

Unit 2: Technology Systems

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **External**

Unit introduction

Technology systems are involved in many of the objects we use every day, from a laptop computer and routers relaying internet traffic, to logging in to a social networking site. This unit provides a first look at how the main building blocks of technology systems work.

You will explore the common hardware components of technology systems, such as a touch screen or a printer, and the internal building blocks of a computer like the processor, buses and memory. The unit also covers the purpose of networks, which allow different devices within a technology system to communicate. (This topic is covered in more detail in *Unit 1: The Online World* and *Unit 11: Computer Networks*.)

No technology system is complete without the software that brings it to life. You will explore different types of software. These will include the operating system (OS) that supports the communication and management of resources, and utility programs that provide functionality to maintain the system.

You will also learn about the role of applications software, such as office programs, graphics packages, accounting software and CAD/CAM, that supports many aspects of everyday business life.

This unit supports all of the optional specialist units in the Award, especially *Unit 8: Mobile Apps Development*, *Unit 9: Spreadsheet Development*, *Unit 10: Database Development*, *Unit 11: Computer Networks*, *Unit 12: Software Development* and *Unit 13: Website Development*.

This unit is particularly useful if you are considering a career in the IT sector, as it includes key concepts and processes which form the basis of any technology system and is relevant for many roles in the industry.

Learning aims

In this unit you will:

- A understand how the components of technology systems work together
- B understand how data flows between internal components of a computer and is processed to provide information
- C understand different types of software.

Learning aims and unit content

What needs to be learnt
<p>Learning aim A: Understand how the components of technology systems work together</p>
<p>Computer and technology systems</p> <p>Understand the concepts:</p> <ul style="list-style-type: none"> • a computer is a machine that processes digital data • a technology system is the complete collection of components (hardware, software, peripherals, power supplies, communication links) making up a single computer installation. <p>Applications and issues of technology systems</p> <p>Understand:</p> <ul style="list-style-type: none"> • application of technology systems used in different sectors, including construction, finance, health, manufacturing (including CAD/CAM/use of robots) and retail • issues involved in the use of technology systems, including health and safety, security measures (passwords, authentication, levels of access), environmental, sustainability, privacy and copyright • reasons why future development of a technology system is important to organisations, including competitive advantage, reduced costs and improved performance. <p>Computer hardware devices</p> <p>Understand the features, uses and implications of hardware devices, including:</p> <ul style="list-style-type: none"> • devices (PC, server, laptop, tablet, games console and other programmable digital devices) • input – keyboard, mouse, sensors, touch screen, microphone, scanner, digital camera • output – printers (inkjet, laser, impact), speakers, force feedback devices, actuators, screens, projectors, robot arms, other control devices • storage devices – solid state, optical media, magnetic media • that modern technology devices are often multifunctional (have both input and output functionality) • how hardware components and software can be combined to form an automated technology system (self-service checkout, production line) • the uses of devices that capture data for automated systems (barcode readers, magnetic strip readers, optical character readers (OCR), optical mark readers (OMR) and radio frequency identification systems (RFID)) • suitable devices to suit the requirements for a specific user and purpose, and justify their use. <p style="text-align: right;"><i>continued</i></p>

What needs to be learnt**Computer networking**

Understand the concepts, applications and implications of networks, including:

- the purpose of different types of network (local area network (LAN), wide area network (WAN), personal area network (PAN), mobile broadband)
- the common uses of network systems (resource sharing, data sharing, entertainment, communication)
- the benefits of computer networking
- the need to synchronise data held on devices forming a PAN.

Data transfer

Understand the concepts, implications and processes of data transfer, including:

- physical methods of transferring data between devices using wireless or cabled topology to meet the requirements for a specific user and purpose
- wireless methods of transfer including the use of Wi-Fi and Bluetooth technologies
- cabled methods for transfer of data between devices, including the use of optical fibre, unshielded twisted pair (UTP) and coaxial cables
- the benefits and drawbacks of these physical methods.

What needs to be learnt

Learning aim B: Understand how data flows between internal components of a computer and is processed to provide information

Internal components of a computer

Understand the main characteristics, functions and role of the internal components of a computer, including:

- the motherboard – printed circuit board (PCB) holding main components of the system
- central processing unit (CPU) – arithmetic and logic unit (ALU), control unit, registers
- memory (RAM, ROM, including Flash memory)
- graphics/sound/video hardware
- heat dispersal systems – fans and heat sinks
- storage devices – solid state, optical and magnetic
- how internal components of a computer affect performance and user experience
- comparison of different specifications of internal components
- how the features of the central processing unit and graphical processing unit affect performance and user experience:
 - clock speed
 - caches
 - multiple processing cores
 - heat, power consumption
- how the features of mobile devices affect performance/user experience:
 - System-on-a-Chip (SoC)
 - CPU and GPU
 - battery life
- comparing how mobile systems are different from traditional platforms
- how the features of memory and storage devices affect performance/user experience:
 - memory (cache and RAM)
 - storage devices (solid state, optical and magnetic media)
- the role of computer buses in carrying data between the internal components of a computer.

continued

What needs to be learnt**Analogue and digital data**

Understand the concepts, processes and implications of data transmission, including:

- the differences between analogue and digital transmission of data
- the need to convert analogue signals to digital signals and digital signals to analogue signals
- how data in a computer is represented using binary notation (bit, bytes, word length).

Understand and use binary format and the concepts of data storage, including:

- how characters can be represented in binary format and convert whole numbers into binary numbers (zero up to 10)
- conversion of binary numbers (up to 8 bits) to whole numbers (base 10)
- units used to describe memory and data storage (bit, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte).

What needs to be learnt

Learning aim C: Understand different types of software

Software

Understand the concepts, differences and implications of software, including:

- software as a series of programs used to direct the operation of technology systems
- the differences between custom-made and off-the-shelf programs
- the advantages and disadvantages of using custom-made and off-the-shelf programs.

Understand the concepts, implications and structures of programming, including:

- the hierarchical structure of a computer as:
 - application software package (user interface)
 - high-level programming language
 - low-level programming language
 - machine code (binary number notation)
 - hardware
- the main characteristics of high-level programming languages, including imperative, procedural, event-driven and object-orientated programming languages
- the main characteristics of low-level programming languages, including assembly language and machine code
- the main distinctions between programs in high-level and low-level forms in terms of structure, closeness to spoken language and intuition of use.

Introduction to computer programming concepts

Understand, use and interpret flowcharts, including:

- flowchart symbols as described in the British Computer Society's *BCS Glossary of Computing and ICT* (ISBN 978-1-906124-00-7, or subsequent editions), including terminators, connectors, processes and decision boxes
- the purpose of simple processes represented in flowchart diagrams (decision making, finding largest/smallest number in a sequence, rates of discount/interest/payments)
- inputs and/or outputs from simple processes represented in flowchart diagrams, including currency conversions, converting marks to grades, calculating wages including overtime payments
- completion of flowchart diagrams with any missing decision statements and decision outcomes.

Recognise and understand:

- the terms used in a computer programs, specifically: declaration, input, output, assignment, variables (local and global) and constants, sub-routines, scope of variables
- the need to annotate code to allow for maintenance
- the use of data types, including character, string, integer, real and Boolean
- the use of data structures, including records and simple arrays.

continued

What needs to be learnt**Operating systems and applications**

Understand the concepts, functions, and implications of operating systems, including:

- the role of an operating system in terms of file management, hardware management (drivers), resource allocation and security
- the role of utility applications, including disk defragmenters, firewalls and anti-virus software
- the differences between graphical user interfaces and command-line user interfaces
- the features of an operating system with a graphical user interface, including user interface, accessibility and ease of use
- the features and benefits of operating systems for mobile devices, including user interface, accessibility and ease of use
- the role of productivity applications, including office software, graphics, multimedia and web-authoring software
- the benefits of using suites of productivity applications
- the factors to consider when installing or upgrading an operating system or productivity application:
 - hardware platform
 - accessibility features
 - compatibility with preferred applications and hardware
 - cost (licence, set-up, training, maintenance)
 - speed
 - security features (including firewalls, malware management, setting user permissions, user support).

Teacher guidance

Resources

There are no special resources needed for this unit.

Assessment guidance

This unit is assessed using an onscreen test. Pearson sets and marks the test. The test lasts for 1 hour and has 50 marks. The assessment is available on-demand.

Learners will complete an onscreen test that has different types of questions including objective and short-answer questions. Where appropriate, questions will contain graphics, photos, animations or video. An onscreen calculator is available for questions requiring calculations. An onscreen notepad is available for making notes. Each item will have an accessibility panel that allows a learner to zoom in and out, and apply a colour filter.

Learners should be encouraged to keep up to date with emerging technology as part of their learning experience.

Centres are encouraged to be aware of developments in systems and technologies. In terms of assessment, we will issue updates annually in April to be taken into account during delivery from the following September. External assessments will reflect updates from the subsequent January.