

SYLLABUS

Cambridge IGCSE[®]
Information and Communication Technology
0417

For examination in June and November 2015

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 2015

This syllabus has been updated, but there are no significant changes.

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1. Introduction

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

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

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

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

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 students 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/cambridgesecundary2

Guided learning hours

Cambridge IGCSE syllabuses are designed on the assumption that candidates 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 is internationally recognised by schools, universities and employers as equivalent to UK GCSE. The Cambridge IGCSE Information and Communication Technology syllabus encourages students to develop lifelong skills including:

- the ability to understand and implement new and emerging technologies within a business environment
- how to analyse, design, implement, test and evaluate Information and Communication Technology (ICT) systems
- considering the impact which new technologies will have on ways of working and the social, economic and ethical issues associated with them
- awareness of the ways ICT can help in practical and work-related scenarios.

Prior learning

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

Progression

Cambridge IGCSE Certificates are general qualifications that enable candidates to progress either 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 I, 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) falls into Group V, Creative, Technical and Vocational.

Learn more about Cambridge ICE at www.cie.org.uk/cambridgesecundary2

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

Detailed timetables are available from www.cie.org.uk/examsOfficers

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

If you are not yet a Cambridge school

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

2. Teacher support

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** 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 online. For Teacher Support 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** for further information.

3. Assessment at a glance

Candidates take:

Paper 1 2 hours
 Written paper testing sections 1–8 of the syllabus and assessing the skills in Assessment objective AO2. It may also assess knowledge and understanding from sections 9–16 of the syllabus.
 All questions compulsory: mostly multiple choice or short answer questions, but also some requiring longer responses.
 100 marks weighted at 40% of total

and:

Paper 2 2½ hours
 Practical test assessing knowledge, skills and understanding of sections 9–16 of the syllabus. It may also assess some core knowledge and understanding from sections 1–8 of the syllabus.
 80 marks weighted at 30% of total

and:

Paper 3 2½ hours
 Practical test assessing knowledge, skills and understanding of sections 9–16 of the syllabus. It may also assess some core knowledge and understanding from sections 1–8 of the syllabus.
 80 marks weighted at 30% of total

Practical tests

The two practical tests will each comprise a number of tasks to be taken under controlled conditions. The practical tests focus on the candidate's ability to carry out practical tasks. Candidates are assessed on their ability to complete these tasks.

Printed copies of the practical tests will be sent to Examination Officers. Practical paper packets must not be opened before the examination. Source files will be available to Cambridge International Centres **three days** before the examination window so they can be downloaded by the Centres.

The printouts produced in the assessment will be externally marked by Cambridge. The criteria that will be used by the examiners are included in this syllabus booklet.

The procedures for conducting the practical tests are given in this syllabus booklet.

The tasks should be completed and sent to Cambridge as specified by the timetable.

Hardware and software requirements

Assessment of the practical tests is software independent. 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 9 to 16.

It is recommended that for the website authoring section of the syllabus, that candidates have a working knowledge of HTML code. There is no requirement for them to complete all of the practical test requirements by writing new code. They may use suitable web editing software to assist them, but they may be required to edit the code generated by such a package.

Availability

This syllabus is examined in the May/June examination series and the October/November examination series.

Detailed timetables are available from **www.cie.org.uk/examsOfficers**

This syllabus is available to private candidates.

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.

4. Syllabus aims and assessment objectives

4.1 Aims

The aims, which are not listed in order of priority, are to:

1. help candidates to develop and consolidate their knowledge, skills and understanding in ICT and be aware of new and emerging technologies;
2. encourage candidates to develop further as autonomous users of ICT;
3. encourage candidates to continue to develop their ICT skills in order to enhance their work in a variety of subject areas;
4. provide opportunities for candidates to analyse, design, implement, test and evaluate ICT systems;
5. encourage candidates to consider the impact of new technologies on methods of working in the outside world and on social, economic, ethical and moral issues;
6. help candidates to improve their skills and increase their awareness of the ways in which ICT is used in practical and work-related situations.

The practical skills contained in the syllabus are directly applicable to the study of other subjects; centres are encouraged to provide opportunities for their candidates to apply their ICT skills to a range of contexts.

4.2 Assessment objectives

The two assessment objectives in ICT are:

AO1 Practical skills

Candidates should be able to demonstrate their ability to use a range of software packages in practical and work-related contexts.

AO2 Knowledge and understanding

Candidates should be able to demonstrate their knowledge and understanding of the structure of ICT systems, the roles of these systems in organisations and their impact on society.

Specification grid

Assessment Objective	Weighting
AO1 Practical skills	60%
AO2 Knowledge and understanding	40%

5. Curriculum content

The curriculum content is set out in eight interrelated sections. These sections should be read as an integrated whole and not as a progression. The sections are:

1. Types and components of computer systems
2. Input and output devices
3. Storage devices and media
4. Computer networks
5. Data types
6. The effects of using ICT
7. The ways in which ICT is used
8. Systems analysis and design

Candidates should be familiar not only with the types of software available and the range of ICT knowledge and skills detailed below, but also with their uses in practical contexts. Examples of such uses are given in each section of the subject content, as a teaching guide.

No marks will be awarded for using brand names of software packages or hardware.

As ICT is a subject that is constantly developing, marks will be awarded for relevant answers which relate to new or emerging technology that has not been specified in the syllabus.

Section 1: Types and components of computer systems

Candidates should be able to:

- (a) define hardware, giving examples
- (b) define software, giving examples
- (c) describe the difference between hardware and software
- (d) identify the main components of a general-purpose computer: central processing unit, main/internal memory (including ROM and RAM), input devices, output devices and secondary/backing storage
- (e) identify operating systems, including those which contain a graphical user interface, a command line interface
- (f) identify different types of computer including Personal Computer or desktop, mainframe, laptop, palmtop and Personal Digital Assistant
- (g) describe recent developments in ICT

Section 2: Input and output devices

Candidates should be able to:

(a) identify the following input devices:

keyboards, numeric keypads, pointing devices (including mouse, touch pad and tracker ball), remote controls, joysticks, touch screens, magnetic stripe readers, chip readers, PIN pads, scanners, digital cameras, microphones, sensors, graphics tablet, MICR, OMR, OCR, barcode readers, video cameras, web cams, light pens

(b) identify suitable uses of the input devices stating the advantages and disadvantages of each:

Device	Use
Keyboard	Entering text into a word processing document. Applications where text has to be created rather than copied
Numeric keypad	Applications where only numeric data is to be entered. Inserting personal identification number (PIN) for Chip and PIN credit/debit cards, or when using an ATM machine to withdraw money or check a bank balance
Pointing devices – all	All applications which require selection from a graphical user interface. For example: the selection of data from a set list or menu
Mouse	In most PCs
Touch pad	On laptop computers
Trackerball	For use by people with limited motor skills e.g. young children or people with disabilities
Remote control	Using remote control devices to operate TVs, video players/recorders, DVD players/recorders, satellite receivers, HiFi music systems, data or multimedia projectors
Joystick	Used by a pilot to fly an aeroplane or flight simulator. Used in car driving simulators and for playing games
Touch screen	Selecting from a limited list of options e.g. certain POS uses such as cafes, tourist information kiosks, public transport enquiries
Magnetic stripe readers	At POS terminals, ATMs and in security applications
Chip readers and PIN pads	Payment cards, ID cards, door control systems, public transport tickets
Scanners	Entering hard copy images into a computer
Digital cameras	Taking photographs for input to computers, for input to photo printers
Microphones	Recording of voices for presentation software

Sensors (general) in control and measuring applications, see section 7.1	
Temperature sensor	Automatic washing machines, automatic cookers, central heating controllers, computer-controlled greenhouses, scientific experiments and environmental monitoring
Pressure sensor	Burglar alarms, automatic washing machines, robotics, production line control, scientific experiments and environmental monitoring
Light sensor	Computer controlled greenhouses, burglar alarm systems, robotics, production line control, scientific experiments and environmental monitoring
Graphics tablet	Inputting freehand drawings or retouch photographs
Optical Mark Reader	Inputting pencil marks on a form such as a school register, candidate exam answers, any application involving input of a choice of options
Optical Character Reader	Inputting text to a computer ready for processing by another software package such as word processors, spreadsheets, databases etc.
Bar code Reader	Inputting code numbers from products at a POS terminal, library books and membership numbers
Video camera	Inputting moving pictures, often pre-recorded, into a computer
Web cam	Inputting moving pictures from a fixed position into a computer
Light pen	Where desktop space is limited, it is used instead of a mouse or for drawing applications where a graphics tablet might be too big

Candidates should be able to:

- (c) identify the following output devices: monitors (CRT, TFT), projectors, printers (laser, ink jet and dot matrix), plotters, speakers, control devices – motors, buzzers, lights, heaters
- (d) identify suitable uses of the output devices stating the advantages and disadvantages of each:

Device	Use
CRT monitor	Applications where space is not a problem. Applications where more than one user may need to view screen simultaneously such as in design use, e.g. when several designers may need to offer suggestions on a prototype
TFT monitor	Applications where space is limited such as small offices. Applications where only one person needs to view the screen such as individual workstations
Multimedia Projector	Applications such as training presentations, advertising presentations and home cinema – it displays data from computers, pictures from televisions and video/DVD recorders
Laser printer	Applications which require low noise and low chemical emissions, e.g. most networked systems. Applications which require rapid, high quality and high volumes of output, e.g. most offices and schools
Inkjet printer	Applications which require portability and low volume output, where changing cartridges is not an issue e.g. small offices and stand alone systems. Applications which require very high quality output and where speed is not an issue, e.g. digital camera applications
Dot matrix printer	Applications where noise is not an issue and copies have to be made, e.g. industrial environments (multipart forms, continuous stationery, labels etc.), car sales and repair companies, manufacturing sites
Graph plotter	CAD applications, particularly where large printouts are required such as A0
Speakers	Any application which requires sound to be output such as multimedia presentations and websites including encyclopaedias. Applications that require musical output such as playing of music CDs and DVD films

Control devices in Control applications, see section 7.1	
Motors	Automatic washing machines, automatic cookers, central heating controllers, computer-controlled greenhouses, microwave ovens, robotics, production line control
Buzzers	Automatic cookers, microwave ovens
Heaters	Automatic washing machines, automatic cookers, central heating controllers, computer-controlled greenhouses
Lights/lamps	Computer-controlled greenhouses

Section 3: Storage devices and media

Candidates should be able to:

- describe common backing storage media (including magnetic tapes, hard discs, all forms of CD and DVD, memory sticks, flash memory) and their associated devices
- identify typical uses of the storage media, including types of access (e.g. serial/sequential, direct/random) and access speeds

Media	Use
Magnetic backing storage media	
Fixed hard discs	Used to store operating systems, software and working data. Any application which requires very fast access to data for both reading and writing to. Not for applications which need portability. Used for online and real time processes requiring direct access. Used in file servers for computer networks
Portable hard discs	Used to store very large files which need transporting from one computer to another and price is not an issue. More expensive than other forms of removable media
Magnetic tapes	Any application which requires extremely large storage capacity and speed of access is not an issue. Uses serial access for reading and writing. Used for backups of file servers for computer networks. Used in a variety of batch processing applications such as reading of bank cheques, payroll processing and general stock control
Optical backing storage media such as CDs and DVDs	CDs tend to be used for large files (but smaller than 1Gb) which are too big for a floppy disc to hold such as music and general animation. DVDs are used to hold very large files (several Gb) such as films. Both CDs and DVDs are portable i.e. they can be transported from one computer to another. Both can be used to store computer data
CD ROM/DVD ROM	Applications which require the prevention of deletion of data, accidental or otherwise. CDs used by software companies for distributing software programs and data; by music companies for distributing music albums and by book publishers for distributing encyclopaedias, reference books etc. DVDs used by film distributors
CD R/DVD R	Applications which require a single 'burning' of data, e.g. CDs – recording of music downloads from the internet, recording of music from MP3 format, recording of data for archiving or backup purposes. DVDs – recording of films and television programs
CD RW/DVD RW	Applications which require the updating of information and ability to record over old data. Not suitable for music recording but is very useful for keeping generations of files. DVDs have between five and ten times the capacity of CDs
DVD RAM	Same properties as DVD RW but quicker access and data can be overwritten more easily. Similar to floppies in nature but has 3000–6000 times more storage and uses optical technology

Blu-ray	Capacities of 25Gb, 50Gb and 100 Gb. Used for storing films (movies). 25Gb equates to 2 hrs HDTV, 13hrs standard definition TV. It is possible to playback video on a disc while simultaneously recording HD video. (Will be) used for storage of PC data
Solid state backing storage	Smallest form of memory, used as removable storage. More robust than other forms of storage. More expensive than other forms, but can be easily written to and updated
Memory sticks/Pen drives	Can store up to many Gb. Used to transport files and backup data from computer to computer
Flash memory cards	Used in digital cameras, palmtops, mobile phones, MP3 players

Candidates should be able to:

- (c) describe the comparative advantages and disadvantages of using different backing storage media
- (d) define the term backup and describe the need for taking backups
- (e) describe the difference between main/internal memory and backing storage, stating the relative benefits of each in terms of speed and permanence

Section 4: Computer networks

Candidates should be able to:

- (a) describe a router and its purpose
- (b) describe the use of WIFI and Bluetooth in networks
- (c) describe how to set up a small network involving access to the internet, understanding the need to set up the use of a browser, email and an ISP
- (d) identify the advantages and disadvantages of using common network environments such as the internet
- (e) describe what is meant by the terms user id and password, stating their purpose and use
- (f) identify a variety of methods of communication such as fax, email, and tele/video conferencing
- (g) define the terms Local Area Network (LAN), Wireless Local Area Network and Wide Area Network (WAN)
- (h) describe the difference between LANs, WLANs and WANs, identifying their main characteristic
- (i) describe the characteristics and purpose of common network environments, such as intranets and the internet
- (j) describe other common network devices (including hubs, bridges, switches and proxy servers)
- (k) discuss the problems of confidentiality and security of data, including problems surrounding common network environments
- (l) identify the need for encryption, authentication techniques, including the use of user identification and passwords, when using common network environments such as the internet

Section 5: Data types

Candidates should be able to:

- (a) identify different data types: logical/Boolean, alphanumeric/text, numeric (real and integer) and date
- (b) select appropriate data types for a given set of data: logical/Boolean, alphanumeric/text, numeric and date
- (c) describe what is meant by the terms file, record, field and key field
- (d) describe different database structures such as flat files and relational tables including the use of relationships, primary keys and foreign keys
- (e) state the difference between analogue data and digital data
- (f) explain the need for conversion between analogue and digital data

Section 6: The effects of using ICT

Candidates should be able to:

- (a) explain what is meant by software copyright
- (b) describe what a computer virus is, what hacking is and explain the measures that must be taken in order to protect against hacking and viruses
- (c) describe the effects of information and communication technology on patterns of employment, including areas of work where there is increased unemployment
- (d) describe the effects of microprocessor-controlled devices in the home, including their effects on leisure time, social interaction and the need to leave the home
- (e) describe the capabilities and limitations of ICT
- (f) describe the use of internet developments such as Web 2.0, blogs, wikis, digital media uploading websites, and new types of social networking websites
- (g) discuss issues relating to information found on the internet, including unreliability, undesirability and the security of data transfer including phishing, pharming and SPAM
- (h) describe the potential health problems related to the prolonged use of ICT equipment, for example repetitive strain injury (RSI), back problems, eye problems and some simple strategies for preventing these problems
- (i) describe a range of safety issues related to using computers and measures for preventing accidents

Section 7: The ways in which ICT is used

7.1 Candidates should have an understanding of a range of ICT applications in their everyday life and be aware of the impact of ICT in terms of:

- (a) communication applications (such as newsletters, websites, multimedia presentations, music scores, cartoons, flyers and posters)
- (b) interactive communication applications (such as blogs, wikis and social networking websites)
- (c) data handling applications (such as surveys, address lists, tuck shop records, clubs and society records, school reports and school libraries)
- (d) measurement applications (such as scientific experiments, electronic timing and environmental monitoring)
- (e) control applications (such as turtle graphics, control of lights, buzzers and motors, automatic washing machines, automatic cookers, central heating controllers, burglar alarms, video recorders/players, microwave ovens and computer controlled greenhouse)
- (f) modelling applications (such as 3D modelling, simulation (e.g. flight, driving and queue management) and use of spreadsheets for personal finance and tuck shop finances)

7.2 Candidates should understand the differences between batch processing, online processing and real-time processing. They should have an understanding of a wider range of work-related ICT applications and their effects, including:

- (a) communication applications (such as the internet, email, fax, electronic conferencing, mobile telephones and internet telephony services)
- (b) applications for publicity and corporate image publications (such as business cards, letterheads, flyers and brochures)
- (c) applications in manufacturing industries (such as robotics in manufacture and production line control)
- (d) applications for finance departments (such as billing systems, stock control and payroll)
- (e) school management systems (including registration, records and reports)
- (f) booking systems (such as those in the travel industry, the theatre and cinemas)
- (g) applications in banking (including Electronic Funds Transfer (EFT), ATMs for cash withdrawals and bill paying, credit/debit cards, cheque clearing, phone banking, internet banking)
- (h) applications in medicine (including doctors' information systems, hospital and pharmacy records, monitoring and expert systems for diagnosis)
- (i) applications in libraries (such as records of books and borrowers and the issue of books)
- (j) the use of expert systems (for example in mineral prospecting, car engine fault diagnosis, medical diagnosis, chess games)
- (k) applications in the retail industry (stock control, POS, EFTPOS, internet shopping, automatic re-ordering)

Section 8: Systems analysis and design

8.1 Analysis

Candidates should be able to:	Examples:
(a) describe different methods of researching a situation	<ul style="list-style-type: none"> • observation, interviews, questionnaires and examination of existing documentation
(b) state the need for recording and analysing information about the current system	<ul style="list-style-type: none"> • identify inputs, outputs and processing of the current system • identify, problems with the system • identify the user and information requirements necessary to solve the identified problems
(c) state the need for identifying features of the existing system	<ul style="list-style-type: none"> • identify problems

8.2 Design

Candidates should be able to:	Examples:
(a) state the need for producing designs	<ul style="list-style-type: none"> need for designing documents, files, forms/inputs, reports/outputs and validation
(b) produce designs to solve a given problem	<ul style="list-style-type: none"> design data capture forms and screen layouts design reports layouts and screen displays design validation routines design the required data/file structures
(c) choose the method of verification	<ul style="list-style-type: none"> visual comparison of data entered with data source entering data twice and comparing the two sets of data, either by comparing them after data has been entered or by comparing them during data entry

8.3 Development and testing

Candidates should be able to:	Examples:
(a) understand that the system is created from the designs and then tested	<ul style="list-style-type: none"> data/file structure created and tested validation routines created and tested input methods created and tested output formats created and tested
(b) describe testing strategies	<ul style="list-style-type: none"> testing each module with normal/live data testing each module with abnormal and extreme data testing whole system
(c) understand that improvements could be needed as a result of testing	<ul style="list-style-type: none"> data/file structures, validation routines, input methods, output formats may need to be amended/improved

8.4 Implementation

Candidates should be able to:	Examples:
(a) describe the different methods of system implementation	<ul style="list-style-type: none"> direct changeover parallel running pilot running phased implementation
(b) identify suitable situations for the use of different methods of system implementation, giving advantages and disadvantages of each	<ul style="list-style-type: none"> organisations or departments within organisations which need a quick changeover organisations or departments within organisations which cannot afford to lose data

8.5 Documentation

Candidates should be able to:	Examples:
(a) identify the components of technical documentation for an information system	<ul style="list-style-type: none"> • purpose of the system • limitations of the system • program coding • program flowcharts • system flowcharts • hardware and software requirements • file structures • list of variables • validation routines
(b) identify the components of user documentation for an information system	<ul style="list-style-type: none"> • purpose of the system • limitations of the system • hardware and software requirements • how to use the system • input and output formats • sample runs • error messages • trouble-shooting guide • frequently asked questions

8.6 Evaluation

Candidates should be able to:	Examples:
(a) explain the need for evaluating a new system	<ul style="list-style-type: none"> • in terms of the efficiency of the solution • in terms of ease of use of the solution • in terms of appropriateness of the solution
(b) state the need for a variety of evaluation strategies	<ul style="list-style-type: none"> • 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

6. Practical tests

ICT is an applied subject and all candidates will require frequent access to computer and internet facilities to develop their skills. The syllabus aims to give Centres the flexibility to cope with a wide variety of resources and ever-changing technology. The practical sections of this course can be accomplished using any software packages that will allow the candidates to demonstrate ALL of the skills listed in the relevant sections of this syllabus. For this reason Cambridge does not prescribe particular software packages or particular hardware. Candidates will learn to use particular packages, but they should be encouraged to realise that, with the aid of a manual, they can transfer their skills to other packages.

6.1 Assessment criteria for practical tests

The assessment criteria for the practical tests are set out in eight sections:

9. Communication
10. Document production
11. Data manipulation
12. Integration
13. Output data
14. Data analysis
15. Website authoring
16. Presentation authoring

Each section is broken down into a series of learning outcomes which candidates should be able to meet. These will be used by the examiners to mark the candidate's work. Candidates will be expected to apply their knowledge, understanding and practical skills to complete these tasks.

The table below details the learning outcomes required to satisfy these performance criteria.

Section 9: Communication

Be an effective online user

Candidates should be able to use email and the internet to gather and communicate information.

Candidates should demonstrate the ability to:

9.1 Communicate with other ICT users using email	
	<i>Learning outcomes</i>
(a) send and receive documents and other files electronically (b) manage contact lists effectively	(i) open an email message, store email messages using a suitable planned structure, save attached file(s), store files using an appropriate planned structure (ii) create new messages using address, subject, reply, forward, carbon copy, blind carbon copy, attach file(s) (iii) manage and save contact details using an address book by adding a new contact, deleting a contact, storing contacts using a planned structure, retrieving contact details, creating and using groups effectively
9.2 Make effective use of the internet as a source of information	
	<i>Learning outcomes</i>
(a) locate specified information from a given website URL (b) find specified information using a search engine (c) download and save information as specified	(i) perform searches using a single criterion (ii) refine searches using more advanced search techniques

Section 10: Document production

Create and edit the contents, appearance and layout of documents

Candidates should be able to use word processing facilities to prepare documents.

Candidates should demonstrate the ability to:

10.1 Enter and edit data from different sources	
	<i>Learning outcomes</i>
(a) create and open documents using information from different sources (b) enter and edit text (c) import, place and manipulate images and different forms of information, from a variety of external sources	(i) locate stored files (ii) identify and import different file types, for example: .csv, .txt, .rtf (iii) enter and edit text and numbers, for example: highlight, delete, move, cut, copy, paste, drag and drop (iv) import clip art, import from a digital source, import from file, import from website (v) place objects/text in a table (vi) edit images, for example: resize, crop, flip, text wrap (around image, square, tight, above, below), maintain aspect ratio (vii) include different formats of information from the internet including text, images, tables, charts

10.2 Organise the page layout	
	<i>Learning outcomes</i>
(a) format the page layout by setting the page size, orientation and margins (b) appropriately use headers and footers (c) use columns and breaks to adjust pagination and text flow (d) set text alignment (e) set line spacing (f) adjust the tabulation (g) ensure the consistency of page layout	(i) set the page size to A4, A5, Letter, etc, adjust the page orientation, set the page and gutter margins of a document (ii) create headers and footers, including automated file information, automated page numbering, text, date, position, consistency of position, position left, right, centre, outside of pages, align with page margins (iii) set the number of columns, adjust the column width and spacing between columns (iv) set and remove page, section and column breaks, to adjust pagination and to avoid widows and orphans (v) set the text to left aligned, centre aligned, right aligned or fully justified (vi) set line spacing to single, 1.5 times, double, multiple
	(vii) ensure that page layout is consistent, including font styles, alignment, and spacing between lines, paragraphs, before and after headings (viii) adjust tabulation settings, for example: to indent text, create indent paragraphs, hanging paragraphs, etc.
10.3 Format the text	
	<i>Learning outcomes</i>
(a) set the font styles and emphasise text (b) format a list as specified (c) create/edit and format a table	(i) set the font style, font type (serif, sans-serif), point size, increase, decrease, use an appropriate font for a given task (ii) set text to bold, underline, italic, highlighted (iii) format as a bulleted list or a numbered list (iv) create and edit a table with a specified number of rows and columns, insert row(s), delete row(s), insert column(s), delete column(s) (v) format cells and the cell contents, show gridlines, hide gridlines, set horizontal cell alignment (left, right, centre, fully justified), set vertical cell alignment (top, centre, bottom), text wrapping around table, text wrapping within cells, shading/colouring cells
10.4 Ensure the accuracy of the text	
	<i>Learning outcomes</i>
(a) use software tools to ensure that the documents are error free (b) proof-read and correct the document	(i) use automated tools e.g. spell check facilities, to remove errors (ii) proof-read and correct a document including consistent line spacing, consistent character spacing, re-pagination, removing blank pages, remove widows/orphans, tables and lists split over columns or pages

Section 11: Data manipulation

Interrogate, manipulate and present data using a data handling system

Candidates should be able to use database facilities to manipulate data to solve problems.

Candidates should demonstrate the ability to:

11.1 Create a database structure	
	<i>Learning outcomes</i>
(a) define an appropriate database record structure (b) enter and amend data in a database	(i) assign appropriate field/data types, for example: text, numeric, (integer, decimal, percentage, currency), date/time, Boolean/logical (yes/no, true/false, -1/0) (ii) use meaningful file and field names (iii) format fields and identify sub-types like: specifying the number of decimal places or a particular currency to be used (iv) identify the structure of external data with different file types, for example: .csv, .txt, .rtf (v) locate, open and import data from an existing file (vi) enter data with 100% accuracy
11.2 Manipulate data	
	<i>Learning outcomes</i>
(a) use arithmetic operations or numeric functions to perform calculations (b) sort data (c) search to select subsets of data	(i) create a calculated field, perform calculations at run time using formulae and functions, for example: addition, subtraction, multiplication, division, sum, average, maximum, minimum, count (ii) sort data using one criterion into ascending or descending order, using different field types, for example: alphanumeric, numeric, date (iii) perform searches using a single criterion and using multiple criteria, with different field types like alphanumeric, numeric, Boolean etc. and a variety of operators like: AND, OR, NOT, LIKE, >, <, =, >=, <= (iv) perform searches using wildcards
11.3 Present data	
(a) produce reports to display fields and other data for a user	(i) produce reports to display all required data and labels in full (ii) set report titles, use headers and footers, align data and labels appropriately, produce different layouts, for example: labels (iii) format numeric data, for example: to display the number of decimal places, a variety of currencies, percentages (iv) show and hide data and labels within a report, show hidden fields, display calculations/formulae (v) export data in common text formats, for example: .csv, .txt, .rtf (vi) export data into a graph/charting package

Section 12: Integration

Integrate data from different sources

Candidates should be able to integrate data from different sources into a single document, presentation, web site, spreadsheet or report.

Candidates should demonstrate the ability to:

12.1 Combine text, image(s) and numeric data	
	<i>Learning outcomes</i>
(a) combine text, images, database extracts and graphs and charts	(i) import text, import clip art, import from a digital source, import from a website, import from a database, import a graph/chart, cut, copy, paste

Section 13: Output data

Output data

Candidates should be able to produce output in a specified format.

Candidates should demonstrate the ability to:

13.1 Save and print documents and data	
	<i>Learning outcomes</i>
(a) save and print documents, data and objects	(i) save and print a draft document, final copy, email, file attachment, screen shots, database reports, data table, graph/chart (ii) save and export in different file formats, for example: .txt, .csv, .rtf

Section 14: Data analysis

Create, manipulate, test, interrogate and present data using a spreadsheet model

Candidates should be able to use a spreadsheet to create and test a data model, extract and summarise data, and to represent this data graphically.

Candidates should demonstrate the ability to:

14.1 Create a data model	
	<i>Learning outcomes</i>
(a) enter the layout of the model (b) enter and amend text, numerical data, functions and formulae with 100% accuracy	(i) cut, copy, paste, drag and drop, fill (ii) manually verify data entry (iii) use mathematical operations, for example: add, subtract, multiply, divide, indices (iv) use absolute and relative references, named cells, named ranges and nested formulae (v) use functions, for example: sum, average, maximum, minimum, integer, rounding, counting, if, lookup, and use nested functions
14.2 Test the data model	
	<i>Learning outcomes</i>
(a) demonstrate that the model works	(i) test the model using appropriately selected test data

14.3 Manipulate data	
	<i>Learning outcomes</i>
(a) search to select subsets of data (b) sort data	(i) perform searches using a single criterion and using multiple criteria, with different data types, for example: alphanumeric, numeric, Boolean etc. and a variety of operators like: AND, OR, NOT, LIKE, >, <, =, >=, <= (ii) perform searches using wildcards (iii) sort data using one or more criteria into ascending or descending order, using different field types, for example: alphanumeric, numeric, date
14.4 Present data	
	<i>Learning outcomes</i>
(a) adjust the display features in a spreadsheet (b) produce a graph or chart from the spreadsheet model	(i) adjust row height, column width, cell sizes so that all data, labels, and formulae are fully visible (ii) use features, for example: bold, underline, italic and colour/shading to enhance the spreadsheet
	(iii) set titles, use headers and footers, align data and labels appropriately (iv) format numeric data to display the number of decimal places, a variety of currencies, percentages (v) set the spreadsheet to display formulae and values, adjust column width and row height, hide rows and columns (vi) adjust page orientation to portrait or landscape (vii) adjust the page layout to use features, for example: fit to page (viii) save and print data in a variety of formats, for example: formulae, values, extracts, test data, save as different file formats, export (ix) select data to produce a graph/chart, for example: using contiguous data, non contiguous data, and specified data ranges (x) select the graph or chart type, enhance the graph or chart by changing the colour scheme or patterns, extract a pie chart segment (xi) label the graph or chart with a title, legend, segment labels, segment values, percentages, category and value axis labels and titles (xii) amend the axes for the graph or chart, for example: by adding a second axis, adding a title or changing the axis scale maximum and minimum values

Section 15: Website authoring

Create web pages using external stylesheets, tables and images

Candidates should be able to create a structured website with stylesheets, tables and hyperlinks.

Candidates should have a working knowledge of html.

Candidates should demonstrate the ability to:

15.1 Use stylesheets	
	<i>Learning outcomes</i>
(a) create and attach an external stylesheet	(i) use tags to create an external stylesheet for common styles like: h1, h2, h3, p, li (ii) specify the font appearance for each style, including features like: font family, size, colour, alignment, bold and italic (iii) attach an external stylesheet to a web page
15.2 Create web pages	
	<i>Learning outcomes</i>
(a) create web page(s) including features like: menu options, text hyperlink, graphics hyperlink, setting the foreground, background and text colours (b) create links from a web page (c) use tables to organise a web page	(i) create links from text and images (ii) create anchors and links to anchors on the same page (iii) create links to other locally stored web pages (iv) create external links to a website using the URL (v) create links to send mail to a specified email address (vi) create links to open in a specified location including: the same window, new window, with a window named as specified (vii) insert tables using a table header, table rows, table data, cell spacing and cell padding (viii) set table width in terms of pixels and % values (ix) use tables with visible and invisible borders, set the border thickness (x) use merged cells within rows and within columns
15.3 Use images	
	<i>Learning outcomes</i>
(a) insert an image in a web page, place the image relative to text and other objects	(i) insert an image (ii) use tags to adjust image size and alignment (iii) use software to resize an image, adjust the colour depth and amend the file type (iv) maintain the aspect ratio of an image or to distort it where appropriate (v) print web sites in browser view, in html format and screen shot evidence (vi) understand the need for low resolution images for data transfer

Section 16: Presentation authoring

Create, control and output information from a presentation

Candidates should be able to create and control an interactive presentation.

Candidates should demonstrate the ability to:

16.1 Create a presentation	
	<i>Learning outcomes</i>
<ul style="list-style-type: none"> (a) use a master slide to place objects and set styles (b) create presentation slides, including text, images, charts, animations and transitions (c) create notes for the presenter and audience 	<ul style="list-style-type: none"> (i) understand the need for consistency of presentation, in terms of styles, point sizes, colour schemes, transitions and animations (ii) use the master slide to place objects like: images, text, logos, slide footers, automated slide numbering, and to set font styles, heading styles and colour scheme (iii) manipulate and use specified areas for headings, subheadings, bullets, images, charts; colours, text boxes, presenter notes, audience notes (iv) include text on the slides including: headings, subheadings, bulleted lists (v) apply consistent, font styles, font types (serif, sans-serif), point sizes, text colour (selected from the presentation colour scheme), text alignment, enhancements (bold, italic, underscore) (vi) manipulate images by resizing, positioning, cropping, copying, changing the image contrast and brightness (vii) create a chart within the presentation package, import from a spreadsheet, use contiguous or non-contiguous data (viii) label the chart with a title, legend, segment labels, segment values, percentages, category axis labels, value axis labels and scales (ix) insert other features, for example: symbols, lines, arrows, call out boxes (x) use consistent transitions, automating the transitions between pages (xi) use animation facilities on text, images and other objects, showing consistency between objects (xii) save the presentation, use file compression, and print the presentation including presenter notes, audience notes (handouts), use screen shots to show features like animations, and transitions

6.2 Procedures for conducting practical tests

Supervisor instructions

Centres are sent a set of Supervisor instructions for practical tests when they request the practical papers from Cambridge. These give any additional instructions which are specific to the particular assessment activity and must be carefully followed. A suitably competent Supervisor, who may be the candidates' tutor is responsible for the preparation of the hardware and software for the test.

Timetabling

The practical tests will not be timetabled in the same way as most Cambridge IGCSE written papers. The Cambridge IGCSE timetable will specify a period within which the two practical tests must be taken by candidates. Within this period, Centres may conduct the practical tests at any convenient time or times. Each candidate must complete each practical test in a single session.

All candidates from a Centre are not required to take the tests at the same time. If more than one session is necessary, these sessions should follow on from each other. However, Centres do not need to sequester candidates until other candidates have taken the test.

Centres should ensure that there is sufficient time between electronically receiving the source files and scheduling examination dates to:

- set up the required ICT facilities;
- allow for contingency planning (e.g. to reschedule examination times due to possible hardware failure).

Preparation for the Practical tests

Before the candidates take a practical test, the Supervisor must work through a similar test at the Centre, using similar hardware and software to that which will be used by the candidates, in order to:

- ensure that the hardware and software at the Centre will enable the candidates to meet all the performance criteria;
- ensure that all files and systems are set up appropriately.

Centres are responsible for ensuring that the hardware and software to be used by candidates is in full working order and will enable them to meet all the performance criteria as specified in the syllabus. Errors as a result of faulty software or hardware will not be taken into consideration in the marking of candidates' work.

Centres are responsible for candidates having access to the internet. However, if the Centre only has limited or unreliable internet access, then a request for a CD containing the source files can be made via **info@cie.org.uk**. Candidates will then need to be made clearly aware of alternative arrangements for searching for specified files required for the tasks before the start of the test.

Centres are responsible for ensuring that a spare computer/printer is available in case of equipment failure. If equipment failure occurs, candidates should be permitted to move to another machine if necessary, making sure that candidates do not have access to other candidates' work, e.g. by using secure areas on all machines or changing the default settings.

Centres should ensure that there are adequate printing facilities and that sufficient stocks of toner, paper etc. are provided.

There is no requirement for work to be printed in colour, unless otherwise instructed. No extra credit will be given to work printed in colour. It is, however, the candidate's responsibility to ensure that adequate differentiation is present on monochrome printouts (e.g. sectors of a pie chart are distinguishable). Where appropriate, candidates should be made aware of this in an announcement immediately before the start of the test.

Security issues

The practical tests are a test of skills, not of knowledge or understanding. The performance criteria – that is, the skills which are to be included in the test – are published in the syllabus and are available to candidates. The majority of the performance criteria are assessed in each examination. Candidates can therefore gain no advantage by speaking to other candidates who have already taken the tests; they already know what skills they have had to acquire. The security issues associated with the practical tests are therefore different from those associated with conventional written papers.

There are, nevertheless, important security issues. For example, candidates must not gain sufficient knowledge of the tests to enable them to rote-learn the sequences of keystrokes or commands which form the answers. All assessment material must be treated as confidential. It should only be issued at the time of the test. Live Cambridge assessment material must not be used for practising skills.

All work stored on a network or hard disk must be kept secure. Centres are strongly advised to consider setting up passwords to control login procedures and to ensure that only authorised access to files is possible.

Centres must ensure that:

- candidates do not have access to test material or source files except during their test;
- at the end of each session all assessment material (including the candidate-dated practical test paper and candidates' completed work) is collected by the invigilator;
- all draft copies and rough work which is not to be submitted is destroyed.

After the test, all copies of the test papers must be collected by the invigilator and either destroyed or kept under secure conditions until the end of the examination session. Candidates are not permitted to retain a copy of the test, or of any printouts produced during the test, or of any electronic files which form part of the test or have been produced during the test. Candidates' work must be kept securely by the Centre between the end of the test and submission to Cambridge.

Submission of candidates' work

The submission to Cambridge of candidates' work should include:

- The candidates' Assessment Record Folders (ARF) containing a printed copy of the candidate submission and the candidate-dated practical test paper;
- Supervisor Report Folder (SRF) including:
 - the nature of any problems encountered, the candidates affected, and the actions taken;
 - details of the software which candidates used to completed the test.

Invigilator instructions

(a) Guide to invigilation

Each practical test is to be completed within the time specified under supervised conditions. The Centre should provide a quiet business-like atmosphere for the tests.

Invigilators should be familiar with the Checklist for Invigilators in the *Cambridge Handbook*, which applies to invigilators of both written examinations and practical tests. They should also, ensure that they have access to a copy of the Supervisor Instructions sent with the test materials and are familiar with these documents.

At least two invigilators should be present for the test. It is essential that a suitably competent invigilator, preferably the Supervisor, is present in the test room to deal with any technical difficulties that may arise. If the Supervisor has been involved in the preparation of any of the candidates for the test, then another invigilator must be present at all times. It is left at the discretion of the Centre to appoint suitable personnel, but the availability of an extra technician in addition to the invigilators is encouraged.

Invigilators should move around the room and remove any unauthorised material. Should any breach of security occur (such as collusion between candidates, e.g. by accessing other candidates' files on the network or sharing solutions via the internet), the Head of Centre should be informed and a detailed written report must be submitted to Cambridge.

It is essential that an invigilator gives the printouts to candidates and candidates do not collect the printouts themselves from the printer. One invigilator should be responsible for collecting the printout(s) from the printers and giving this to the candidate, only where the candidate's name, candidate number and Centre number have been printed on each printout. If this information is not present on the printout then the printout will be removed and destroyed by the invigilator at the end of the test period.

If printers are in a different room an additional invigilator will be required in order to collect the printouts and distribute these to the candidates as they work during the test.

(b) During the test:

- There must be no access to portable storage media (e.g. memory sticks, floppy disks, CDs, etc.).
- Candidates must NOT have access to their own electronic files or personal notes, pre-prepared templates, past papers or other files during the test.
- Candidates may use English or simple translation dictionaries, spell-checkers, the software's help facilities, and the manufacturer's manuals on the software packages during the practical test.
- Candidates may use software's wizards provided by the original software vendor.
- Candidates are NOT allowed to refer to textbooks or Centre-prepared manuals during the test.
- Display material (e.g. maps, diagrams, wall charts) must be removed from the examination room.
- No other help may be given to the candidates during the test, unless there is an equipment failure. Any assistance given to an individual candidate which is beyond that given to the group as a whole must be recorded as part of a supervisor report which is submitted to Cambridge with the candidates' work.
- Candidates must not communicate with one another in any way (including the use of email, via the internet or intranet) and security of the individual candidates' files must be ensured.
- To conform with safe working practices in using display screen equipment, it is recommended that candidates be allowed to take short approved breaks from working at their screens (5–10 minutes every hour), without leaving the examination room. Such breaks may naturally form part of the working pattern as candidates study the assessment material. The invigilators are responsible for maintaining security during these break periods.

(c) At the end of the test:

- Candidates should present the invigilator with the printouts they wish to submit. Each printout should include the candidate's name, number and Centre number. This information should be printed, not hand-written. Any printouts with hand-written details or no candidate details will not be marked.
- All assessment material (including the Cambridge practical tests and candidates' completed work) should be collected.
- All draft copies and rough work not to be submitted should be destroyed.
- Candidates must send all work to the printer during the duration of the test. Collating printouts may be done after the test time specified under supervised conditions. Where specified, tasks such as highlighting parts of the printout can be done after the test time specified.

(d) Equipment failure

In the event of a system crash, software failure, power cut or damage to equipment occurring during the test, any action taken must ensure the integrity of the test can be guaranteed.

If a candidate appears to be having problems with faulty equipment, the Supervisor should be informed, who will determine if the fault lies with the equipment or the candidate. If equipment failure occurs with individual computers, candidates should be permitted to move to another machine if necessary. Invigilators are advised to check that candidates do not have access to other candidates' work e.g. by using secure areas on all machines or changing the default settings. If equipment can be restored, extra time may be given to the candidates to compensate for time lost while the problem is resolved as long as the integrity of the test can be guaranteed. If equipment failure makes it impossible to continue with the test, (for example power has been lost indefinitely or all the candidate's work has been lost or corrupted), all the candidate's work must be destroyed and the candidate should be allowed a second attempt at the test on a different day. This should only be a last resort.

If there has been an equipment or software failure, the Supervisor must include a detailed report in the Supervisor Report Folder (SRF) to Cambridge examiners with the candidates' work. The report should state the nature of the problem, the candidates affected, and the actions taken.

In the event of a printer breakdown the Centre may use its discretion on extending the time specified for the test. This must be recorded as part of the Supervisor's report.

7. Grade descriptions

A **Grade A** candidate is likely to:

- demonstrate a sound knowledge and understanding of the range and scope of information processing applications and of the techniques and systems needed to support them, some of which are outside their everyday experience;
- have a good grasp of terms and definitions and be able to contrast and compare related ideas;
- be able to apply general principles of information processing to given situations and to be able to abstract general principles from given examples;
- identify a range of needs and opportunities and analyse, design and evaluate the most appropriate ways of addressing these using information systems;
- be able to discuss methods of detecting the loss or corruption of electronic information and describe steps that minimise the likelihood of the abuse of personal information;
- be able to use competently a broad range of software packages to successfully complete a wide variety of practical work-related tasks.

A **Grade C** candidate is likely to:

- demonstrate knowledge and understanding of the range and scope of information processing applications and of the techniques and systems needed to support them;
- have a good grasp of basic terms and definitions and be able to contrast and compare related ideas;
- identify some needs and opportunities and analyse, design and evaluate appropriate ways of addressing these using information systems;
- be able to control ICT devices showing an awareness of efficiency and economy;
- demonstrate a clear sense of audience and purpose in their presentations;
- be able to use a range of software packages to complete a variety of practical work-related tasks.

A **Grade F** candidate is likely to:

- demonstrate a basic knowledge and understanding of familiar, simple information processing applications and of the techniques and systems needed to support them;
- have some knowledge of some of the basic terms and definitions;
- respond to needs and opportunities and evaluate ways of addressing these using information systems;
- manipulate and interrogate previously stored information;
- use ICT to present work and demonstrate how it contributes to the development of their ideas;
- be able to use software packages to complete some simple practical work-related tasks.

8. Other information

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**

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, examination timetables and administrative instructions can be found in the *Cambridge Guide to Making Entries*.

9. Additional information for England, Wales and Northern Ireland

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 (www.education.gov.uk/performance-tables).

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

Prior learning

Candidates in England who are beginning this course should normally have followed a Key Stage 3 ICT programme of study.

Other candidates beginning this course should have achieved an equivalent level of general education.

Progression

Cambridge International Level 1/Level 2 Certificates are general qualifications that enable candidates to progress either directly to employment, or to proceed to further qualifications.

This syllabus provides a foundation for further study at Levels 2 and 3 in the National Qualifications Framework, including GCSE, AS and A Level GCE, and Cambridge Pre-U qualifications.

Candidates who are awarded grades C to A* are well prepared to follow courses leading to Level 3 AS and A Level GCE Information and Communication Technology, IB Certificates in Computing and Information Technology in a Global Society or the Cambridge International AS and A Level Computing.

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 6 and 7 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
Sections 6 and 7 of the syllabus provide 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
Section 6 of the syllabus requires 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 section 7 of the syllabus.
Sections 6 and 7 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, culture and social development.

Key Skills

This syllabus provides opportunities for learners to develop the following Key Skills at Level 1 and/or Level 2:

- Application of number
- Communication
- Information technology
- Improving own learning and performance
- Working with others
- Problem solving.

The extent to which this evidence fulfills the Key Skills criteria at these levels will be totally dependent on the style of teaching and learning. Further information on Key Skills can be found on the Ofqual website **www.ofqual.gov.uk**

Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
Tel: +44 (0)1223 553554 Fax: +44 (0)1223 553558
Email: info@cie.org.uk www.cie.org.uk

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