ○ application rules
	   ○ IP address rules
	• network segregation:
	   ○ virtual
	   ○ physical
	   ○ offline network
	• network monitoring
	• port scanning.

8.4 Interrelationship of components required for effective security	

8.4.1	Understand how the relationships in the CIA triad interrelate:
	• confidentiality:
	   ○ ensuring that data is kept private by controlling who has access to the data
	• integrity:
	   ○ ensuring that the data has not been tampered with; this can be done by maintaining confidentiality
	• availability:
	   ○ ensuring that data is available and useful; this can be done by ensuring integrity.

8.4.2	Understand the elements of the Identification Authentication Authorisation Accountability (IAAA) model, including the techniques used and their benefits and drawbacks:
	• identification:
	   ○ recognising the individual within a digital system
	   ○ knowledge-based identification, including usernames
	   ○ possession-based identification methods
	   ○ biometric-based identification models
	• authentication:
	   ○ verifying the identity claimed during the identification phase
	   ○ multi-factor authentication methods
	   ○ passwords and passphrases
	   ○ biometric authentication

	- authorisation: - ensuring that authenticated users can only access resources and perform actions that they are permitted to - role-based using the role of the user within the digital system - access control lists - accountability: - ensuring that any actions within a system can be traced back to the responsible user: - audit logs - user activity monitoring.

Employer Set Project

Pre-task – Familiarisation with the industry context E1 E4 E6 M1 M2 M7 D1 D3 D5

The purpose of the pre-release task is to allow students the opportunity to familiarise themselves with the context of the main brief, i.e. the use of digital solutions in the financial sector.

Students are encouraged to carry out independent investigation and share findings with others, work in groups and communicate with others, and take part in and lead discussions.

While the pre-release task is not directly assessed and not taken under controlled conditions, students will be able to use your research to inform responses to the assessed tasks.

Task 1 – Planning a project

Project planning tools

Be able to use project planning tools to apply understanding of project planning in response to a scenario.

Make use of given template (provided by Pearson) to produce a project plan containing a Gantt chart and a resource and cost plan.

Gantt chart E4 E5 M1 M2 M3 M5 M8 M9 M10 D1 D2 D4

- Assess the strengths and skills of people and assign appropriate tasks to them.
- Make scheduling decisions in response to a defined deadline.
- Prioritise activities or tasks based on analysis of requirements.
- Demonstrate how to correctly and appropriately assign resources to project tasks.
- Use an appropriate project management methodology to efficiently organise project tasks.

Resource and cost plan E1 E4 M1 M2 M4 M8 D1 D2 D4

- Identify and calculate costs of a project, including:
  - materials
  - physical resources
  - personnel.
- Select and allocate resources to the resource list and correctly attribute costs to provide an accurate estimate of the total project cost.
- Determine the affordability and viability of implementing a project and its impact on a company over time.

Rationale E2 E3 E4 E5

- Consider the factors that are most relevant when planning projects.
- Justify notable project planning decisions made, with consideration given to:
  - order and timing of tasks
  - allocation of team members
  - potential benefits and risks
  - impact of decisions on timings and costs.

Task 2 – Identifying and fixing defects in a model and dataset

Use of testing to identify defects

- Assess the given dataset and/or data model against requirements.
- Carry out testing to identify issues in the dataset and related model.
- Perform any remedial actions required, justifying any decision made when fixing the defect.

Documenting the testing process E1 E4 M4 M8 D1 D2 D4

Provide annotated evidence of testing, including:

- identifying tests to be carried out
- describing the purpose of the identified test
- identifying test data to be used (where applicable)
- describing the expected results
- describing the actual results of the tests performed
- comparing the actual results of testing with the expected results
- describing the nature of any issues identified in the dataset and model
- describing any actions that are required to correct any issues in the data and/or model
- refining the dataset and model as required.

The solution M4 M5 M7 D2 D4 D6

- Correct errors to ensure that:
  - the dataset has been cleansed to ensure data is accurate and reliable
  - the given model is functional and meets the given requirements.
- Follow appropriate formatting and data handling conventions to ensure that it makes use of precise logic so that the model produces consistently correct outcomes.

Task 3 – Designing a solution E1 E2 E3 E4 E5 M1 M5 M6 D1 D2 D4

Produce a design for a data solution that improves on current data handling procedures used. Communicate the design through appropriate use of:

- an entity relationship diagram (ERD)
- data dictionaries.

Normalisation E3 D4

Apply an understanding of decomposition to break down the problem into smaller parts suitable for data solutions.

Use decomposition to ensure coverage of the required attributes, entities and keys are identified.

Make effective use of normalisation to remove data redundancy and produce appropriate designs for data structures.

Application of logical thinking and data conventions E3 M4 D2

- Clearly define the data types and field sizes for attributes.
- Describe data assurance techniques that will be applied.
- Uniquely define each step. Each step should, where appropriate, depend on the input and the result of the preceding steps.
- Ensure the design makes use of key constructs, such as:
  - correct use of structure and convention for the chosen method of communication (ERD, data dictionaries), such as correct use of symbols for relationship/key notation in ERD
  - selection and consistent use of appropriate entity names
  - appropriate use of normalisation, reduction of data redundancy, application of ACID principles (where appropriate).

Communication of the design E4 D3

- Ensure design documents are of sufficient detail to:
  - effectively communicate the intended solution
  - allow the client to make informed decisions
  - allow a third party to use design documents to create the proposed solution.
- Communicate intended solution effectively and clearly, with use of:
  - appropriate combination of written and diagrammatical presentation
  - appropriate use of technical vocabulary
  - consideration of audience
  - explanations of structures and process in the design.

Task 4a – Developing a solution

The solution E1 E5 M2 M4 M5 M6 M7 D1 D4 D6

Apply an understanding of data handling to develop a data solution that meets the requirements of a brief, including:

- refining the given data model as required
- selecting appropriate data to use from the given set to meet the requirements
- demonstrating an appropriate level of technical skill, and understanding of data wrangling techniques and problem solving
- use of tools and functions available in the chosen data handling environment (e.g. functions in Excel, data structure and libraries in code environments).

Organisation M4

Ensure model produced for the solution is appropriate to meet the demands of the brief, including:

- use of 3D cell referencing
- precise use of logic in functions/formulae
- comments whenever possible to help explain the logic and operations to users
- good use of attribute and entity names
- application of data assurance principles.

Security M6

- Handling data securely such as locking cells and worksheets, extracting subsets of data to manipulate
- Avoiding unnecessary redundancy
- Good exception handling.

User experience E4

Meet user needs, with consideration of:

- consistency of the product
- simplification of user input and ease of use
- accessibility to all types of users
- appropriate messages and meaningful output (e.g. visualisation).

Task 4b – Reflective evaluation

Review of outcomes E1 E2 E3 E4 D3

- Be able to apply reflection and evaluation techniques.
- Provide evidence that the product meets brief requirements:
  o include measures against success criteria
  o provide evidence that the product meets user needs
  o discuss how it could be improved if the problem was revisited and given detailed consideration.

Scheme of Assessment – Core Component

There are three assessments in the Core component of the *T Level Technical Qualification in Digital Data Analytics*:

- Core Examination Paper 1
- Core Examination Paper 2
- Employer Set Project.

The mapping, timings, scheduling and preparation for the assessments shown below are for the current specimen assessment material. The actual live assessments will have the same overarching number of tasks and overall focus. However, the order of tasks and the details within the tasks may change each series.

Core examination

Paper 1
Written examination: 2 hours 15 minutes **30% of the core assessments** **90 marks**
Content overview 1. Problem solving 2. Introduction to analytics 3. Data
Assessment overview A written examination comprising two sections, A and B. Students answer all questions in each section. Each section of the examination will get more challenging as the student progresses by ramping up demand and difficulty in a manner broadly similar to the other sections. Each section will be assessed through a combination of: • short open response items • medium open response items • extended open response questions. The examination is: • set and marked by Pearson • timetabled at a time and on a date specified by Pearson.
Administration This paper must be assessed under examination conditions following JCQ's Instructions for Conducting Examinations (ICE).

Paper 2
Written examination: 2 hours 15 minutes **30% of the core assessments** **90 marks**
Content overview 4. Legislation and regulatory requirements 5. Business context 6. Emerging issues 7. Digital environments 8. Security
Assessment overview A written examination comprising two sections, A and B. Students answer all questions in each section. Each section of the examination will get more challenging as the student progresses by ramping up demand and difficulty in a manner broadly similar to the other sections. Each section will be assessed through a combination of: • short open response items • medium open response items • extended open response questions. The examination is: • set and marked by Pearson • timetabled at a time and on a date specified by Pearson.
Administration This paper must be assessed under examination conditions following JCQ's Instructions for Conducting Examinations (ICE).

Core Examination Assessment Objectives

Assessment Objective		Paper 1 (marks/%)	Paper 2 (marks/%)
AO1a	Demonstrate knowledge and understanding of the content (knowledge)	8 (8.9%)	10 (11.1%)
AO1b	Demonstrate knowledge and understanding of the content (understanding)	22 (24.4%)	21 (23.3%)
AO2	Apply knowledge and understanding of the content to different situations and contexts	39 (43.3%)	38 (42.2%)
AO3a	Analyse information and issues related to the content	12 (13.3%)	12 (13.3%)
AO3b	Evaluate information and issues related to the content	9 (10%)	9 (10%)

Paper 1	AO1a	AO1b	AO2	AO3a	AO3b
Section A	8	16	3	3	0
Section B	0	6	36	9	9
Total 90 marks	30		39	21	

Paper 2	AO1a	AO1b	AO2	AO3a	AO3b
Section A	6	18	3	3	0
Section B	4	3	35	9	9
Total 90 marks	31		38	21	

Employer Set Project

Employer Set Project
Externally assessed project: 14 hours 30 minutes **40% of the core assessments** **100 marks**
Content overview When responding to the Employer Set Project students will need to draw upon knowledge and understanding from across the core content in a synoptic manner in order to effectively respond to a brief within a vocational context.
Assessment overview There is a pre-release task that is not assessed. There are five parts to the assessment: • Task 1: Planning a project • Task 2: Identifying and fixing defects in a model and dataset • Task 3: Designing a solution • Task 4a: Developing a solution • Task 4b: Reflective evaluation. Students will undertake the assessed elements of the project tasks under supervised conditions. Internet access is not permitted. Students may not use AI or any other tool designed to prepare a response. The assessment will take place over multiple sessions up to a combined duration of 14 hours 30 minutes. The project outcomes will consist of a portfolio of evidence submitted electronically. Students will undertake a project in response to a realistic contextual challenge. The project is validated by an employer panel, taking into account the client's requirements and the user experience. The project will consist of planning documentation, an annotated digital portfolio, prototype digital product, testing evidence and evaluation. The project will be set and marked by Pearson.
Administration Providers must follow the guidance in the following: • General Administrative Support Guide • Administration Support Guide for the specific Technical Qualification Employer Set Project (if applicable). These can be found on the Training and Admin Support webpage.

Employer Set Project Assessment Objectives

Assessment Objective			Proportion
AO1	**Planning**	Plan an approach to developing solutions to solve problems in response to a brief.	12%
AO2	**Application**	Apply knowledge and skills to develop software, create an artefact, fix defects and mitigate risks to security.	41%
AO3	**Selecting relevant techniques and resources**	Select relevant tools, techniques and resources to respond to a brief and work in a collaborative environment.	9%
AO4	**a. English skills**	Use appropriate English skills to communicate technical information to both technical and non-technical audiences.	3%
	b. Maths skills	Use appropriate maths skills to realise a project outcome in response to a brief.	
	c. Digital skills	Use appropriate digital skills to realise a project outcome in response to a brief and communicate technical information to both technical and non-technical audiences.	
AO5	**a. Project outcome**	Realise a project outcome by producing software and artefacts in response to a brief.	26%
	b. Review	Review how well digital solutions meet a brief, using reflective evaluation.	9%

Resources for the delivery of the Core component content

The following resources are required for the delivery of the Core component for this Technical Qualification:

- diagramming software with suitable features and tools for creating ERDs
- spreadsheet software (for example, MS Excel, Google Sheets) for:
    - the handling and manipulation of datasets
    - producing a dashboard
    - producing project plans (Gantt chart and costings).

General:

- computer
- internet access
- audio/visual recording equipment
- software:
    - word processing (for example, MS Word, Google Docs)
    - presentation (for example, MS PowerPoint, Google Slides)
    - project management (for example, MS Excel, MS Project)
    - basic image-editing software (for example, Photoshop, GIMP)
    - programming software (for example, TextEdit)
    - database software (for example, MS SQL, phpMyAdmin)
    - web browsers (for example, Chrome, Firefox, Edge)
- data sources (for example, online, social media, analytical)
- research resources (for example, online, books, journals)
- a web server.

4   Occupational Specialism

Data Analytics Technician

Content area 1: Source, organise and format data securely in a relevant way for analysis

What students need to learn

1.1 Understand different sources of data and how to access and process the appropriate sources for the relevant task
• Sources of data:
  o internal:
    – organisational data
    – departmental data
  o external – held by external organisations:
    – public
    – private
    – voluntary/charity:
      ▪ not for profit
  o non-governmental organisations (NGOs).
• Data within internal and external sources:
  o open – free to access, available to anyone to reuse and redistribute:
    – published by independent organisations
    – published as a government requirement
  o private:
    – person identifiable
    – commercially sensitive data
  o licensed data:
    – ordnance survey and mapping
    – address data.
• Accessing and processing data:
  o compliance – with security standards and legislation (for example, General Data Protection Regulation (GDPR), Data Protection Act (DPA) 2018)
  o select – identify data
  o prepare – check data quality
  o extract – process of retrieving data
  o transform – performing an operation or calculation.

1.2 Know how different types of organisations within sectors work with information systems and data

Sectors	Types of application within organisations
Education: • school • college • university	• booking/scheduling – courses, student and staff timetable, resources • inventory – product replenishment • reporting – academic and demographic information
Health: • GP surgery • hospital • dentist	• booking/scheduling – appointments, patients, resources • inventory – medical consumables • electronic health record (EHR) and associated standards
Hospitality: • hotel • restaurant • theatre	• booking/scheduling – reservations • customer relationship management (CRM) system – marketing, loyalty/rewards • social media – promotion, feedback
Retail: • high street • online	• online retail – purchasing, predicted recommendations • inventory – product replenishment • CRM – marketing, loyalty/rewards • social media – promotion, feedback
Technological: • software • infrastructure • digital support • cyber security	• software as a service (SaaS) • user experience/user interface (UX/UI) • digital transformation

1.3 Know the types, features and functions of information systems and their application

- Features and functions of information systems:
  - storage
  - manipulation
  - retrieval methods to access and export
  - applications.

Type of information system	Applied features	Applied functions
Online purchasing	Public-facing, presentation of products and prices	Recording transactions (for example, shopping basket, calculating pricing, recommended purchases)
Booking/ scheduling	Allocated time/date slots, management of availability	Managing resources and availability (for example, payment systems, online calendars, email confirmation)
Inventory management	Log and order of commodity levels, option to automate ordering	Stock management (for example, current stock levels, email notifications)
Customer relationship management (CRM) system	Lead/customer and sales management	Managing customer/client lists and interactions
Social media	Public-facing, used in a wide variety of organisations	Managing user-generated content

1.4 Be able to classify data for sector-specific applications

- Identify and interpret data to support the classification process.
- Classify data based on required criteria:
  - content
  - context
  - user.
- Organise and group datasets logically and coherently into relevant sectors based on criteria:
  - health
  - retail
  - hospitality
  - technological
  - education.

(M5, M6, M10)

1.5 Understand the differences between primary and secondary data usage and usage by organisations and individuals

Differences	Primary	Secondary
Purpose	Used for its original purpose	Used for a further purpose
Data	Current data	Past data
Sources	Surveys, observations, questionnaires, interviews	Forums, government publications, internal records
Relevance	Specific for requirements	Useful but not created for this purpose/requirement
Legitimacy	Obtain permission to use, informed consent of intended use	Permissions may be required depending on use
Availability	Design collection needed – time-consuming, labour intensive	Readily available, accessible

- Organisational data usage:
  - customer centricity (for example, customer service and satisfaction, promoting customer-centred approach)
  - business intelligence and forecasting (for example, prediction of future risks and opportunities, informed business decision making)
  - product design (for example, research and development processes, new/updated/terminated product lines)
  - financial (for example, cashflow, funding, department contribution)
  - staff management and development (for example, key performance indicators (KPIs), staff profiles, skills gaps)
  - sector-specific classification:
    - healthcare (for example, inventory, birth and death rates)
    - education (for example, retention, achievement, attendance)
    - government (for example, tax, employment rate, census).
- Individual data usage:
  - financial (for example, banking, tax, income, budgeting)
  - consumer behaviour (for example, frequent purchasing, loyalty schemes)
  - health and fitness (for example, weight, calories, heart rate)
  - entertainment (for example, suggested viewing/listening).

1.6 Understand the types of data structures, their characteristics and applications

- Structured:
  - characteristics:
    - organised
    - consistent
    - fixed data field names
    - fixed data type and/or length
  - applications:
    - spreadsheets
    - databases (for example, relational database, data warehouses).
- Unstructured:
  - characteristics:
    - no predefined data model
    - not organised in a predefined manner
  - applications:
    - databases (for example, Not Only Structured Query Language (NoSQL) database)
    - social media content
    - web pages/sites
    - documents
    - audio/visual.
- Semi-structured:
  - characteristics:
    - flexible data model
  - applications:
    - spreadsheets
    - data log file.

1.7 Be able to identify a variety of different sources of data to support analysis to meet a specific business requirement

- Assess the parameters of the analysis requirements.
- Select the appropriate sources of data from:
  - internal sources
  - external sources.
- Identify the appropriate data types required for analysis (for example, numeric, text, media, temporal).

(M10)

1.8 Be able to collect data from different internal and external sources

- Gather appropriate information from internal and external sources.
- Identify and select appropriate data structures within sources to meet requirements:
    o structured (for example, spreadsheets, database)
    o unstructured (for example, social media, web)
    o semi-structured (for example, data log file).
- Collect and process data in compliance with appropriate legislation.

1.9 Be able to apply appropriate tools and techniques to identify trends and patterns in data

- Identify and analyse the parameters of the task:
    o specific trends and patterns required
    o select appropriate techniques and tools to identify the trends and patterns.
- Apply the techniques and tools appropriately to support analysis:
    o apply the most appropriate representation of the information (for example, dashboard, graph)
    o apply appropriate level of detail and accuracy.
- Review and critically interpret findings of trends and patterns to meet task.

(M2, M6, M7, M8, M10)

1.10 Be able to organise and store sourced data securely for a specific business requirement

- Select appropriate types of data storage and location (for example, on premises, cloud, third party).
- Select appropriate data storage format (for example, database).
- Organise sourced data based on selected criteria.
- Store sourced data securely, complying with all appropriate security standards and legislation, and apply appropriate levels of permissions and access.
- Review operations to make sure requirements have been met.

(M2, D6)

1.11 Understand the different data types and the importance for calculations and blending of data

- Data types:
    o numeric:
        – integer – whole number
        – decimal:
            ▪ float
            ▪ double
    o financial:
        – currency
    o temporal:
        – date
        – time
        – duration

- o text:
  - – single and multiple characters
  - – words
  - – paragraphs
- o geospatial:
  - – location
- o media:
  - – image
  - – audio
  - – video
- o logical:
  - – Boolean
- o references:
  - – pointer to another data location.
- Size of the dataset (for example, Big Data):
  - o volume
  - o veracity
  - o velocity
  - o value
  - o variety.
- Importance and requirements of data types for calculations and blending of data:
  - o standardised data:
    - – consistent data types
  - o appropriate data:
    - – correct data type for required data
    - – compatible with each other to allow effective calculations and blending.

1.12 Be able to change and format different data types to support efficient analysis for a specific business requirement

- Identify requirements of analysis.
- Identify data types (for example, numeric, financial, temporal, text).
- Change data type to be consistent to support the analysis.
- Format and manipulate data types to support efficient analysis.
- Perform the analysis to meet identified requirements.
- Review output meets requirements.

(M4, M5, M10, D6)

1.13 Be able to analyse the different data quality issues, the importance of addressing data quality issues and the process of cleansing

- Data quality issues:
  - o missing:
    - – missing completely at random (MCAR)
    - – missing at random (MAR)
    - – missing not at random (MNAR)
    - – systematic

- o outliers (for example, abnormal value)
- o abnormal trends and patterns
- o duplications
- o different formats
- o inconsistency
- o mismatched types
- o structural (for example, file types, file conversion)
- o unstandardised (for example, yes/no versus Y/N, date formats).
- Importance of addressing data quality issues:
  - o enables accurate and meaningful results from analysis
  - o avoidance of bias within data management.
- Data confidence through the process of cleansing:
  - o remove (for example, duplicates, out-of-date data, outliers)
  - o edit errors (for example, typos)
  - o parsing – reading text data into a structured format.

1.14 Know the factors of data quality and confidence, and methods of verifying and validating data

- Data quality and confidence:
  - o storage
  - o classification of data:
    - – content – classified based on contained information
    - – context – metadata and application domain
    - – user – classified based on user knowledge and specification
  - o understanding the link between classification of data and appropriate use and ease of future analysis
  - o data dictionary
  - o normalisation where appropriate – relational databases:
    - – unnormalised form (UNF)
    - – 1st normal form (1NF)
    - – 2nd normal form (2NF)
    - – 3rd normal form (3NF).
- Auditing data – to confirm the data is clean, correct and useful:
  - o verification methods:
    - – cross-checking
    - – review external systems for consistency against original data
    - – quality assurance
    - – spell check
  - o validation types:
    - – check digit
    - – format check
    - – length check
    - – lookup table
    - – presence check
    - – range check.

1.15 Be able to blend data from different sources into a single unified structure for a specific business requirement

- Identify and analyse each source in preparation for blending.
- Prepare and refine each source for effective blending:
  - o check consistency of data types
  - o check compatibility of data formats.
- Review and standardise data.
- Blend sources to create a single unified structure.
- Test outcome meets requirements.

(M3, M4, M10, D2)

1.16 Be able to perform data cleansing to meet a specific business requirement

- Identify the parameters of the cleansing task.
- Assess data to be cleansed.
- Apply the process of data cleansing to meet the business requirement:
  - o remove (for example, duplicates)
  - o edit (for example, out-of-date data)
  - o parse (for example, making data easier to read).
- Review the output of the cleansing process against the business requirement.

(M2, M4, M5, M10)

1.17 Be able to apply verification methods to validate data and save resultant dataset

- Identify appropriate methods to validate (for example, format check).
- Apply the verification method to data.
- Assess reliability and validity of sources based on verification (for example, citing trusted sources).
- Save resultant dataset securely.

1.18 Be able to rationalise the appropriateness of the resultant dataset for a specified analysis

- Identify the requirements of the specified analysis.
- Compare analysis requirements with dataset.
- Rationalise how the dataset is appropriate for the analysis.
- Present and organise information logically and coherently to allow for future analysis and conclusions:
  - o include appropriate level of detail to reflect audience and purpose
  - o express ideas clearly and concisely.

(E1, E3, M8, M10)

1.19 Be able to provide a statistical summary of analysis

- Identify the requirements of the summary.
- Apply relevant tools and techniques to identify trends and patterns.
- Identify relevant outcomes and results:
  - regressions
  - trends
  - gains
  - derived data.
- Analyse and interpret outcomes in statistical summary.
- Present and communicate summary that meets intended purpose and audience:
  - use technical language correctly to support understanding of summary
  - include appropriate level of detail to reflect audience and purpose.

(E1, E3, M3, M4, M7, M8, M10, D3, D4, D5)

1.20 Be able to summarise and explain how data security standards and legislation have been followed in handling data (for example, UK GDPR/DPA 2018)

- Summarise the key points of handling data and its compliance with relevant standards and legislation.
- Explain responsible and safe usage of data online and offline following standards and legislation.
- Use appropriate technical terms (for example, information from the DPA 2018).

1.21 Know the stages of data life cycle management and their use of data

- Preparation:
  - design – selection of appropriate dataset type and data model based on requirements
  - migration – reliable transfer of data from one database or source to another
  - creation/acquisition of data (for example, created or supplied by third party):
    - consent for usage.
- Operations:
  - application and governance of:
    - access control – granting or removing access to data where appropriate
    - security/privacy – ensuring data is safe and secure
    - version control – maintaining and recording version of dataset
    - retention policy – maintaining compliance with legal and business guidelines
  - storage
  - usage/exploitation
  - maintenance
  - share
  - backup
  - restoration.

- Post-operations:
  - retention – archiving of dataset for future use
  - destruction/disposal – secure and appropriate destruction of data and data storage.

1.22 Know the selection criteria and types of tools and techniques for identifying data trends and patterns

- Selection criteria for the appropriate tools and techniques:
  - purpose for identifying trends and patterns
  - expected and relevant outcomes:
    - gains
    - trends
    - regressions
    - derived data
  - availability of resources.
- Tools for identifying trends and patterns:
  - programming languages (for example, Python, R, Scala)
  - dashboards (for example, KPIs, financial)
  - query tool (for example, SQL)
  - scatter graphs/trends
  - histograms and box plots.
- Techniques for identifying trends and patterns:
  - exploratory data analysis
  - time series forecasting
  - hypothesis testing
  - data mining.

1.23 Be able to access, process and transfer data from one computer storage system to another

- Select appropriate sources of data.
- Extract relevant data.
- Standardise and prepare data (for example, quality, format, remove redundant data).
- Ensure storage systems have appropriate proportion of storage space.
- Export data effectively from initial computer storage system.
- Transform data to meet importing requirements.
- Import data effectively into alternate computer storage system.
- Comply with all appropriate security standards and legislation.

(M2, M3, M5, M6, D1, D6)

1.24 Know the purpose, principles and functions of data architecture

- Purpose:
  - a framework guiding the development and operation of information systems and data storage
  - a set of rules and policies that are able to define and explain the type of data.

- Principles:
  - access – data available for user functions
  - definition – data is valued as an asset
  - managed – data is in a form which facilitates maintenance and understanding of the data pipeline process
  - secured – data has the appropriate security controls applied and is accessed only by appropriate users
  - shared – data can be extracted and shared between communities, without compromising safety or exporting sensitive information.
- Functions:
  - organise data – grouped by selected criteria:
    - data types
    - formats (for example, database, spreadsheets, comma-separated value (CSV) file)
  - data storage – specifying the different types of data storage and its location:
    - on premises
    - cloud
    - third-party
    - hybrid
  - permissions and access across different systems (for example, file server):
    - levels of permissions
    - levels of access
    - multi-factor authentication.

Content area 2: Blend data from multiple sources

What students need to learn

2.1 Know the types of data technologies and systems that support data operations

- Database:
  - relational – stores and provides access to data points that are related to one another
  - non-relational – model and structure optimised specifically for the type of data being stored.
- Data warehousing – centralises and consolidates large amounts of data to support business intelligence:
  - data marts – a simple data warehouse focused on a single functional area
  - spreadsheets – storage of data in rows and columns usually utilising application software.

2.2 Understand the fundamentals of data operations

- Database operations:
  - joining tables
  - primary keys
  - foreign keys
  - import and export
  - indexing and partitioning.
- Spreadsheet operations:
  - linking of data across worksheets
  - importing and exporting data
  - pivot table functionality.
- Auditing:
  - result validation and verification:
    - standardisation of format
    - cross-checking.

2.3 Know the purpose of logical queries and types of data query-based tools for blending data

- Purpose of logical queries:
  - to accurately search for required data.
- Types of data query-based tools:
  - macros – to automate operations within a spreadsheet/system
  - SQL – facilitates searches within a relational database
  - NoSQL – facilitates searches within a non-relational database.

2.4 Know the techniques of joining and blending data

- Data joining:
  - inner/outer join
  - full join
  - left/right join
  - union join.
- Fuzzy matching – matching search terms that are inexact (for example, search engine queries).
- Spatial matching – matching based on their spatial location (for example, emergency services allocation).
- Consolidation – combining separate worksheets into one worksheet.
- Merging data – combining multiple datasets in a single dataset.
- Linking data – reference to external/discrete data sources.

2.5 Be able to blend datasets from different formats (for example, spreadsheets, tables, databases)

- Identify and analyse datasets and their formats in preparation for blending.
- Prepare and standardise each dataset for effective blending:
  - check consistency of data types
  - check compatibility of data formats.
- Blend datasets into final format.
- Review quality of outcome.

(E5, M2, M4, M5, M10, D1, D4)

2.6 Be able to apply techniques of joining data to create a combined dataset from a single source for a specific business requirement

- Assess the specific requirements.
- Select and apply appropriate joining techniques:
  - full join, inner/outer join, left/right join
  - union join.
- Review outcome meets requirements.

(M4, M5, M10, D1, D4)

2.7 Be able to manipulate and link different datasets

- Identify and review the different datasets in preparation for linking.
- Manipulate datasets based on required data (for example, related database tables).
- Establish a link to the repository.
- Test datasets are linked.

(M4, M5, M10, D1, D4)

2.8 Be able to apply data blending and joining to datasets from multiple sources and present in a specific format to meet requirements

- Review datasets in preparation for blending.
- Select and apply appropriate blending and joining techniques:
  - data joining
  - fuzzy matching
  - spatial matching
  - consolidation.
- Present datasets in appropriate format based on requirements and outcomes.
- Assess blending and joining outcomes.

(E5, M4, M5, M10, D1, D4)

2.9 Be able to design and set up a dataset

- Review intended purpose of dataset.
- Gather relevant data.
- Identify appropriate design requirements:
  - data type (for example, numeric, temporal)
  - size of data (for example, volume, value, variety)
  - format of data file (for example, spreadsheet).
- Set up a dataset based on identified design requirements.

(M5, D1, D2, D4)

2.10 Be able to import and export data from a dataset

- Review the dataset.
- Standardise data to support import and export process (for example, quality, format, remove redundant data).
- Import/export data from datasets to meet requirements.
- Review the import/export process to confirm completion.
- Comply with all appropriate security standards and legislation.

(M2, D1, D4)

2.11 Be able to design and execute logical queries

- Identify and assess the purpose and parameters of the query.
- Design query based on identified purpose and parameters.
- Execute using appropriate query tool (for example, SQL, NoSQL, spreadsheets).

(E4, D1, D2, D4, D6)

2.12 Be able to create spreadsheets with pivot tables

- Identify and organise spreadsheet layout.
- Input data into spreadsheet.
- Design pivot table based on required information:
  - select relevant data cells
  - select data to be analysed
  - select cell range.
- Create pivot table from design.
- Test the functionality of the pivot table.

<div align="right">(M4, M10, D1, D2, D4, D6)</div>

2.13 Be able to analyse datasets and identify data to be blended

- Assess compatibility of datasets including spreadsheets in preparation for blending.
- Assess data for blending:
  - quality of data (for example, data validation)
  - standardise data (for example, format).
- Identify the data to be blended based on the outcome of analysis.

<div align="right">(M10, D1, D4)</div>

2.14 Be able to automate spreadsheet operations to meet a requirement

- Identify the requirements of the automation.
- Assess standardisation of data within the spreadsheet.
- Apply appropriate macros to complete automation.
- Test the automation outcome.

<div align="right">(D1, D2, D4, D6, E5)</div>

2.15 Be able to apply data sampling techniques to select representative subsets from large datasets

- Identify the purpose and requirements for data sampling.
- Choose an appropriate sampling technique:
  - random sampling
  - stratified sampling
  - cluster sampling
  - systematic sampling.
- Prepare the dataset for sampling.
- Apply the chosen sampling method to select a representative subset of data.

2.16 Be able to audit data results from outcomes

- Identify requirements of the audit.
- Validate data results:
  - check format is appropriate for requirements.
- Verify data results:
  - apply cross-checking against requirements.
- Record outcomes of audit logically and coherently to advise future actions.

<div align="right">(D1, D4)</div>

2.17 Understand and be able to design analytical workflows:

- Data gathering to support the design:
  - hard data or soft data
  - on premises/propriety
  - SaaS and analytical services.
- Selection of workflow components:
  - input
  - transformation
  - output.
- Workflow analysis of current processes.
- Drawing conclusions from the outcome of the analysis.
- Visualisation of workflow.

Content area 3: Analyse structured and unstructured data to support business outcomes

What students need to learn		

3.1 Understand the value of data in a business/organisation and how data analytics can be applied to improve performance and outcomes

Value of data for business improvement	Role and application of data analytics	Success criteria to measure value
Business intelligence and insight	Research market leaders and potential customers	New products/services with unique selling points
Competitive advantage/sales and marketing	Customer insight, market analysis, targeted sales	Income, customer reach, customer satisfaction
Process improvement	Provide actionable cause and effect analysis	Waste reduction, cost, quality, lower carbon footprint
Maintenance planning	Forecasting tool performance/failure	Less downtime, cost, plan downtime

3.2 Know the process for using data to solve a business problem

- Understanding:
  - discover – identify and understand the business problem (for example, new system being implemented)
  - investigate:
    - data relevance
    - data characteristics
  - type:
    - qualitative data
    - quantitative data
  - size:
    - data availability.
- Preparation:
  - plan and prioritise – define an approach, select relevant data tools and data preparation (for example, finding best piece of software, planning project, working with stakeholders/users)
  - build – creation, data and blending operations (for example, build and develop systems).
- Analysis:
  - perform data analysis tasks (for example, use data analysis to develop system).

- Validation:
  - plan tests (for example, use testing plans to complete tests, user testing)
  - validate and audit outcomes and improvements
  - reiterate steps and perform additional analysis if desired outcome not achieved.
- Presentation:
  - report outcome – present and communicate results.
- Review:
  - gather and review feedback from presentation.

3.3 Know a range of tools and techniques for data analysis and their application in solving business problems

- Online analytical processing (OLAP):
  - discovering data from different sources
  - limitless report viewing
  - complex analytical calculations
  - predictive scenario planning.
- Spreadsheets and dashboards:
  - identifying trends and patterns
  - monitoring of KPIs.
- Time series analysis (for example, stationarity and seasonality).
- Geospatial – enriching an existing dataset with geographical variables:
  - geographic clustering.
- Descriptive and diagnostic analytics:
  - programmatic data analysis – analysing data using a programming language (for example, Python using Jupyter Notebook or Google Colab Notebook for structuring and presenting analysis)
  - data visualisation
  - exploratory data analysis (EDA):
    - univariate, multivariate and bivariate analysis
    - feature engineering and feature selection
  - statistical analysis.
- Predictive analytics:
  - supervised machine learning
  - artificial intelligence
  - forecasting
  - simulations
  - data mining (for example, market basket analysis)
  - unsupervised machine learning (for example, clustering).

3.4 Be able to apply statistical methods and algorithms to identify trends and patterns in data

- Clarify requirements:
  - o trends and patterns to be identified.
- Select appropriate statistical methods to meet requirements:
  - o clustering – used to group related data points within a dataset
  - o time series modelling – identifies patterns over time (for example, daily or weekly trends)
  - o standard deviation – variance from the mean
  - o regression – identifies relationship between data variables
  - o correlation – identifies a relationship between datasets
  - o chi-square test – identifies whether there is an association between categorical variables.
- Apply algorithms efficiently to meet requirements.
- Apply appropriate representation of the information to support the identification of trends and patterns:
  - o level of detail and accuracy required
  - o review outcomes against requirements.

(E1, M2, M4, M5, M7, M10, D2, D4, D5, D6)

3.5 Understand the application of algorithms to identify trends and patterns in data

- Summarises trends and patterns in numerical and graphical data.
- Identifies what methods are suitable for different applications.
- Forecasts based on historical trends and patterns.
- Supports assumptions and implications behind forecasting methods.

3.6 Be able to identify relevant data for a specified business problem

- Assess the business problem to understand all components.
- Discover the available data sources.
- Assess relevant data from available sources.
- Investigate and review the appropriateness of the data characteristics (for example, type, size) to support the business problem.
- Identify and present the relevant data for the business problem.

(E5, M2, D4)

3.7 Understand the importance and process of data preparation, modelling and testing

- Data preparation – to ensure effective use and analysis of data:
  - o sourcing/identifying
  - o collecting
  - o cleansing
  - o blending/consolidating.

- Data modelling – provides a framework to develop understanding of future data systems:
  - conceptual data models – establish business components, their attributes and their relationships
  - logical data models – structure of data elements and their relationships
  - physical data models – implementation of data model based on data persistence technology.
- Testing outcomes – to ensure the business problem is solved:
  - plan the testing approach
  - appropriateness of datasets to support problem resolution
  - analysis of datasets to draw conclusions and solutions:
    - use of statistical methods to identify trends and patterns
    - test outcomes meet business requirements.

3.8 Be able to build a dataset for a specific business requirement

- Identify the relevant sources of data for requirements.
- Gather the relevant data from identified sources.
- Cleanse and standardise data for blending (for example, remove, edit, parse).
- Blend data using appropriate techniques.
- Build dataset from gathered and blended data.

(M2, M5, M10, D1, D2, D4, D6)

3.9 Be able to test a dataset to meet a business requirement

- Plan the approach to testing the dataset.
- Test the dataset against business requirements.
- Analyse the test results against requirements.
- Review the outcomes.

(M2, M5, M10, D1, D2, D4)

Content area 4: Interpret data and communicate a result appropriate to the audience

What students need to learn

4.1 Know the factors and requirements of communicating data within a business

- Requirements of audience (for example, technical or non-technical, job role, level of authority):
  - specified timeframes of communication
  - prioritisation of communication
  - method of communication (for example, a presentation)
  - accessibility of communication.
- Purpose of the data communication (for example, telling the story of data):
  - communication's intended use
  - expected outcomes (for example, linking data back to objectives).
- Content:
  - size (for example, limited word count)
  - complexity (for example, use of technical terms, levels of understanding).
- Data type (for example, text, numeric).
- Review:
  - validation of communication outcome
  - meets the brief of business and audience requirements
  - utilisation of analytic services to analyse communication outcomes (for example, response rate, open rate).

4.2 Know the types of visualisation techniques and their application in the presentation of data to meet a specific requirement

- Type of visualisation techniques and how to create:
  - charts/graphs:
    - bar chart
    - pie chart
    - scatter graph
    - line graph
    - heat maps
    - flowcharts
    - tables
    - images/infographics
    - extended reality (XR)
    - three-dimensional (3D) models/printing.

- Selection criteria for appropriate application of technique:
  - considerations to meet requirements:
    – brief
    – audience
    – level of technical knowledge and skills (for example, use of technical terminology)
  - role specific.

4.3 Be able to prepare raw data and present in a visual format for a specific business requirement

- Identify raw data to meet the requirements.
- Prepare and standardise the raw data (for example, cleanse, format).
- Assess communication requirements:
  - audience (for example, levels of knowledge)
  - content and context.
- Apply appropriate visualisation techniques (for example, graphs, heat maps, flowcharts).
- Present data visually to meet requirements.

<div align="right">(E1, M4, M5, M10, D1, D2, D4)</div>

4.4 Be able to develop a specification to meet audience requirements

- Identify the requirements of the specification.
- Analyse and apply the factors and requirements of communicating data:
  - audience
  - purpose
  - content
  - data type
  - context
  - review.
- Select and apply data communication formats (for example, reports, dashboards).
- Present specification and its benefits clearly.

<div align="right">(E3, M8, M10, D1, D2, D3)</div>

4.5 Be able to create materials using data points to tell a story

- Identify the requirements of the materials.
- Analyse and identify appropriate data points from datasets.
- Apply the factors and requirements of communicating data:
  - audience
  - purpose
  - content
  - data type
  - context
  - review.

- Apply appropriate format (for example, presentation, report).
- Communicate data story clearly and effectively.

<div align="right">(E3, M8, M10, D2, D3, D6)</div>

4.6 Be able to demonstrate the ability to link data back to objectives and decision making within a business scenario

- Identify and assess the business scenario.
- Select and link data points to support objectives and decision making.
- Justify the value of selected data points.
- Apply appropriate data communication methods and techniques to present outcome.

<div align="right">(M8, M10, D3)</div>

4.7 Know methods, techniques and formats of communicating data and results

- Data communication:
  - methods:
    - written (for example, business case)
    - verbal (for example, public speaking)
    - non-verbal (for example, visualisation techniques)
  - communication techniques:
    - technical/non-technical (for example, complexity levels of language)
    - active listening
    - tailoring to audience
    - use of open questioning
    - reflection and review
    - storyboarding
    - framework for conversation
  - formats:
    - presentation:
    - reports
    - dashboard
    - infographics
    - video.

4.8 Be able to collaboratively review to validate results for a business problem:

- Identify, clarify and analyse parameters for the review:
  - levels of technical information needed for different audiences
  - desired outcome
  - business problem.
- Collaboratively review and apply validation techniques to results:
  - use technical language correctly and relevant techniques to aid understanding
  - actively listen and contribute to discussions
  - summarise key points of discussions for collaboration.
- Analyse outcomes of review.

<div align="right">(E1, E6, M10, D3, D5)</div>

4.9 Understand the application of and review the effectiveness of digital marketing through use of data analytics services to inform business decision making

- Identify the parameters of the review:
  - website metrics (for example, average session, bounce rate, targeted purchases, clicks)
  - email metrics (for example, open rates, location, clicks)
  - social media metrics (for example, engagement, followers, likes, post views).
- Process and analyse results of digital marketing metrics for:
  - websites
  - email
  - social media.
- Draw conclusions from results of marketing metrics data:
  - predictions versus actual results.
- Apply appropriate visualisation techniques to communicate results (for example, graphs, heat maps, flowcharts):
  - use technical language correctly and techniques to aid understanding
  - organise results logically and coherently.

(E1, M2, M4, M5, M8, M10, D1, D2, D3, D4, D5, D6)

Content area 5: Can apply legal, ethical and professional principles when manipulating data

What students need to learn

5.1 Know the legal and regulatory requirements that apply to data analysis

- Requirements:
  - data protection and data security:
    - UK GDPR/DPA 2018:
      - seven principles of data protection
    - data processing agreement – the agreement between a controller and processor
  - Intellectual property rights (IPR):
    - copyright
    - licensing
    - ownership.

5.2 Know the standard data protection roles and their responsibilities

- Roles:
  - data protection officer:
    - ensures compliance with data protection legislation
    - formal point of contact for regulators
    - identifies the need and quality assures the policies developed for compliance with regulations
    - educates staff in data protection
    - ensures data protection standards are met
  - data controller:
    - responsible for management of organisational data
    - defines the purpose or outcome of data
  - data processor:
    - performs tasks on the data as instructed by the data controller
    - collects data
    - delivers in line with the agreement with the controller.

5.3 Understand the data sharing code of practice and its applications

- Data sharing code of practice – practical guide for organisations defining how to share personal data in compliance with data sharing legislation:
  - follow good practice recommendations
  - communicate to data owners (for example, understanding of their rights)
  - undertake data sharing impact assessment
  - create a data sharing agreement
  - data processing agreements
  - sharing of personal data between organisations that are controllers
  - when you can give access to data to a third party
  - how data sharing can take place (for example routine, scheduled or one-off)
  - sharing data in an emergency situation.

5.4 Know where to locate the legal requirements and codes of practice, and their application in different business sectors

- Location of legal requirements and codes of practice:
  - Information Commissioner's Office (ICO)
  - government websites
  - industry regulatory bodies
  - organisational policies and procedures
  - business sectors:
    - education (for example, compliance with copyright)
    - health (for example, sharing of medical records)
    - retail (for example, storing of bank details)
    - hospitality (for example, retention of personal information).

5.5 Be able to source regulatory and legal information relevant to data analysis

- Identify relevant regulatory and legal information required from appropriate sources (for example, IPR).
- Locate regulatory and legal information.

(D6)

5.6 Be able to locate and apply guidelines and rules in relation to data handling regulations

- Identify relevant business guidelines and rules.
- Analyse and interpret guidelines and rules in relation to data handling.
- Apply relevant business guidelines and rules when handling data.

(E5)

5.7 Be able to implement data safely and ethically for intended purposes

- Identify the intended purpose and implementation of data:
  - investigations
  - processes
  - procedures.
- Assess ethical implications:
  - check for informed consent
  - appropriate permissions/access
  - store data securely
  - protect data subject.
- Implement data effectively for identified purpose.
- Comply with organisational data policies and procedures.

(D1, D4, D6)

5.8 Be able to apply the principles of risk management for a specific purpose

- Risk assessment:
  - identification – identify risks that might occur when handling data within the business
  - probability – likelihood of occurrence
  - impact – on quality, cost and time (for example, impact to data subject)
  - prioritisation – rank risks based on the quantification of probability and impact.
- Risk response:
  - accept – the impact of the risk is deemed acceptable
  - transfer – contractually outsource the risk to another party
  - avoid – change scope to avoid identified risk
  - mitigate – reduce the impact or probability of the identified risk.
- Risk monitoring:
  - periodic risk review of probability and impact
  - recording (for example, risk register, lessons learned and action plans)
  - ownership of risks – people responsible for the day-to-day management of a risk
  - escalation – highlighting risk to appropriate authority within an organisation.
- Risk communication:
  - communication of relevant information to relevant stakeholders
  - safe handling of sensitive data
  - documentation of communication.

5.9 Be able to demonstrate an understanding of methods to reduce the risk and impact of attacks

- Identify privacy and security concerns in different contexts.
- Analyse the risk and impact of attacks.
- Select and explain the appropriate methods, security controls or procedures (for example, disaster recovery plan (DRP), encryption) to meet the outcome of analysis.
- Explain how selected response complies with regulations and standards.
- Record and document responses and outcomes clearly and concisely.

(D2)

5.10 Be able to comply with relevant regulations when using personal identifiable data

- Personal identifiable data – any data that could be used to identify a particular person (for example, name).
- Techniques applied to remove personal identification:
  - UK GDPR/DPA 2018 definition of personal identifiable information and the right to erasure
  - privacy impact assessment
  - methods of aggregation
  - anonymisation of data.

- Primary and secondary use – understanding when anonymisation and aggregation can and should be used.

(M6, D4, D5)

5.11 Understand the ethical considerations and implications when implementing and analysing data

- Consent – informed consent must be gained for use and reuse.
- Permissions and access – only appropriate people should have access to data.
- Storage and archiving – data should be stored only when needed.
- Reuse – clearly defined purpose of reuse of data in line with consent.
- Avoiding bias – when using automation, machine learning or of the individual conducting the analysis.
- Privacy – protecting the data subject at individual and organisation level.
- Impact – effect on individual or organisation.
- Ownership – who owns the data in the analysis.
- Third party – sharing data with external organisations.

5.12 Understand the ethical and moral issues of enhancing technology and reliance on data

- Autonomous operation:
  - reduced skill level of manual workforce
  - dehumanisation of decision making (for example, algorithms, profiling)
  - reduced employment (for example, shift in skills towards higher digital requirements).
- Changing behaviours:
  - isolation due to availability of data (for example, online banking/retail, education)
  - reduction in physical social skills (for example, body language awareness).
- Accessibility:
  - increased/constant access
  - risk of addiction (for example, constant access to gaming, gambling, shopping).
- Privacy:
  - unauthorised media (for example, filming without consent)
  - cyberstalking/attacks (for example, identity theft, social engineering).

5.13 Know the means of attack posed to a business by different threat actors

- Means of attack:
  - physical – damage to digital systems or environment
  - social engineering – manipulation of people or situations to gain information
  - cyber-attack – attempts to damage, disrupt or gain unauthorised access to computer systems, networks or devices.

5.14 Know the methods, security controls and procedures to reduce the risk and impact of attacks

- Methods:
  - business continuity plan (BCP) – planning and managing business continuity during a disruptive event
  - DRP – restoring normal business operations following a disaster (for example, flood)
  - acceptable use policies
  - staff training (for example, continuing professional development (CPD))
  - compliance with requirements (for example, the 10 steps to cyber security, ISO 27001).
- Security controls and procedures:
  - anonymisation/pseudonymisation
  - encryption
  - segregation
  - access control
  - change monitoring.

5.15 Understand the potential impacts of cyber-attacks on organisations and individuals

- Impacts on organisations:
  - financial penalties
  - reputation (for example, loss of custom)
  - legal consequences (for example, UK GDPR/DPA 2018 penalties).
- Impacts on individuals:
  - financial (for example, identity theft)
  - emotional (for example, extortion).

5.16 Know the marketing consent within regulations of data protection and Consent Lifecycle Management

- Consent – types of data may require consent for use (for example, personal information).
- Principles of marketing consent:
  - consent not assumed
  - freely given
  - specific
  - informed
  - unambiguous.
- Recording of consent:
  - who has given consent
  - date of consent
  - scope of consent.
- Indication signifying agreement.

- Consent Lifecycle Management:
  - withdrawal of consent
  - renewal of consent.
- Relevant regulation:
  - The Privacy and Electronic Communications (EC Directive) Regulations 2003 (PECR)
  - UK GDPR/DPA 2018.

5.17 Be able to apply and maintain procedures and security controls to maintain confidentiality, integrity and availability of data

- Select the appropriate security controls and procedures for the task.
- Apply appropriate controls and procedures.
- Maintain and monitor controls and procedures against requirements.

Content area 6: Discover, evaluate and apply reliable sources of knowledge

What students need to learn

6.1 Know the role of data in supporting digital interactions across the digital landscape

- Digital interactions and processes (for example, customer centricity):
  - o transactional data:
    - – purchasing (for example, invoices, statements, credit)
  - o booking data:
    - – reservations (for example, availability, peak and off-peak pricing)
  - o recording and monitoring of data (for example, digital footprint):
    - – online applications (for example, access, targeted marketing across applications)
    - – physical world (for example, location, transactions across multiple sites)
    - – smart devices (for example, virtual assistant, home management)
    - – Internet of Things (IoT)
    - – technologies (for example, building management, transportation, manufacturing).

6.2 Know different types of sources of knowledge that can be applied within a digital business context

- Sources of knowledge:
  - o academic publications (for example, textbooks, research journals and periodicals)
  - o search engines (for example, Google, Bing)
  - o websites (for example, wikis, forums, statistical websites)
  - o social media (for example, analytics)
  - o blogs/vlogs (for example, reviews of new technologies, opinions on topical issues in the digital sector)
  - o professional networks (for example, conferences)
  - o e-learning (for example, massive open online courses (MOOCs), recognised vendor qualifications)
  - o peers (for example, colleagues, network contacts, other industry professionals).

6.3 Know the factors of reliability, validity and bias that can be applied to legitimise sources of knowledge

- Factors of reliability and validity:
  - o industry-certified accreditation
  - o appropriateness of data
  - o based on fact/evidence:
    - – citations
    - – filtering out malicious data (for example, fake news)
  - o relevant context

- credibility of author:
  - affiliated to specific bodies (for example, government, industry regulators)
  - reputation
  - experience (for example, relevant qualification in subject)
  - target audience – produced with specific audience requirements taken into consideration (for example, use of technical/non-technical terminology)
  - publication:
    - version (for example, use of the current version)
    - date of publication (for example, is the content outdated?).
- Factors of bias:
  - types of conscious and unconscious bias:
    - author/proprietary bias – unweighted opinions of the author or owner
    - confirmation bias – sources support a predetermined assumption
    - selection bias – selection of sources that meet specific criteria
    - cultural bias – implicit assumptions based on societal norms
  - indicators of bias within sources:
    - partiality
    - prejudice
    - omission
  - avoiding bias:
    - based on fact/evidence
    - be inclusive/full representation of demographics
    - be objective.

6.4 Understand the process of critical thinking and the application of evaluation techniques and tools

- The process of critical thinking:
  - identification of relevant information and data:
    - different arguments, views and opinions
  - analysis of identified information and data:
    - identify types of bias and objectivity
    - understand links between information and data
  - selection of relevant evaluation techniques and tools
  - evaluation of findings and drawing of conclusions
  - recording of conclusions
  - qualitative (for example, interviews, observations, workshops)
  - quantitative (for example, experiments, surveys, statistical analysis)
  - benchmarking
  - corroboration/cross-referencing
  - triangulation.
- Evaluation tools:
  - gap analysis
  - KPI analysis
  - score cards
  - observation reports
  - user stories/diaries

o scenario mapping
o self-assessment frameworks
o maturity assessments.

6.5 Know the types of data communication methods and their appropriate application within a business

- Visualisation:
  - o infographics
  - o graphs/charts.
- Dashboards.
- Audiovisual.
- Extended reality (XR):
  - o virtual reality (VR)
  - o augmented reality (AR).
- Cross-channel engagement:
  - o brand consistency
  - o integrated platform usage.
- Platform parameters (for example, character limit, privacy settings).

6.6 Be able to search for information to meet a specific data requirement and corroborate across multiple sources

- Identify and clarify the parameters of the search (for example, explore the future of the digital economy, identify trends in Big Data).
- Identify the sources of data that contain the required information.
- Safely and securely search the sources for the information required.
- Corroborate sources by applying cross-referencing across multiple sources.
- Apply reliability and validity factors.
- Assess and review potential bias of sources.

(E4, D5)

6.7 Be able to select and apply techniques and tools to support evaluation for a business requirement

- Identify and clarify the parameters of the evaluation.
- Select appropriate techniques and tools to support evaluation.
- Apply the evaluation techniques and tools appropriately.
- Record the findings of evaluation for the requirement.

(E4, D2)

6.8 Be able to compare and rationalise the actions taken to ensure the reliability and validity of sources

- Identify and compare possible actions to ensure reliability and validity.
- Apply the relevant reliability and validity factors to the sources.
- Compare the outcomes of the validity and reliability actions.
- Explain and recommend the choice of action to ensure the sources are valid and reliable, using appropriate technical terms.

(E1, E3, E5, D3)

6.9 Be able to identify and understand bias when using sources of knowledge and data

- Identify bias where datasets are non-representative.
- Analyse data to identify indicators of bias.
- Explain clearly and concisely how bias can be created within a source.
- Explain clearly and concisely how bias could be avoided within sources.

(E1, E3, E5, D3)

6.10 Be able to demonstrate critical thinking when using sources of knowledge

- Apply the process of critical thinking to meet requirements:
  - identify relevant information and data
  - analyse the information and data
  - select and apply appropriate evaluation techniques and tools
  - evaluate findings to draw conclusions and to identify the best use of digital technologies
  - organise and record conclusions logically.

(E1, E3)

6.11 Be able to identify sources of knowledge (up to three) and apply factors that legitimise their use to meet requirements

- Identify and clarify the parameters of the requirements.
- Identify appropriate sources of knowledge (for example, search engines, blogs).
- Apply the factors of reliability and validity to the identified sources (for example, authority, date of publication).
- Assess and review potential bias of sources and malicious data.
- Assess and review the identified sources' appropriateness to meet the requirements.

(E4, D1)

Scheme of Assessment

There is a single synoptic assessment for this Occupational Specialism, which is an extended project. The synoptic element of the project is important to ensure students can demonstrate threshold competence and are able to evidence all the skills required by the Performance Outcomes.

The project consists of several activities grouped into four substantive tasks.

Each task is completed during a window set by Pearson, during which Providers schedule supervised assessment sessions. In some cases, tasks also include opportunities for unsupervised activities, where the requirements of the skills being assessed make this necessary.

Occupational Specialism project – Data Analytics Technician
Internally assessed project: 47 hours 30 minutes **134 marks**
Performance Outcomes In this project students will: **PO1** – Source, organise and format data securely in a relevant way for analysis **PO2** – Blend data from multiple sources **PO3** – Analyse structured and unstructured data to support business outcomes **PO4** – Interpret data and communicate a result appropriate to the audience **PO5** – Can apply legal, ethical and professional principles when manipulating data **PO6** – Discover, evaluate and apply reliable sources of knowledge.
Assessment overview There are three parts to the assessment: • Task 1: Sourcing data and designing a data model • Task 2: Developing and testing the data model • Task 3: Analysing and evaluating the data model. Students respond to a given scenario to complete a substantial project. They are assessed on their application of the skills listed for the Performance Outcomes. Students are not assessed against specific 'knowledge' outcomes but are expected to draw on and apply related knowledge to ensure appropriate outcomes when applying the skills in response to an assessment scenario. Students undertake the project under a combination of supervised and controlled conditions. Internet access is permitted for all tasks except Task 3. The assessment takes place over multiple sessions, up to a combined duration of 47.5 supervised hours. The project outcomes consist of a portfolio of evidence submitted electronically. This project is externally marked by Pearson.

Occupational Specialism project – Data Analytics Technician

Administration

Providers must follow the guidance in the following:

- General Administrative Support Guide
- Administration Support Guide for the specific Technical Qualification Occupational Specialism Project (if applicable).

These are located on the [Training and Admin Support webpage](#).

Performance Outcome		**Weighting**	
		Raw marks	**% of total marks**
PO1	Source, organise and format data securely in a relevant way for analysis	31	23.1
PO2	Blend data from multiple sources	8	6.0
PO3	Analyse structured and unstructured data to support business outcomes	32	23.9
PO4	Interpret data and communicate a result appropriate to the audience	30	22.4
PO5	Can apply legal, ethical and professional principles when manipulating data	15	11.2
PO6	Discover, evaluate and apply reliable sources of knowledge	18	13.4

Resources for the delivery of Occupational Specialism: Data Analytics Technician

Providers are required to have the following resources to deliver this OS:

- access to up-to-date PC or MAC computers with a specification that meets (or exceeds) the recommended requirements to run data manipulation software and office productivity software
- equipment to capture or generate data
- teachers with qualifications and/or experience in the digital sector
- a curriculum team with experience and knowledge that span the breadth of the qualification content.

	Resource required
General	• Word processing software (such as MS Word) to generate written evidence/reports. • Internet access to locate datasets.
Specific	• Data manipulation/blending software (such as MS Excel) to create unified datasets. • Data modelling software (e.g. spreadsheet software such as MS Excel, database software such as MS Access, or programming languages such as Python or R) to view and create functional data models. • Wire framing software (such as Figma) to create mock-ups/ data model output designs.

5 Technical Qualification grading, T Level grading and results transfer

How the Technical Qualification is graded and awarded

Calculation of the Technical Qualification grade

The Technical Qualification components are awarded at the grade ranges below.

Component	Available grade range
Core (including Core examination/s and Employer Set Project)	A* – E and Unclassified
Occupational Specialism	Distinction, Merit, Pass and Unclassified

The Core uses an aggregation of points from each of the Core assessments to calculate the A* to E grade.

Students whose level of achievement for either component is below the minimum judged by Pearson to be of sufficient standard receive an Unclassified (U) result.

Awarding the components

Grade boundaries will be set for each component and/or sub-component (Core Examinations, Employer Set Project and Occupational Specialism) in each series they are offered through a process known as awarding. Awarding is used to set grade boundaries and ensure standards are maintained over time. This is important as we must ensure students have the same opportunity to achieve, regardless of the assessment opportunity.

Uniform Mark Scale

For the Core component, students' raw component and/or sub-component marks are converted to a Uniform Mark Scale (UMS). The UMS is used to convert students' 'raw' marks into uniform marks. This is done to benchmark outcomes from one series to another to account for any variety of difficulty in assessments. For example, a student who produces a response worthy of a C grade in the Employer Set Project in one series will receive the same uniform mark as a student achieving that same grade and level of performance in another series, regardless of their raw marks.

The maximum number of uniform marks available for each sub-component, and the uniform marks relating to each grade boundary, are fixed. These are shown below.

Grade	Core Exam	Core ESP	Core Overall
Maximum	240	160	400
A*	216 – 240	144 – 160	360 – 400
A	192 – 215	128 – 143	320 – 359
B	168 – 191	112 – 127	280 – 319
C	144 – 167	96 – 111	240 – 279
D	120 – 143	80 – 95	200 – 239
E	96 – 119	64 – 79	160 – 199
U	0 – 95	0 – 63	0 – 159

Where the Core component has two Core Exams, the results are combined before conversion to UMS.

Calculation of the T Level grade

The T Level grade look-up table shows the minimum thresholds the Department for Education uses for calculating the T Level grade.

Students must complete both components and achieve a minimum of a grade E in the Core and a Pass in the Occupational Specialism. In addition, they must successfully complete the other elements of the T Level, such as the industry placement.

Students who do not meet the minimum requirements will not be certificated.

Results transfer to Providers

Technical Qualification result days

Assessment series	Results day
Summer	August (Level 3 Results Day)
November	March (normally the third week − Level 3 Results Day)

Pearson issues the results directly to you and makes available:

- Scorecards: outlining the achievement in percentage terms against each Assessment Objective
- Results Plus: a service whereby achievement will be presented in an item-by-item format. This means Providers will be able to ascertain trends across and within cohorts, and clearly label the associated Assessment Objective
- Statement of Provisional Results: we will offer a provisional component result slip, clearly watermarked as a provisional component result.

As we are not required to issue Technical Qualification certificates, T Level certificates or T Level statements of achievement, we do not require you to complete any forms or processes to claim the Technical Qualification from Pearson.

T Level results reporting

The Technical Qualification forms part of the T Level.

The Department for Education will issue T Level results on Level 3 results day in August.

The Department for Education will provide T Level certificates to students who successfully complete all elements of the T Level.

Appendix 1: General Competency Frameworks for T Levels

The General Competency Framework for T Levels articulates English, maths and digital competencies that students are required to develop over the course of the qualification. The tables below list the competencies from the framework that are relevant to the *T Level Technical Qualification in Digital Data Analytics*.

Competencies that can be developed in relation to a specification element of content are referenced in the column next to this content element in the Occupational Specialism. These competencies should be delivered through the content of this qualification and teachers should seek opportunities to allow students to develop the relevant skills to enable them to reach threshold competence in the specialism.

The English, maths and digital competencies are embedded in both the Core Component and the Occupational Specialism Component of the *T Level Technical Qualification in Digital Data Analytics*. This is so that students can demonstrate their knowledge and understanding of these skills over the course of the qualification.

General English competencies

Students should be supported to develop the English knowledge and skills needed in order to:

E1	Convey technical information to different audiences
E2	Present information and ideas
E3	Create texts for different purposes and audiences
E4	Summarise information/ideas
E5	Synthesise information
E6	Take part in/leading discussions

General maths competencies

Students should be supported to develop the maths knowledge and skills needed in order to:

M1	Measure with precision
M2	Estimate, calculate and spot errors
M3	Work with proportion
M4	Use rules and formulae
M5	Process data
M6	Understand data and risk
M7	Interpret and represent with mathematical diagrams
M8	Communicate using mathematics
M9	Cost a project
M10	Optimise work processes

General digital competencies

Students should be supported to develop the digital knowledge and skills needed in order to:

D1	Use digital technology and media effectively
D2	Design, create and edit documents and digital media
D3	Communicate and collaborate
D4	Process and analyse numerical data
D5	Be safe and responsible online
D6	Code and program

Command word taxonomy list

The following table shows the command words that will be used consistently in our assessments to ensure students are rewarded for demonstrating the necessary skills. The list below will not necessarily be used in every paper and is provided for guidance only.

| Command word	Definition
Give/state/name	Provide a response (e.g. a feature, a characteristic, a use of or a justification for something).
Identify	Select the correct answer from the given context or stimulus.
Write	Write, using information from the given context or stimulus, a: • formula • statement/expression (e.g. an SQL statement).
Describe	Provide responses that are linked in an appropriate logical order.
Explain	Requires identification of a point and linked justification of that point.
Explain with additional justification	Requires identification of a point, a linked justification and a third point, which is a further justification of the first justification.
Discuss	Consider the factors that apply in relation to a specific context. Give careful consideration to opposing aspects of an issue, situation or problem. A conclusion is not required.
Evaluate	Consider various aspects of a subject's qualities in relation to its context, such as strengths and weaknesses, advantages and disadvantages, pros and cons. Come to a judgement supported by evidence which will often be in the form of a conclusion.
Draw	Produce a diagram (e.g. an algorithm, a process flow) using information from a given context or scenario.
Complete	Provide the missing information for a diagram so that it is complete (contains all the necessary information).

Appendix 2: Diagrams

This appendix provides additional information about the digital technologies that students are expected to learn about within the Core and Occupational Specialism content.

This appendix does not replace the specification but should be used alongside the specification content to provide additional guidance and scope.

Sections of the specification that do not require additional expansion are not included.

Information flow diagrams

Students should be able to use and create appropriately labelled diagrams to express meaning.
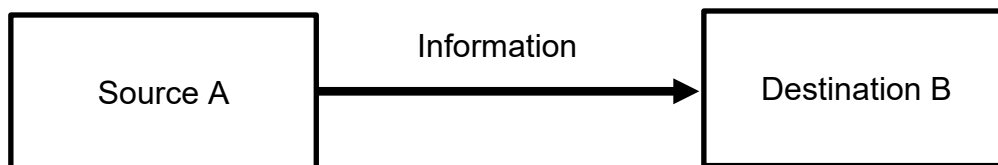
Data flow diagrams

Arrows and labels as required.

Denotes data source of destination (inputs and outputs)
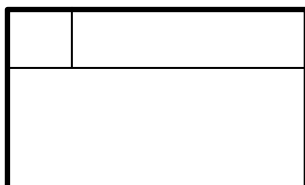
Denotes a process

Denotes a data store

Flowchart symbols

Symbol	Description
(stadium / rounded rectangle)	Denotes the start and end of an algorithm
(rectangle)	Denotes a process to be carried out
(rectangle with vertical bars)	Denotes a sub-process
(diamond)	Denotes a decision to be made
(parallelogram)	Denotes input or output
(circle)	Denotes a connection to part of a flowchart that cannot easily be linked using an unbroken flow arrow
(arrow)	Shows the logical flow of the program
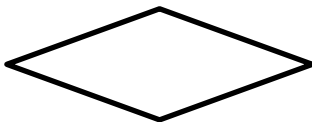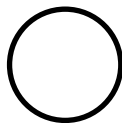
Entity relationship diagrams

Denotes an entity

Primary keys must be underlined.

Foreign keys must be indicated using a * at the end of the key name.

Cardinality using crow's foot notation.
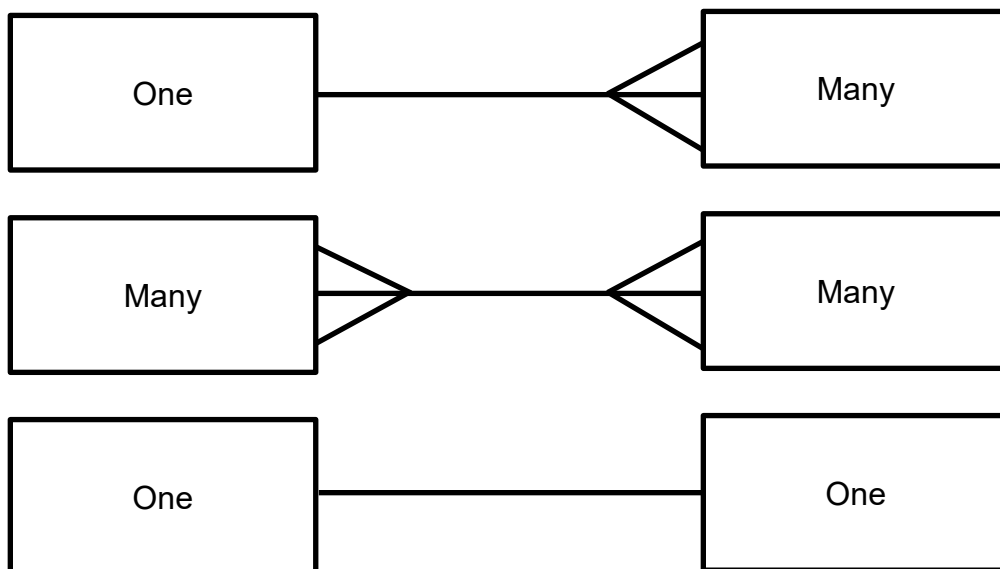
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