

# SYLLABUS

**Cambridge IGCSE<sup>®</sup>**  
**Information and Communication Technology**  
**0417**

For examination in June and November 2016.  
Also available for examination in March 2016 for India only.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate (QN: 500/5649/9).

## Changes to syllabus for 2016

This syllabus has been updated and teachers are advised to read the whole syllabus document before planning their teaching programmes. Changes include:

- some changes to the assessment structure, but with many features retained (see Section 4):
  - the names of the components have changed
  - the topics to be assessed within each component are revised
- revised syllabus aims, assessment objectives and grade descriptions (see Section 5)
- revised syllabus content (see Section 6).

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# 1. Introduction

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## 1.1 Why choose Cambridge?

### Recognition

Cambridge International Examinations is the world's largest provider of international education programmes and qualifications for learners aged 5 to 19. We are part of Cambridge Assessment, a department of the University of Cambridge, trusted for excellence in education. Our qualifications are recognised by the world's universities and employers.

Cambridge IGCSE® (International General Certificate of Secondary Education) is internationally recognised by schools, universities and employers as equivalent in demand to UK GCSEs. Learn more at [www.cie.org.uk/recognition](http://www.cie.org.uk/recognition)

### Excellence in education

Our mission is to deliver world-class international education through the provision of high-quality curricula, assessment and services.

More than 9000 schools are part of our Cambridge learning community. We support teachers in over 160 countries who offer their learners an international education based on our curricula and leading to our qualifications. Every year, thousands of learners use Cambridge qualifications to gain places at universities around the world.

Our syllabuses are reviewed and updated regularly so that they reflect the latest thinking of international experts and practitioners and take account of the different national contexts in which they are taught.

Cambridge programmes and qualifications are designed to support learners in becoming:

- **confident** in working with information and ideas – their own and those of others
- **responsible** for themselves, responsive to and respectful of others
- **reflective** as learners, developing their ability to learn
- **innovative** and equipped for new and future challenges
- **engaged** intellectually and socially, ready to make a difference.

### Support for teachers

A wide range of materials and resources is available to support teachers and learners in Cambridge schools. Resources suit a variety of teaching methods in different international contexts. Through subject discussion forums and training, teachers can access the expert advice they need for teaching our qualifications. More details can be found in Section 2 of this syllabus and at [www.cie.org.uk/teachers](http://www.cie.org.uk/teachers)

### Support for exams officers

Exams officers can trust in reliable, efficient administration of exams entries and excellent personal support from our customer services. Learn more at [www.cie.org.uk/examsOfficers](http://www.cie.org.uk/examsOfficers)

## Not-for-profit, part of the University of Cambridge

We are a not-for-profit organisation where the needs of the teachers and learners are at the core of what we do. We continually invest in educational research and respond to feedback from our customers in order to improve our qualifications, products and services.

Our systems for managing the provision of international qualifications and education programmes for learners aged 5 to 19 are certified as meeting the internationally recognised standard for quality management, ISO 9001:2008. Learn more at [www.cie.org.uk/ISO9001](http://www.cie.org.uk/ISO9001)

## 1.2 Why choose Cambridge IGCSE?

Cambridge IGCSEs are international in outlook, but retain a local relevance. The syllabuses provide opportunities for contextualised learning and the content has been created to suit a wide variety of schools, avoid cultural bias and develop essential lifelong skills, including creative thinking and problem-solving.

Our aim is to balance knowledge, understanding and skills in our programmes and qualifications to enable candidates to become effective learners and to provide a solid foundation for their continuing educational journey.

Through our professional development courses and our support materials for Cambridge IGCSEs, we provide the tools to enable teachers to prepare learners to the best of their ability and work with us in the pursuit of excellence in education.

Cambridge IGCSEs are considered to be an excellent preparation for Cambridge International AS and A Levels, the Cambridge AICE (Advanced International Certificate of Education) Group Award, Cambridge Pre-U, and other education programmes, such as the US Advanced Placement program and the International Baccalaureate Diploma programme. Learn more about Cambridge IGCSEs at [www.cie.org.uk/cambridgesecondary2](http://www.cie.org.uk/cambridgesecondary2)

### Guided learning hours

Cambridge IGCSE syllabuses are designed on the assumption that learners have about 130 guided learning hours per subject over the duration of the course, but this is for guidance only. The number of hours required to gain the qualification may vary according to local curricular practice and the learners' prior experience of the subject.

## 1.3 Why choose Cambridge IGCSE Information and Communication Technology?

Cambridge IGCSE Information and Communication Technology encourages learners to develop lifelong skills, including:

- understanding and using applications
- using Information and Communication Technology (ICT) to solve problems
- analysing, designing, implementing, testing and evaluating ICT systems, ensuring that they are fit for purpose
- understanding the implications of technology in society, including social, economic and ethical uses
- awareness of the ways ICT can help in home, learning and work environments.

## Prior learning

Candidates beginning this course are not expected to have studied ICT previously.

## Progression

Cambridge IGCSE syllabuses are general qualifications that enable candidates either to progress directly to employment, or to proceed to further qualifications.

Candidates who are awarded grades C to A\* in Cambridge IGCSE Information and Communication Technology are well prepared to follow courses leading to Cambridge International AS and A Level Applied Information and Communication Technology, or the equivalent.

## 1.4 Cambridge ICE (International Certificate of Education)

Cambridge ICE is a group award for Cambridge IGCSE. It gives schools the opportunity to benefit from offering a broad and balanced curriculum by recognising the achievements of learners who pass examinations in at least seven subjects. To qualify for the Cambridge ICE award, learners are required to have studied subjects from five groups: two languages from Group 1, and one subject from each of the remaining four groups. The seventh subject can be taken from any of the five subject groups.

Information and Communication Technology (0417) is in Group 5, Creative, Technical and Vocational Subjects.

Learn more about Cambridge ICE at [www.cie.org.uk/cambridgesecondary2](http://www.cie.org.uk/cambridgesecondary2)

The Cambridge ICE is awarded from examinations administered in the June and November series each year.

## 1.5 How can I find out more?

### If you are already a Cambridge school

You can make entries for this qualification through your usual channels. If you have any questions, please contact us at [info@cie.org.uk](mailto:info@cie.org.uk)

### If you are not yet a Cambridge school

Learn about the benefits of becoming a Cambridge school at [www.cie.org.uk/startcambridge](http://www.cie.org.uk/startcambridge). Email us at [info@cie.org.uk](mailto:info@cie.org.uk) to find out how your organisation can register to become a Cambridge school.

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## 2. Teacher support

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### 2.1 Support materials

Cambridge syllabuses, past question papers and examiner reports to cover the last examination series are on the *Syllabus and Support Materials* DVD, which we send to all Cambridge schools.

You can also go to our public website at [www.cie.org.uk/igcse](http://www.cie.org.uk/igcse) to download current and future syllabuses together with specimen papers or past question papers and examiner reports from one series.

For teachers at registered Cambridge schools a range of additional support materials for specific syllabuses is available from Teacher Support, our secure online support for Cambridge teachers. Go to <http://teachers.cie.org.uk> (username and password required).

### 2.2 Resource lists

We work with publishers providing a range of resources for our syllabuses including textbooks, websites, CDs, etc. Any endorsed, recommended and suggested resources are listed on both our public website and on Teacher Support.

The resource lists can be filtered to show all resources or just those which are endorsed or recommended by Cambridge. Resources endorsed by Cambridge go through a detailed quality assurance process and are written to align closely with the Cambridge syllabus they support.

### 2.3 Training

We offer a range of support activities for teachers to ensure they have the relevant knowledge and skills to deliver our qualifications. See [www.cie.org.uk/events](http://www.cie.org.uk/events) for further information.

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## 3. Syllabus content at a glance

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All candidates study the following topics.

### 1. Types and components of computer systems

- 1.1 hardware and software
- 1.2 the main components of computer systems
- 1.3 operating systems
- 1.4 types of computer
- 1.5 impact of emerging technologies

### 2. Input and output devices

- 2.1 input devices and their uses
- 2.2 direct data entry and associated devices
- 2.3 output devices and their uses

### 3. Storage devices and media

### 4. Networks and the effects of using them

- 4.1 networks
- 4.2 network issues and communication

### 5. The effects of using IT

- 5.1 effects of IT on employment
- 5.2 effects of IT on working patterns within organisations
- 5.3 microprocessor-controlled devices in the home
- 5.4 potential health problems related to the prolonged use of IT equipment

### 6. ICT applications

- 6.1 communication applications
- 6.2 data handling applications
- 6.3 measurement applications
- 6.4 microprocessors in control applications
- 6.5 modelling applications
- 6.6 applications in manufacturing industry
- 6.7 school management systems
- 6.8 booking systems
- 6.9 banking applications
- 6.10 computers in medicine
- 6.11 computers in libraries
- 6.12 expert systems
- 6.13 computers in the retail industry
- 6.14 recognition systems
- 6.15 monitoring and tracking systems
- 6.16 satellite systems

**7. The systems life cycle**

- 7.1 analysis
- 7.2 design
- 7.3 development and testing
- 7.4 implementation
- 7.5 documentation
- 7.6 evaluation

**8. Safety and security**

- 8.1 physical safety
- 8.2 e-safety
- 8.3 security of data

**9. Audience**

- 9.1 audience appreciation
- 9.2 legal, moral, ethical and cultural appreciation

**10. Communication**

- 10.1 communicate with other ICT users using email
- 10.2 effective use of the internet

**11. File management**

- 11.1 manage files effectively
- 11.2 reduce file sizes for storage or transmission

**12. Images****13. Layout****14. Styles****15. Proofing**

- 15.1 software tools
- 15.2 proofing techniques

**16. Graphs and charts****17. Document production****18. Data manipulation**

- 18.1 create a database structure
- 18.2 manipulate data
- 18.3 present data

**19. Presentations****20. Data analysis**

- 20.1 create a data model
- 20.2 test the data model
- 20.3 manipulate data
- 20.4 present data

**21. Website authoring**

- 21.1 web development layers
- 21.2 create a web page
- 21.3 use stylesheets
- 21.4 test and publish a website

## 4. Assessment at a glance

For Cambridge IGCSE Information and Communication Technology, candidates take three components: Paper 1 Theory; Paper 2 Document Production, Data Manipulation and Presentations and Paper 3 Data Analysis and Website Authoring.

Components	Weighting
<p><b>Paper 1 Theory</b> <span style="float: right;"><b>2 hours</b></span></p> <p>This written paper tests sections 1–21 of the syllabus content. All questions are compulsory, mostly multiple choice or short answer questions, but also some require longer answers.</p> <p>100 marks</p> <p>External assessment</p>	40%
<p><b>Paper 2 Document Production, Data Manipulation and Presentations</b> <span style="float: right;"><b>2 hours 30 minutes</b></span></p> <p>This test assesses the practical skills needed to use the applications covered in sections 17, 18 and 19 of the syllabus content.</p> <p>All tasks are compulsory.</p> <p>80 marks</p> <p>External assessment</p>	30%
<p><b>Paper 3 Data Analysis and Website Authoring</b> <span style="float: right;"><b>2 hours 30 minutes</b></span></p> <p>This test assesses the practical skills needed to use the applications covered in sections 20 and 21 of the syllabus content.</p> <p>All tasks are compulsory.</p> <p>80 marks</p> <p>External assessment</p>	30%

This syllabus is examined in the June and November examination series. This syllabus is also available for examination in March for India only.

This syllabus is available to private candidates.

Detailed timetables are available from [www.cie.org.uk/examsOfficers](http://www.cie.org.uk/examsOfficers)

### Combining this with other syllabuses

Candidates can combine this syllabus in an examination series with any other Cambridge syllabus, except:

- syllabuses with the same title at the same level

Please note that Cambridge IGCSE, Cambridge International Level 1/Level 2 Certificate and Cambridge O Level syllabuses are at the same level.

## 5. Syllabus aims and assessment objectives

### 5.1 Syllabus aims

Cambridge IGCSE Information and Communication Technology aims to develop:

- knowledge of ICT including new and emerging technologies
- autonomous and discerning use of ICT
- skills to enhance work produced in a range of contexts
- skills to analyse, design, implement, test and evaluate ICT systems
- skills to consider the impact of current and new technologies on methods of working in the outside world and on social, economic, ethical and moral issues
- ICT-based solutions to solve problems
- the ability to recognise potential risks when using ICT, and use safe, secure and responsible practice.

### 5.2 Assessment objectives

**AO1** Recall, select and communicate knowledge and understanding of ICT.

**AO2** Apply knowledge, understanding and skills to produce ICT-based solutions.

**AO3** Analyse, evaluate, make reasoned judgements and present conclusions.

### 5.3 Relationship between assessment objectives and components

The approximate weightings allocated to each of the assessment objectives are summarised below.

Component	AO1	AO2	AO3	Weighting of component in overall qualification
Paper 1 Theory	70%	15%	15%	40%
Paper 2 Document Production, Data Manipulation and Presentations	5%	90%	5%	30%
Paper 3 Data Analysis and Website Authoring	5%	90%	5%	30%
Weighting of AO in overall qualification	30%	60%	10%	

## 5.4 Grade descriptions

### Grade A

- Candidates recall, select and communicate a thorough knowledge and understanding of ICT across a broad range of ICT including the impact of its social and commercial use and its use in the wider world.
- They apply knowledge, understanding and skills to a variety of situations, selecting and using a range of ICT tools efficiently to critically analyse problems and produce effective ICT-based solutions to solve them. In their solutions, they manipulate and process data efficiently and effectively, and represent their results in the most appropriate format. They effectively model situations, sequence instructions, interpret and systematically analyse information and amend their solutions to suit a given audience or when requirements change. They work systematically and understand and adopt safe, secure and responsible practices.
- They critically analyse and evaluate the way they and others use ICT. They use ICT to communicate effectively, demonstrating a clear sense of purpose and audience.

### Grade C

- Candidates recall, select and communicate a good knowledge and understanding of ICT, including the impact of its social and commercial use and its use in the wider world.
- They apply knowledge, understanding and skills in a range of situations, applying ICT tools effectively to analyse problems and provide ICT-based solutions to solve them. In their solutions, they input and select information, process data and represent their results in an appropriate format. They model situations, sequence instructions and explore ideas. They amend their solutions to suit a given audience. They work using safe, secure and responsible practices.
- They review and evaluate the way they and others use ICT. They use ICT to communicate, demonstrating consideration of purpose and audience.

### Grade F

- Candidates recall, select and communicate a basic knowledge and understanding of aspects of ICT, including its use in the wider world.
- They apply limited knowledge, understanding and skills to address simple problems and create basic solutions using ICT tools. In their solutions, they input, select and present data and information, and use simple models and instructions to process data. They respond to needs using ICT. They sometimes review and provide comments on the way they and others use ICT. They demonstrate some awareness of the need for safe, secure and responsible practices.
- They use ICT to communicate, demonstrating limited awareness of purpose and audience.

## 6. Syllabus content

### Annual technical updates

Technical updates will be published each year to take account of emerging technologies relevant to the syllabus content. Please refer to the updates page for this syllabus on the Cambridge website <http://www.cie.org.uk/0417> for the relevant year of examination.

### 1. Types and components of computer systems

Candidates should be able to:

#### 1.1 hardware and software

- define hardware as consisting of physical components of a computer system
- identify internal hardware devices (e.g. processor, motherboards, random access memory (RAM), read-only memory (ROM), video cards, sound cards and internal hard disk drives)
- identify external hardware devices and peripherals (such as monitors, keyboards, mice, keyboards, printers as input and output devices and external storage devices in general)
- define software as programs for controlling the operation of a computer or processing of electronic data
- identify the two types of software – applications software and system software
- define applications software (e.g. word processing, spreadsheet, database management systems, control software, measuring software, applets and apps, photo-editing software, video-editing software, graphics manipulation software)
- define system software (e.g. compilers, linkers, device drivers, operating systems and utilities)

#### 1.2 the main components of computer systems

- describe the central processing unit including its role
- describe internal memory, i.e. ROM and RAM and the differences between them
- define input and output devices and describe the difference between them
- define secondary/backing storage

#### 1.3 operating systems

- define and describe operating systems which contain a Command Line Interface (CLI)
- define and describe operating systems which contain a Graphical User Interface (GUI)
- describe the differences, including the benefits and drawbacks, between operating systems which contain a CLI and those which contain a GUI

#### 1.4 types of computer

- describe the characteristics of a personal/desktop computer and its uses, both as a standalone and networked computer
- describe the characteristics of a laptop computer and what it is used for, both as a standalone and networked computer
- describe the characteristics of a tablet computer and what it is used for, including its ability to use wireless technology or 3G/4G technology
- describe the computer characteristics of a smartphone and what it is used for in computing terms
- describe the advantages and disadvantages of each type of computer (as above) in comparison with the others (as above)

**1.5 impact of emerging technologies**

- describe how emerging technologies are having an impact on everyday life (e.g. artificial intelligence, biometrics, vision enhancement, robotics, quantum cryptography, computer-assisted translation, 3D and holographic imaging, virtual reality)

**2. Input and output devices**

Candidates should be able to:

**2.1 input devices and their uses**

- identify input devices and their uses, e.g. keyboard, numeric keypad, pointing devices (such as mouse, touchpad, trackerball), remote control, joystick/driving wheel, touch screen, scanners, digital cameras, microphone, sensors (general), temperature sensor, pressure sensor, light sensor, graphics tablet, video camera, web cam

**2.2 direct data entry and associated devices**

- describe direct data entry and associated devices, e.g. magnetic stripe readers, chip and PIN readers, Radio Frequency Identification (RFID) readers, Magnetic Ink Character Reader (MICR), Optical Mark Reader (OMR), Optical Character Reader (OCR), bar code reader
- identify the advantages and disadvantages of any of the above devices in comparison with others

**2.3 output devices and their uses**

- identify output devices and their uses, e.g. CRT monitor, TFT/LCD monitor, IPS/LCD monitor, LED monitor, touch screen (as an output device), multimedia projector, laser printer, inkjet printer, dot matrix printer, wide format printer, 3D printer, speakers, motors, buzzers, heaters, lights/lamps
- describe the advantages and disadvantages of any of the above devices

**3. Storage devices and media**

Candidates should be able to:

- identify storage devices, their associated media and their uses, e.g.
  - magnetic backing storage media: fixed hard disks and drives, portable and removable hard disks, portable and removable hard drives, magnetic tape drives and magnetic tapes, memory cards
  - optical backing storage media (CD/DVD/Blu-ray): CD ROM/DVD ROM, CD R/DVD R, CD RW/DVD RW, DVD RAM, Blu-ray discs
  - solid state backing storage: solid state drives, flash drives (pen drive/memory stick/USB stick)
- describe the advantages and disadvantages of the above devices

#### 4. Networks and the effects of using them

Candidates should be able to:

##### 4.1 networks

- understand how a router works and its purpose
  - describe how networks and individual computers connect to the internet
  - describe how a router stores computer addresses
  - describe how it routes data packets
- understand the use of other common network devices, including: network interface cards, hubs, bridges, switches, modems
- understand the use of WiFi and Bluetooth in networks
  - describe how computers can use WiFi to connect to a network
  - describe how computers can use Bluetooth to connect to a network
  - compare and contrast Bluetooth and WiFi
- understand how to set up and configure a small network, including: access to the internet, the use of a browser, the use of email, access to an ISP
- understand the characteristics and purpose of common network environments, such as intranets and the internet
  - define what the internet is
  - define what an intranet is
  - describe the differences between an intranet and the internet
  - explain the purpose of an intranet and how that differs from the purpose of the internet
  - describe the uses of an intranet
  - describe the uses of the internet
  - define the terms Local Area Network (LAN), Wireless Local Area Network (WLAN) and Wide Area Network (WAN)
  - describe the differences between a LAN, a WLAN and a WAN
- understand the advantages and disadvantages of using different types of computer to access the internet
  - compare the advantages and disadvantages of using laptop computers, desktop computers, tablet computers and mobile phones to access the internet

## 4.2 network issues and communication

- security issues regarding data transfer
  - describe the security issues surrounding the use of computer networks
  - describe other issues such as the internet is not policed and the effects of this, such as the existence of inappropriate sites
  - identify methods of avoiding password interception (such as the use of anti spyware and changing passwords regularly)
  - describe the difference between strong and weak passwords
  - describe other authentication techniques (such as biometric methods, magnetic stripes, id cards, passports, other physical tokens, retina scans, iris scans, face scans)
  - describe the use of antivirus software and other methods of avoiding viruses (such as use of unknown storage media to transfer data, the risk of downloading software from the internet)
  - define encryption and describe its use
  - list the principles of a typical data protection act
- network communication
  - describe facsimile communication and describe the differences between physical faxing (which does not require the use of a network) and electronic faxing (which does require the use of a network)
  - describe email communication, including the use of attachments
  - describe the advantages and disadvantages of using email compared with faxing
  - describe video-conferencing, including the hardware used
  - describe audio-conferencing
  - describe web-conferencing and how it can be linked to either video- or audio-conferencing

## 5. The effects of using IT

Candidates should be able to:

### 5.1 effects of IT on employment

- describe how there has been a reduction of employment in offices, as workers' jobs have been replaced by computers in a number of fields (e.g. payroll workers, typing pools, car production workers)
- describe how there has been an increase in employment in other fields (e.g. website designers, computer programmers, delivery drivers in retail stores)

### 5.2 effects of IT on working patterns within organisations

- describe how the use of computers has led to a number of employees changing their working patterns (e.g. part-time working, flexible hours, job sharing, compressed hours)
- describe what is meant by part-time working, flexible hours, job sharing, compressed hours

### 5.3 microprocessor-controlled devices in the home

- describe the positive effects microprocessors have on aspects of lifestyle (e.g. the amount and use of leisure time, the degree of social interaction, the ability to leave the home)
- describe the negative effects microprocessors have on aspects of lifestyle (e.g. lack of exercise)

### 5.4 potential health problems related to the prolonged use of IT equipment

- describe repetitive strain injury (RSI) and what causes it
- identify other health issues (e.g. back problems, eye problems, headaches)
- describe some simple strategies for preventing these problems
- evaluate the use of IT equipment and develop strategies to minimise the health risks

## 6. ICT applications

Candidates should be able to:

### 6.1 communication applications

- describe a range of communication applications (e.g. newsletters, websites, multimedia presentations, music scores, cartoons, flyers and posters)
- describe the use of mobile phones for communication (e.g. text messaging, phone calls, accessing the internet)
- describe the use of internet telephony, including Voice Over Internet Protocol (VOIP)
- describe applications for publicity and corporate image publications (e.g. business cards, letterheads, flyers and brochures)

### 6.2 data handling applications

- describe the use of a range of data handling applications (e.g. surveys, address lists, clubs and society records, school reports and school libraries)

### 6.3 measurement applications

- describe a range of measurement applications (e.g. scientific experiments, weather stations)
- explain the difference between analogue data and digital data
- explain the need for conversion between analogue and digital data
- describe the use of microprocessors and computers in a number of applications (e.g. pollution monitoring, intensive care units in hospitals)
- discuss the advantages and disadvantages of using computers in measurement rather than humans

### 6.4 microprocessors in control applications

- describe the role of a microprocessor or computer in control applications, including the role of the pre-set value
- describe the use of computer control in applications (e.g. turtle graphics, automatic washing machines, automatic cookers, computer controlled central heating systems, burglar alarms, computer controlled glasshouse)

### 6.5 modelling applications

- describe the use of computer modelling in spreadsheets (e.g. for personal finance)

### 6.6 applications in manufacturing industries

- describe a range of computer controlled applications (e.g. robotics in manufacture and production line control)
- discuss the advantages and disadvantages of using computer controlled systems rather than humans

### 6.7 school management systems

- describe how systems are used to manage learner registration and attendance
- describe how systems can be used to record learner performance
- describe how systems can be used for organising examinations, creating timetables and managing teaching cover/substitution

**6.8 booking systems**

- identify areas where booking systems are used (e.g. travel industry, theatre and cinemas)
- describe the online processing involved in booking tickets
- discuss the advantages and disadvantages of online booking systems

**6.9 banking applications**

- describe the computer processing involved in Electronic Funds Transfer (EFT)
- describe the computer processing involved in using automatic teller machines (ATM) (e.g. withdrawing cash, depositing cash or cheques, checking account balance, mini statements, mobile/cellphone recharge/top up, bill paying, money transfers, ordering paper-based goods)
- describe the use of processing credit/debit card transactions
- describe the clearing of cheques
- describe phone banking
- describe internet banking, and discuss the advantages and disadvantages of it

**6.10 computers in medicine**

- describe the contents of information systems in medicine (including patient records, pharmacy records, monitoring and expert systems for diagnosis)
- describe how 3D printers can be used in producing medical aids (e.g. surgical and diagnostic aids, development of prosthetics and medical products, tissue engineering, artificial blood vessels and the design of medical tools and equipment)

**6.11 computers in libraries**

- describe the files used in libraries (e.g. records of books and borrowers)
- describe the computer processing involved in the issue of books, including the use of direct data entry methods
- describe the automatic processing involved in issuing reminders for overdue books

**6.12 expert systems**

- identify a range of applications which use expert systems (e.g. mineral prospecting, car engine fault diagnosis, medical diagnosis, chess games)
- identify the components of an expert system (e.g. interactive user interface, inference engine, rules base, knowledge base)
- describe how an expert system is used to suggest diagnoses

**6.13 computers in the retail industry**

- describe the use of point of sale (POS) terminals, how the stock file is updated automatically, and how new stock can be ordered automatically
- describe the use of electronic funds transfer at point of sale (EFTPOS) terminals (e.g. the checking of the validity of cards, the use of chip and PIN, the communication between the supermarket computer and the bank computer)
- describe internet shopping
- discuss the advantages and disadvantages of internet shopping

**6.14 recognition systems**

- describe how recognition systems work (e.g. Magnetic Ink Character Recognition (MICR), Optical Mark Recognition (OMR) and Optical Character Recognition (OCR), Radio Frequency Identification Device (RFID))
- describe how number plate recognition systems work
- describe the processing of cheques
- describe the processing of OMR media (e.g. school registers, multiple choice examination papers)
- describe how RFID and RF technology is used in a range of applications (e.g. tracking stock, passports, automobiles, contactless payment)

**6.15 monitoring and tracking systems**

- describe how a workforce or member of the public can be monitored or logged
- describe how the use of cookies can be used to monitor a person's internet activity
- describe the use of key-logging
- describe how worker/employee call monitors can be used
- describe the use of automatic number plate recognition

**6.16 satellite systems**

- describe the use of different satellite systems (e.g. Global Positioning Systems (GPS), satellite navigation, Geographic Information System (GIS), media communication systems)

**7. The systems life cycle**

Candidates should be able to:

**7.1 analysis**

- methods of researching an existing system
  - identify and describe methods of researching an existing system (e.g. observation, interviews, questionnaires and examination of existing documents)
  - discuss the disadvantages and advantages of the different methods
- recording and analysing information about the current system
  - describe the need to identify inputs, outputs and processing of the current system
  - describe the need to identify problems with the current system
  - describe the need to identify the user and information requirements for the new system
- system specification
  - identify and justify suitable hardware for the new system
  - identify and justify suitable software for the new system

## 7.2 design

- describe how it is necessary to design documents, files, forms/inputs, reports/outputs and validation
- produce designs to solve a given problem
- design data capture forms and screen layouts
- design report layouts and screen displays
- design validation routines (including length check, type check, format check, presence check, check digit)
- design the required data/file structures (e.g. field length, field name, data type)

## 7.3 development and testing

- testing designs
  - describe how data/file structures are created and tested
  - describe how validation routines are created and tested
  - describe how input methods are created and tested
  - describe how output formats are created and tested
- testing strategies
  - describe the need to test each module
  - describe the need to test the whole system
  - describe testing using normal data including definition and examples
  - describe testing using live data including definition and examples
  - describe testing using abnormal data including definition and examples
  - describe testing using extreme data including definition and examples
- improvements needed as a result of testing
  - describe how it may be necessary to improve the system and make changes (e.g. data/file structures, validation routines, input methods, output formats may need to be amended/improved)

## 7.4 implementation

- different methods of system implementation
  - describe the four methods of implementation (direct changeover, parallel running, pilot running, phased implementation)
- methods of implementation
  - identify suitable situations for the use of different methods of system implementation (e.g. organisations or departments within organisations which need a quick changeover, organisations or departments within organisations which cannot afford to lose data)
  - describe advantages and disadvantages of each method of implementation

### **7.5 documentation**

- technical documentation for an information system
  - explain the need for technical documentation
  - identify the components of technical documentation (e.g. purpose of the system/program, limitations of the system, program listing, program language, program flowcharts/algorithms, system flowcharts, hardware and software requirements, file structures, list of variables, input format, output format, sample runs/test runs, validation routines)
- user documentation for an information system
  - explain the need for user documentation
  - identify the components of user documentation (e.g. purpose of the system, limitations of the system, hardware and software requirements, how to load/run/install software, how to save a file, how to print data, how to add records, how to delete/edit records, input format, output formats, sample runs, error messages, error handling, trouble-shooting guide/help line, frequently asked questions, glossary of terms)

### **7.6 evaluation**

- describe the need to evaluate a solution in terms of the efficiency of the solution, the ease of use of the solution, and the appropriateness of the solution
- describe the need for a variety of evaluation strategies e.g.
  - compare the solution with the original task requirements
  - identify any limitations and necessary improvements to the system
  - evaluate the users' responses to the results of testing the system

## **8. Safety and security**

Candidates should be able to:

### **8.1 physical safety**

- describe common physical safety issues and what causes them, e.g. electrocution from spilling drinks, fire from sockets being overloaded or equipment overheating, tripping over trailing cables
- describe some simple strategies for preventing these issues
- evaluate own use of IT equipment and develop strategies to minimise the potential safety risks

**8.2 e-safety**

- explain what is meant by personal data
- explain why personal data should be confidential and protected
- explain how to avoid inappropriate disclosure of personal data including: own name, address, school name, a picture in school uniform
- discuss why e-safety is needed
- evaluate own use of the internet and use strategies to minimise the potential dangers, e.g. only using websites recommended by teachers, only using a learner-friendly search engine
- evaluate own use of email and use strategies to minimise the potential dangers, including only emailing people already known, thinking before opening an email from an unknown person, never emailing the school's name or a picture of a learner in school uniform
- evaluate own use of social media/networking sites, instant messaging and internet chat rooms and use strategies to minimise the potential dangers, including: knowing how to block and report unwanted users, never arranging to meet anyone alone, and always telling an adult first and meeting in a public place, avoiding the misuse of images, using appropriate language, respecting confidentiality
- describe measures which should be taken when playing games on the internet (including not using real names)

### 8.3 security of data

- effective security of data
  - define the term hacking and describe its effects
  - explain what is meant by the term *hacking* and the measures that must be taken in order to protect data.
  - explain what is meant by the terms *user id* and *password* stating their purpose and how they are used to increase the security of data
  - explain what is meant by the terms *biometric data* and why biometric data is used
- security of data online
  - explain what is meant by the term *digital certificate* and its purpose
  - explain what is meant by the term Secure Socket Layer (SSL)
  - describe the features of a web page that identify it as using a secure server
  - define the terms: *phishing*, *pharming*, *smishing*
  - describe the methods which can be used to help prevent phishing, pharming and smishing
  - describe the potential for the malicious use of technology to collect personal data, including: phishing, pharming, smishing
  - describe how it is possible to recognise when someone is attempting to obtain personal data, report the attempt and avoid the disclosure of information
  - explain the difference between moderated and un-moderated forums and the relative security of these
  - explain the concept of and how to recognise spam mail and avoid being drawn into it
  - describe what encryption is and why it is used
  - define the term *computer virus* and describe its effects
  - describe the effects of infecting a computer with a virus from a downloaded file
  - describe how to take preventative action to avoid the danger of infecting a computer with a virus from a downloaded file
  - describe the measures that must be taken in order to protect against hacking
  - describe how it is possible to be the subject of fraud when using a credit card online
  - explain the issues related to security of data in the cloud
  - explain the concept of a firewall and why it is used
  - discuss the effectiveness of different methods of increasing security

## 9. Audience

Candidates should be able to:

### 9.1 audience appreciation

- show a clear sense of audience when planning and creating ICT solutions
- analyse the needs of an audience
- explain why solutions must meet the needs of the audience

### 9.2 legal, moral, ethical and cultural appreciation

- explain the need for copyright legislation and the principles of copyright relating to computer software (e.g. software piracy)
- describe methods that software producers employ to prevent software copyright being broken
- discuss the legal, moral, ethical and cultural implications of creating an ICT solution
- create ICT solutions that are responsive to and respectful of the needs of the audience
- discuss why the internet is not policed (although legislation is enforced in some countries) and the effects of this, including the existence of inappropriate sites

## 10. Communication

Candidates should be able to:

### 10.1 communicate with other ICT users using email

- describe the constraints that affect the use of email, including: the laws within a country, acceptable language, copyright, local guidelines set by an employer, the need for security, netiquette, password protection
- define the term *spam*
- explain why spam needs to be prevented
- describe the methods which can be used to help prevent spam
- explain why email groups are used

## 10.2 effective use of the internet

- fundamentals of the internet
  - define the terms *internet* and *intranet*
  - explain the differences between the internet, an intranet and the World Wide Web (WWW)
  - explain the concept of storage in the cloud
  - define and understand the terms: HyperText Transfer Protocol (HTTP), HyperText Transfer Protocol secure variant (HTTPS), Uniform Resource Locator (URL), *hyperlink*, Internet Service Provider (ISP), File Transfer Protocol (FTP)
  - describe the structure of a web address
  - explain what a web browser is used for
  - explain what a search engine is used for
  - define the term *blog* and describe the use of a blog as a means of communication
  - define the term *wiki* and describe the use of a wiki as a means of communication
  - define the term *social networking* and describe the use of social networking websites as a means of communication.
- advantages and disadvantages of using the internet
  - explain why the internet is so popular giving reasons such as the amount of information available and the speed of accessing information
  - explain why an internet search to find relevant information is not always fast
  - explain why it is not always easy to find reliable information on the internet
  - explain how to evaluate the reliability of information found on the internet

## 11. File management

Candidates should be able to:

### 11.1 manage files effectively

- identify different file types and their use/s, for example: css, csv, gif, htm, jpg, pdf, png, rtf, txt, zip
- locate stored files
- open and import files of different types
- save files in a planned hierarchical directory/folder structure
- save files using appropriate file names
- save and print files in a variety of formats, including: a draft document, final copy, screen shots, database reports, data table, graph/chart, a web page in browser view, a web page in HTML view
- save and export data into file formats for your applications packages, e.g. .doc, .docx, .xls, .sdb, .sdc, .rtf, .ppt
- explain why generic file formats are needed
- save and export data into generic file formats, including: .csv, .txt, .rtf, .pdf, .css, .htm

### 11.2 reduce file sizes for storage or transmission

- explain the need to reduce file sizes for storage or transmission
- identify where it will be necessary to reduce file sizes for storage or transmission
- reduce file sizes using file compression

## 12. Images

Candidates should be able to:

- use software tools to place and edit an image to meet the requirements of its intended application and audience
- know when it is necessary to edit an image and can appropriately:
  - place an image with precision
  - resize an image
  - maintain or adjust the aspect ratio of an image, or distort an image where appropriate
  - crop an image
  - rotate an image
  - reflect an image
  - adjust the colour depth of an image
  - adjust the brightness of an image
  - adjust the contrast of an image
  - understand the need to reduce image resolution to increase transmission speed
  - reduce the resolution of an image to reduce file size

### 13. Layout

Candidates should be able to:

NB: The word 'document' in this section relates to any of the applications used within sections 16 to 21.

- use software tools to prepare a basic document to match the purpose and target audience
  - create a new document or, where appropriate, open an existing document
  - enter text and numbers
  - use editing techniques to manipulate text and numbers, including: highlight, delete, move, cut, copy, paste, drag and drop
  - place objects into the document from a variety of sources, including: text, image, screen shot, spreadsheet extract, database extract, clip art or chart
  - create a table with a specified number of rows and columns
  - format a table and its contents
  - place text or objects in a table
  - wrap text around a table, chart or image, including: above, below, square and tight
- use software tools to use headers and footers appropriately within a range of software packages
  - create headers and footers
  - align consistently within a document the contents of the header and footer including: to left margin, right margin and centre of the page
  - place automated objects in headers and footers, including: automated file information, automated page numbering, text, date, time
  - explain why headers and footers are needed

### 14. Styles

Candidates should be able to:

- understand the purpose of a corporate house style and ensure that all work produced matches this
  - produce documents which conform to a corporate house style
  - explain what is meant by corporate branding/house style
- apply styles to ensure consistency of presentation
  - explain why consistent styles are required
  - apply consistent styles using a variety of application packages
  - ensure that page/slide layout is consistent, including: font styles, text alignment, spacing between lines, spacing between paragraphs, spacing before and after headings
  - create and apply an appropriate style, including: font type (serif, sans-serif), point size, font colour, alignment, line spacing, style of bullets, text alignment to the left, right, centre or fully justified
  - select an appropriate font style for a task, taking into account the audience
  - use text enhancement, including: bold, underline, italic, highlight
  - create and apply paragraph style(s) with a new style name to match the corporate house style

## 15. Proofing

Candidates should be able to:

### 15.1 software tools

- use software tools to ensure that all work produced contains as few errors as possible
  - explain why the automated suggestions given by spell check software do not always give the correct response
  - use automated tools, including spell check facilities, to remove errors
  - use validation routines to minimise errors
  - explain why validation checks must be appropriate to the data that is being checked

### 15.2 proofing techniques

- accuracy of data entry
  - describe the importance of accuracy and the potential consequences of data entry errors
  - correct errors in data entry, including: transposed numbers, spelling, consistent character spacing, consistent case and factual errors (following proofreading by a third party)
  - check to ensure consistent line spacing, to remove blank pages/slides, remove widows/orphans, ensure that tables and lists are not split over columns or pages/slides
- verification
  - define the term *verification*
  - describe visual verification (i.e. visual comparison of data entered with a data source)
  - describe double data entry (i.e. entering data twice and the computer compares the two sets of data, either by comparing them after data has been entered or by comparing them during data entry)
  - explain the need for validation as well as verification

## 16 Graphs and charts

Candidates should be able to:

- produce a graph or chart from the given data
  - select data to produce a graph/chart, including: using contiguous data, non-contiguous data, and specified data ranges where necessary
  - select the graph or chart type to match the required purpose and meet the needs of the audience
  - label the graph or chart, including: chart title, legend, sector labels, sector values, segment labels, segment values, percentages, category axis title, value axis title, category axis labels, value axis labels, scales
  - add a second data series to a chart, as necessary
  - add a second axis to a chart, as necessary
  - change the maximum and minimum values of an axis scale to appropriate values
  - enhance the appearance of a graph or chart, including: changing the colour scheme or fill patterns, extracting a pie chart sector to meet the needs of the audience

## 17. Document production

Candidates should be able to:

- format text and organise page layout
  - set page size
  - set page orientation
  - set page and gutter margins
  - set the number of columns
  - set the column width and spacing between columns
  - define the terms *widow* and *orphan*
  - explain why it is necessary to use page, section and column breaks, to adjust pagination and to avoid widows and orphans
  - set and remove page, section and column breaks
  - set line spacing, including: single, 1.5 times, double, multiple, spacing before and after paragraphs
  - set tabulation settings, including: indented paragraphs, hanging paragraphs
  - format text as bulleted or numbered lists to meet the needs of the audience
- use software tools to edit tables
  - edit a table structure, where necessary, to include: insert row(s), delete row(s), insert column(s), delete column(s), merge cells
  - set horizontal cell alignment: left, right, centre, fully justified
  - set vertical cell alignment: top, centre, bottom
  - format cells and the cell contents, including: show gridlines, hide gridlines, wrap text within a cell, shading/colouring cells
- mail merge a document with a data source
  - explain why mail merged documents are created
  - edit a master document to insert appropriate fields from a data source
  - insert special fields such as date
  - select records to merge
  - merge a document with selected fields
  - save and print merge master document
  - save and print selected merged documents as appropriate

## 18. Data manipulation

Candidates should be able to:

### 18.1 create a database structure

- design and use suitable software tools to create an appropriate database record structure
  - define the terms *flat-file database* and *relational database*
  - explain where it would be appropriate to select a flat-file database or a relational database
  - assign appropriate data types to fields, including: text, numeric, (integer, decimal, percentage, currency), date/time, Boolean/logical (–1/0, yes/no, true/false)
  - explain that other field types like placeholders for media, including images, sound bites and video clips are used in commercial databases
  - use short, meaningful file and field names
  - format fields and identify sub-types, including: specifying the number of decimal places, specifying a particular currency
  - identify the structure of external data with different file types, including: .csv, .txt, .rtf
  - locate, open and import data from an existing file
  - define and understand the terms *primary key* and *foreign key* and their role in a relational database
  - create a relationship between two or three tables
  - discuss the advantages and disadvantages of using relational tables rather than a flat file database
- design and use suitable software tools to create a data entry form appropriate to purpose and audience.
  - understand the key features of form design
  - create a data entry form to meet the needs of the audience
  - create a data entry form with all fields included to match the purpose of the task
  - create an appropriate data entry form, including: appropriate font styles and sizes, spacing between fields, character spacing of individual fields, use of white space, radio buttons, drop down menus, highlighting key fields

### 18.2 manipulate data

- use arithmetic operations or numeric functions to perform calculations within a database
  - create a calculated field
  - perform calculations at run time using formulae and functions, including: addition, subtraction, multiplication, division, sum, average, maximum, minimum, count
- use suitable software tools to sort data appropriately in a database
  - sort data using a single criterion and using multiple criteria where necessary, into ascending or descending order
- use suitable software tools to search a database to select subsets of data
  - perform suitable searches using a single criterion and using multiple criteria, on different field types like alphanumeric, numeric, Boolean
  - perform searches using a variety of operators including: AND, OR, NOT, LIKE, >, <, =, >=, <=, <>
  - perform searches using wildcards, as appropriate

**18.3 present data**

- use suitable software tools to produce reports to display data appropriate to purpose and audience
  - produce reports to display all the required data and labels in full where required
  - use appropriate headers and footers within a database report, including: report header, report footer, page header, page footer
  - set report titles
  - produce different output layouts as required, including: tabular format, labels,
  - align data and labels appropriately, including: right aligning numeric data and decimal alignment
  - format numeric data, including: number of decimal places, variety of currencies, percentages as required by the task
  - show and hide data and labels within a report, as necessary
  - export data for use in another application

**19. Presentations**

Candidates should be able to:

- use a master slide to appropriately place objects and set suitable styles to meet the needs of the audience
  - identify the need for consistency of presentation, in terms of styles, point sizes, colour schemes, transitions and animations
  - use the master slide to place objects appropriately, including: images, text, logos, slide footers, automated slide numbering
  - use the master slide to set font styles, heading styles and colour schemes as required by the audience
  - manipulate and use specified areas for headings, subheadings, bullets, images, charts, colours, text boxes, presenter notes, audience notes as appropriate
- use suitable software tools to create presentation slides to meet the needs of the audience
  - insert a new slide, when required, selecting the appropriate slide type for the purpose
  - place text on the slides including: headings, subheadings, bulleted lists where appropriate
  - apply consistent styles using available software tools, including: select from the presentation colour scheme, the use of text enhancement
  - place appropriate images on the slides, including: still images, video clips, animated images
  - place sound within a slide
  - place charts imported from a spreadsheet
  - place other objects including: symbols, lines, arrows, call out boxes
  - create consistent transitions between pages
  - create consistent animation facilities on text, images and other objects
- use suitable software tools to display the presentation in a variety of formats, including: looped on-screen carousel, controlled presentation, presenter notes, audience notes taking into account the needs of the audience

## 20. Data analysis

Candidates should be able to:

### 20.1 create a data model

- create and edit a data model
  - define the terms: *cells, rows, columns, sheets, tabs, pages, charts*
  - explain the importance of accurate data entry in spreadsheets
  - enter data with 100% accuracy
  - edit the structure of an existing model, including: inserting cells, deleting cells, inserting rows, deleting rows, inserting columns, deleting columns
  - define the terms: *formula, function, absolute reference, relative reference, ranges, named cell, named range, nested formulae/functions*
  - explain the difference between a formula and a function
  - explain the order in which mathematical operations are performed and use brackets to make sure that formulae work
  - use mathematical operators, including: add, subtract, multiply, divide, indices, where necessary
  - explain the function of, and use, absolute and relative referencing, as appropriate, when formulae are to be replicated
  - use absolute and relative references, named cells, named ranges and nested formulae, as appropriate
  - use functions, including: sum, average, maximum, minimum, integer, rounding, counting, LOOKUP, VLOOKUP, HLOOKUP, IF and nested functions, when necessary

### 20.2 test the data model

- devise suitable test plans and test the data to demonstrate that the model works
  - define the terms: *testing, test data, expected outcome, actual outcome, normal data, abnormal data, extreme data, what if*
  - explain the need to test a model before it is used
  - select appropriate test data to thoroughly test a data model
  - justify the choice of test data
  - calculate the expected outcomes before testing the model
  - test the model, correcting errors and re-testing, where appropriate
  - test the model by the use of what ifs

### 20.3 manipulate data

- use search tools in spreadsheet software to select subsets of data
  - search using a single criterion and using multiple criteria, where appropriate, with a variety of operators like: AND, OR, NOT, LIKE, >, <, =, >=, <=
  - search, where appropriate, using wildcards
- sort data using a single criterion and using multiple criteria into ascending or descending order, as required

#### **20.4 present data**

- use software tools to adjust the display features in a spreadsheet
  - adjust row height, column width and cell sizes so that all data, labels, and formulae are fully visible
  - wrap text within cells so that all data are fully visible
  - hide and display rows and columns, where appropriate
  - use features to enhance a spreadsheet, including: text colour, cell colour, bold, underline, italic and shading to meet the needs of the audience
  - format numeric data to display the number of decimal places, a variety of different currency values, percentages as appropriate
  - set the spreadsheet to display formulae and values
  - set the page orientation to portrait or landscape as necessary
  - set the page layout so that it prints on a specified number of pages
  - use conditional formatting appropriately to change display format depending upon the contents of a cell

## 21. Website authoring

Candidates should be able to:

### 21.1 web development layers

- identify and describe the three web development layers
- understand the function of: content layer to enter the content of a web page structure; presentation layer to format whole web page(s) or individual elements; behaviour layer to enter scripting language to a web page or an individual element

### 21.2 create a web page

- use software tools to create the content layer of a web page to meet the needs of the audience
  - explain why tables are used to structure elements within a web page
  - insert a table, including: table header, table rows, table data
  - use attributes within a table, including: width in terms of pixels and % values, border to create visible and invisible borders, set the border thickness, merging cells, background colour, horizontal alignment, vertical alignment, to meet the needs of the audience
- use software tools to appropriately place the content in a web page
  - insert appropriate objects into a web page including: text, still images, moving images, sound clips
  - apply styles to text within a web page
  - apply styles to a list, including: ordered list, unordered list
  - insert an appropriate image into a web page
  - use appropriate attributes of an image to adjust its size
- use software tools to create navigation within a web page and between web pages
  - describe the function of a hyperlink
  - describe the function of an anchor and why it is rarely seen from the browser view
  - define and understand the terms *relative file path* and *absolute file path*
  - explain why absolute file paths must not be used for hyperlinks to locally saved web pages/objects
  - create an anchor within a web page
  - create hyperlinks from: text, images
  - create hyperlinks, where appropriate, to: anchors on the same page, other locally stored web pages, a website using the URL, send mail to a specified email address, open in a specified location including: the same window, new window, with a window named as specified

### 21.3 use stylesheets

- use software tools to create the presentation layer of a web page
  - explain what is meant by the term *cascading stylesheets*
  - explain the hierarchy of multiple attached stylesheets and in-line styles within a web page
  - create generic external styles including: background properties (like colour), table properties (like border, spacing, padding), font properties (like style, typeface)
  - create external styles to be tagged in a web page including: h1, h2, h3, p, li as required
  - specify the font appearance for each style, including features like: font family, size, colour, alignment, bold and italic
  - save styles in cascading stylesheet format
  - explain why relative file paths must be used for attached stylesheets
  - attach an external stylesheet to a web page using a relative file path

#### **21.4 test and publish a website**

- know how to publish a website
  - explain how to upload and publish the content of a website using ftp
  - test that web page elements work
  - test navigation within/from a web page using a test plan
- test a website
  - create a test plan to test a website including: web page elements are visible, navigation within/from a web page
  - justify the choice of test plan

## Paper 1 Theory

This is a compulsory paper consisting of multiple choice, short answer and structured questions. The questions are set on all sections of the syllabus content. Each individual question is set within separate contexts of ICT applications in everyday life. Candidates must answer all questions. Candidates answer on the question paper.

## Paper 2 Document Production, Data Manipulation and Presentations

For Paper 2 Document Production, Data Manipulation and Presentations, the candidates must not have access to the internet or email. For each of the tasks, candidates will be provided with electronic source files; these files must be loaded onto the candidates' computer system before the start of the examination. Please refer to the *Cambridge Handbook* for full details on the administration of this paper.

This is a compulsory paper. It is a practical test which comprises a number of tasks to be taken under examination conditions and focuses on the candidate's ability to carry out practical tasks by applying their knowledge and understanding to the following syllabus content sections:

- Section 17 Document production
- Section 18 Data manipulation
- Section 19 Presentations

Candidates will also need to show their knowledge and understanding of sections 1–10, and demonstrate the practical skills relevant to sections 11–16.

A scenario is described at the start of the paper and each task has a purpose within this scenario. Candidates work through the steps of each task in order and they can track their progress by marking off each question number as they progress through the paper. At the end of each task, candidates are prompted to produce evidence of their work by creating screenshots and placing these within an Evidence Document and making printouts. It is essential that candidates remember to enter electronically their Centre number, candidate number and name on each piece of evidence.

## Paper 3 Data Analysis and Website Authoring

For Paper 3 Data Analysis and Website Authoring, the candidates must not have access to the internet or email. For each of the tasks, candidates will be provided with electronic source files; these files must be loaded onto the candidates' computer system before the start of the examination. Please refer to the *Cambridge Handbook* for full details on the administration of this paper.

This is a compulsory paper. It is a practical test which comprises a number of tasks to be taken under examination conditions and focuses on the candidate's ability to carry out practical tasks by applying their knowledge and understanding to the following syllabus content sections:

- Section 20 Data analysis
- Section 21 Website authoring

Candidates will also need to show their knowledge and understanding of sections 1–10, and demonstrate the practical skills relevant to sections 11–16.

The paper sets a scenario at the start of the paper and each task has a purpose within this scenario. Candidates work through the steps of each task in order and they can track their progress by marking off each question number as they progress through the paper. At the end of each task, candidates are prompted to produce evidence of their work by creating screenshots and placing these within an Evidence

Document and making printouts. It is essential that candidates remember to enter electronically their Centre number, candidate number and name on each piece of evidence.

## Hardware and software requirements

Assessment of the practical tests is software independent; therefore, any hardware platform, operating system and applications packages can be used by candidates in the practical examinations, providing that they have the facilities to enable the candidates to fully demonstrate all of the skills, performance criteria and assessment objectives in sections 1–21.

It is recommended that for the website authoring section of the syllabus, that candidates have a working knowledge of HTML. They may use suitable web editing software to assist them, but they will be required to edit the markup generated by such a package, or they may create their own HTML.

There will be no requirement for candidates to use any scripting language

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## 7. Other information

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### Equality and inclusion

Cambridge International Examinations has taken great care in the preparation of this syllabus and assessment materials to avoid bias of any kind. To comply with the UK Equality Act (2010), Cambridge has designed this qualification with the aim of avoiding direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with disabilities or learning difficulties. Arrangements can be put in place for these candidates to enable them to access the assessments and receive recognition of their attainment. Access arrangements will not be agreed if they give candidates an unfair advantage over others or if they compromise the standards being assessed.

Candidates who are unable to access the assessment of any component may be eligible to receive an award based on the parts of the assessment they have taken.

Information on access arrangements is found in the *Cambridge Handbook* which can be downloaded from the website [www.cie.org.uk/exams/officer](http://www.cie.org.uk/exams/officer)

### Language

This syllabus and the associated assessment materials are available in English only.

### Grading and reporting

Cambridge IGCSE results are shown by one of the grades A\*, A, B, C, D, E, F or G indicating the standard achieved, A\* being the highest and G the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade G. 'Ungraded' will be reported on the statement of results but not on the certificate. The letters Q (result pending), X (no results) and Y (to be issued) may also appear on the statement of results but not on the certificate.

### Entry codes

To maintain the security of our examinations, we produce question papers for different areas of the world, known as 'administrative zones'. Where the component entry code has two digits, the first digit is the component number given in the syllabus. The second digit is the location code, specific to an administrative zone. Information about entry codes can be found in the *Cambridge Guide to Making Entries*.

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## 8. Additional information for England, Wales and Northern Ireland

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This syllabus appears on the Register of Regulated Qualifications (<http://register.ofqual.gov.uk>) as a Cambridge International Level 1/Level 2 Certificate. In other contexts it is known as a Cambridge IGCSE.

Cambridge International Level 1/Level 2 Certificates are approved for regulation in England, Wales and Northern Ireland and are eligible for inclusion in school and college performance tables.

For up-to-date information on the performance tables, including the list of qualifications which count towards the English Baccalaureate, please go to the Department for Education website and search on 'performance tables'.

Candidates who are awarded grades D to G will have achieved an award at Level 1 of the National Qualifications Framework. Candidates who are awarded grades A\* to C will have achieved an award at Level 2 of the National Qualifications Framework.

### Prior learning

Candidates beginning this course are not expected to have studied ICT previously.

### Progression

Cambridge IGCSE syllabuses are general qualifications that enable candidates either to progress directly to employment, or to proceed to further qualifications.

Candidates who are awarded grades C to A\* in Cambridge IGCSE in Information and Communication Technology are well prepared to follow courses leading to Cambridge International AS and A Level Applied Information and Communication Technology, or the equivalent.

### Grading and reporting

Cambridge International Level 1/Level 2 Certificate results are shown by one of the grades A\*, A, B, C, D, E, F or G indicating the standard achieved, A\* being the highest and G the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade G. 'Ungraded' will be reported on the statement of results but not on the certificate. The letters Q (result pending), X (no results) and Y (to be issued) may also appear on the statement of results but not on the certificate.

### Overlapping qualifications

Every qualification is assigned to a national classification code indicating the subject area to which it belongs. Candidates who enter for more than one qualification with the same classification code will only have one grade (the highest) counted for the purpose of the school and college performance tables. Centres may wish to advise candidates that, if they take two qualifications with the same classification code, colleges are very likely to take the view that they have achieved only one of the two qualifications. Candidates who have any doubts about their subject combinations should seek advice, either from their centre or the institution to which they wish to progress.

## Spiritual, moral, ethical, social, legislative, economic and cultural issues

The study of ICT supports the development of skills and attitudes that increase candidates' ability to address the social and ethical issues of technological advancements.

Many aspects of society have been influenced by the ICT revolution. ICT is having a profound impact on the world of work, affecting both the jobs that people do and how they do them. New media for communication and social networking are having a significant impact on the relationships that people form. Candidates and teachers are finding new ways to learn through the medium of technology.

To be fully participating and responsible members of society, candidates must be aware of the ever-growing impact of ICT. Through sections 1, 5, 6 and 9 of the syllabus, candidates will be required to reflect critically on the role of ICT in society and to consider its effects both economically and culturally.

## Sustainable development, health and safety considerations and international developments

This syllabus offers opportunities to develop ideas on sustainable development and environmental issues, health and safety, and the international dimension of ICT use.

- Sustainable development and environmental issues  
Section 6 of the syllabus provides candidates with an opportunity to explore the effects of a range of ICT applications. This includes the potential impact on energy use of the use of control technology, modelling applications and electronic communication media.
- Health and Safety  
Sections 5 and 8 of the syllabus require candidates to be able to describe both the potential health problems and safety hazards associated with the use of ICT. Candidates are also expected to understand the measures that can be taken to minimise these risks.
- The International dimension of ICT use  
ICT continues to have a profound impact on the communication between people and businesses who are remote from each other. This is explored in sections 4 and 6 of this syllabus.  
Sections 5, 6, 9 and 10 of the syllabus provide opportunities for candidates to explore the effect that ICT has on patterns of employment, including areas of work where there is increased unemployment.  
Candidates should appreciate the technological dependence of modern economies on ICT and the potential that this has for future economic, cultural and social development.

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