

Neale-Wade Community College

# ICT

INFORMATION COMMUNICATION TECHNOLOGY

For interactive revision exercises, games and other internet links go to:

**ReviseICT.co.uk**

## Introduction

- This revision booklet offers you the key information you need to be familiar with for your mock and final GCSE exams in ICT.
- Remember the exam is worth 40% and the coursework 60%
- The course you are studying is Specification A (short course) Information and Communication Technology from AQA.



## Topics

The exam covers a wide range of topics linked to ICT, but most questions are linked to the use of ICT in society.

The topics covered are:

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# Systems and Components



Information systems - inputs, storage, processing and outputs  
Difference between information and data  
Input peripherals  
Output peripherals  
Storage devices and media  
Basic networking

## Key points

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Inputs - the raw data that is fed into an information system. Number of ways of doing this via input peripherals.

Storage - data is stored in the information system so it can be used when needed. Can be stored temporarily (while a program is running) or more long-term via storage devices.

Processing - term used to describe the way information systems convert raw data into useful information.

Outputs - the visible or audible result of data processing - information that can be used. Outputs are made via output peripherals

Feedback - term used when outputs are used for further inputs.

**Think** - what is the difference between information and data?

Diagram p. 10

Input peripherals - peripherals are pieces of hardware connected to a computer. Input peripherals are devices that input data into the system.

Examples of input peripherals are:

[*Manual input*] Keyboards, concept keyboard, touch screens, mouse, keypad, microphone, joystick.

[*Automated input*] Bar code reader, OMR (Optical Mark Recognition), OCR (Optical Character Recognition), Scanners, Infrared detectors, Pressure sensors, Light sensors, Card readers, MICR (Magnetic Ink Character Recognition]

Output peripherals - devices that provide information in an accessible form after data processing.

Examples of output peripherals are:

Speakers, Printers (Inkjet, Dot matrix, Thermal, Laser), VDU / Monitor, Plotters, Motors

Also

Some devices are both input and output:

EPOS terminals - Electronic Point of Sale

EFTPOS terminals - Electronic Funds Transfer at the Point of Sale



Storage Media

### Storage devices and Media

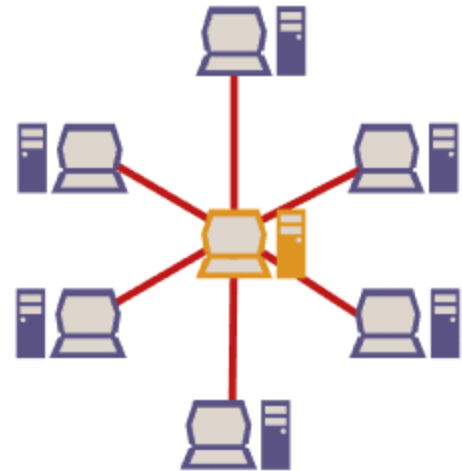
Backing storage is used to keep data or programs. Backing storage devices are the hardware peripherals used to store data. These devices write data onto backing storage media and read it back.

Hard Disks - usually built into the computer itself, usually storing the operating system, applications and the user's data.

Floppy Disks - removable storage. Relatively small amount of data generally 1.44 megabytes and slow access times. Can be written to many times.

CD-ROMS - Compact Disk-Read-Only Memory - read by laser beams in the CD Drive. Hold over 600 megabytes of data and much quicker to access than a floppy disk. Normally write once, read many, although some CD-Roms are re-writable.

Also DVDs (Digital Versatile Disks) and ZIP drives (high-capacity removable disks similar to floppy disks)



### Basic networking

LANs - Local Area Networks - computers on one site.

WANs - Wide Area Networks - cover different sites.

Workstation - PC on a network.

Server - computer where shared data files and software are stored. Some networks have many servers. Examples include file server, web server and e-mail server.

Advantages of networks - sharing of information, easy communication, expensive peripherals (e.g. colour laser printers) can be shared, central installation of software makes upgrades easier + allow tight control over data.

Disadvantages of networks - can be expensive to set up, vulnerable to security problems, vulnerable to server crashes, complex networks require a network manager to keep it running.

Passwords - usernames and passwords allow users to log onto their files. Yet users much change their passwords frequently to prevent access by someone who has discovered the password and to reduce the chances of someone discovering the password.

Data security on networks - by limited access rights of the network to certain users, restricting the physical access to the network, using virus scanners, making sure important files are read-only, making regular back-ups and using a firewall to prevent intruders from the Internet.

# Applications software

Function of applications software within the system  
The types of applications software used  
Database management  
Spreadsheets  
Charts  
Word processing  
Desk top publishing  
Drawing  
Graphics  
Web design



## Key points

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Software - programs that are run on computer systems. Two types of software  
- operating systems and applications

Operating Systems - controls the hardware and run the applications

Applications - perform real-world jobs that people want to do i.e. Word Processing, Spreadsheets, DTP, Computer Aided Design, Databases, Web design. "Software designed to do a useful job for people".

Word-processors - allow users to enter, edit and save text. Useful when a lot of text needs to be entered or when high quality presentation is needed.

Mail-Merge - function of a word-processor allowing you to send, for example, a standard letter to many people. Fields are set up for variable data. These fields are filled by merging with a data source - for example the Wordprocessor gets the names and addresses from a database.

Spell Check

Cut, Copy and Paste

Also Word-processors have more advanced features: Graphics capabilities, tables, styles, indexes, templates and hyperlinks.

Database management - databases are organised collections of data stored on a computer system. Databases are created and managed with Database Management systems (DBMS)

Tables - data is stored in tables

Rows - records

Columns - fields

Field names - titles for the different records e.g. if the records were 'Mr Jones', '28 years old', the fieldnames would be 'Name', 'Age'.

Key field - unique field that identifies a record

Queries - questioning the database - extracting exactly what information is required

Reports - printed output from a database

Forms - screen objects that make entering and retrieving data easier. Often called a 'user interface' for a database. When designing a form, you need to consider what information the database requires.

Spreadsheets - spreadsheets are designed to perform calculations. Data and calculations can be set up to model situations such as a company budget

Columns and Rows

Diagram p. 34

Graphs / Charts - column, bar, line, pie - think when each is best used.

Validation - checks to ensure correct data entry and calculation

Desk Top Publishing (DTP) - useful for producing leaflets, books, newspapers and advertisements. Can also be used to create simple websites.

Advantages - images can be positioned and shaped more accurately than with a Wordprocessor.

Graphics software - used to create and manipulate images. Used for drawings and diagrams, creating and editing web elements such as buttons, editing pre-existing images such as those scanned in or produced by digital cameras.

Clip Art - prepared images that can be inserted to allow people who are not artists to include professional-looking images in their work.

Bit-mapped - where pictures are represented as a set of dots. Each dot is stored separately in a file. If enlarged, the dots simply get bigger producing a jagged image. Can be very large files unless compressed (made smaller) e.g. .gif or .jpg format.

Vector - images as mathematical instructions. Vector graphics have smaller file sizes and smooth rescaling. When resized no jagged images are visible. However, complicated images such as photo images do not convert to Vector images easily.

Web design software - used to create webpages. Similar to word processors, web design software allow users to create HTML (Hyper-text markup language) files to upload to the internet.

Presentational software - slideshow makers / creators that allow users to present graphics and text for presentations.

**Think** - what are examples of all these different types of application software?



# Data

- Data transfer
- Gathering data
- Storing data
- Security
- Processing data



## Key points

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Data preparation - data needs to be 'tidy'. Computers are much better at processing data that is organised logically and consistently.

Forms - used to input data - paper forms are used to collect data whereas screen forms are for a computer operator to use.

Verification - checking that data entered into a computer system is accurate.

Validation - checking of data at the time of input - check carried about by the software to make sure the data is reasonable.

Batch processing - collection of data over a period, followed later by processing

Direct (Random) Access Files - where records are not stored one after another, stored on disk. Allows for immediate access.

Serial Access Files - where one record is stored after another - usually stored on tape. Can take a long time to search through.

Output - can be in many forms. Can be signals to devices such as heaters, lights (e.g. traffic lights) or motors (e.g. washing machine). Usually output is something visual such as via a screen or on paper.

Form of output - factual information can be displayed as text, tables, diagrams and graphs.

Accidental data loss - data can be lost or damaged by hardware failure such as a damaged disk drive, software and management problems such as bugs or failed 'saves', operator error such as accidental deletions or disasters such as fires.

Security - data is so important to most businesses that great care must be taken of it. Loss or corruption of data could threaten an entire organisation.

Dealing with viruses - preventing access via floppy disks, scan incoming e-mails with an up to date virus checker.

Backing up - an organisation needs to keep backup copies of its important data. Servers are usually backed up to tape on a regular basis. Online-backup and (for small jobs) floppy disk backups are also used.

Data encryption - data can be made more secure through encryption - where it is disguised to prevent authorised access

### Malicious Acts -

Hacking - unauthorised accessing of files. Can be prevented by correctly set-up security and Firewalls (hardware or software programs designed to prevent access to the network or PC)

Viruses - computer programs written by malicious or maladjusted individuals designed to damage files or disk drives. Can be prevented through the use of Virus Checkers and Firewalls

Malicious Employees - employees who work in IT sometimes cause deliberate damage to files and network configurations because of grievances.



# Modelling, Control & Simulation



Computer models  
Modelling software  
Data-logging  
Control software  
Simulation

## Key points

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Model - when a real-life situation is represented by computer software. Models are useful for making predictions - calculations based on rules and data.

Advantages of using Models - much cheaper than using real items, results can be obtained more quickly than in real-life, dangerous experiments can be simulated.

Disadvantages of using Models - it is rare for the exact rules and data to be perfectly known. Predictions based on models are only approximations i.e. they can go wrong!

Examples - flight simulators, games, science experiments, weather forecasting, economic models and virtual reality.

Modelling software - software written for very specific modelling purposes such as for monitoring Formula 1 racing cars.

Data-Logging - using a computer to collect data - ideal for scientific experiments

Examples - climatic data over a long period, temperature changes during a chemical process, radiation output from a star, gases produced during photosynthesis.

Data-logging is useful because is it automated, accurate, allows for data to be collected over long or short periods of time, allows data to be stored for later analysis and graphs can be plotted automatically.

Sensors - input devices in both data logging and control applications. Convert physical quantities into electrical voltages.

Examples - pressure, infra-red, thermistors, pH sensors and many more...

Sampling intervals - the time the computer is set to collect data. The time interval is the time between each collection of data. It is important to select a sensible time interval.

Computer control - computers can be connected to output devices that carry out actions. The computer software makes decisions based on the inputs from sensors.

Real-time Processing - where processing of incoming data is immediate. For example: Traffic lights - input = car passes over wires buried in road, action = lights change.

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## ICT and society

Growth of information and its effects on society  
Information systems in society  
Communications  
Data misuse  
Health and safety  
The Data Protection Act



### Key points

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Information technology has created an entire new industry. Many thousands of people now make their living directly in the IT world.

ICT - Information Communication Technology

Examples of jobs created: Programmers, Systems Managers, Technicians, Consultants, Data Processing Staff, Network Designers, Network Managers, Web Designers, Technical authors.

New industries: Mobile Telecommunications, ATM (Automatic Teller Machines - cash machines which rely on online checks to validate requests) and many companies have arisen because of the Internet.

Old / Changed jobs: Many traditional jobs have disappeared with less demand for manual labour. Typesetters (used to set out newspapers) and some factory workers (replaced by more 'reliable' robots).

Changed jobs: Most jobs have changed as a result of computers. For example secretaries can use office software, shop assistants scan bar codes and police use databases to track criminals. ICT has had an enormous impact on society.

Teleworking: Computers and computer communication have made working from home a possibility.



Advantages: less travel, working hours to suit the individual, no need to live near the work place, savings of expensive office space.

Disadvantages: Less social contact, a suitable room has to be found at home, likelihood of interruptions or distractions from family.

EPOS - Electronic Point of Sale

EFTPOS - Electronic Funds Transfer at Point of Sale

Credit cards - allow the holder to borrow money when making a purchase and settle up later.

Debit cards - transfer money that is already in someone's bank account to settle a bill.

'Cashless society' - some people think that eventually few transactions will be in cash. Smart cards will allow you to charge them up with money and use them for small transactions. However, some people prefer to use money, some people may not be able to obtain bank accounts or credit and small transactions are often only possible through cash.

Health and Safety - people who use computers can suffer from health problems. Some issues are only now appearing because computer use has grown so rapidly.

Legislation under the Health and Safety at Work Act (together with European Directives) covers some of these problems.

Stress - job security threatened by introduction of new computer systems, worry about coping with new technology and ways of working. Information overload where users are pressurised to produce more and more information.

Muscular and Joint problems - Repetitive Strain Injury (RSI) pains resulting from carrying out an activity repeatedly. Posture - people who spend a long time sitting at a PC need to ensure they are sitting correctly.

Safety issues - computers are often in control of situations that are potentially hazardous to people. These systems are designed to be fail-safe. Include aircraft navigation, Air Traffic Control, Nuclear power stations.

Visual problems - Eyestrain, leading to headaches and discomfort. Flicker effect of screens can trigger headaches. Offices sometimes have lighting conditions that make reading the screen difficult.

Remedies - anti-glare screens, larger, higher resolution monitors (more comfortable to look at), correct positioning of monitors, regular eye-tests for employees.

Safety issues at work - Electrical equipment, risk of electric shock, trailing leads can be tripped over.

Privacy - computers make it easier for people to access information. For any particular person there is a huge amount of data stored on many databases. Privacy concerns include where organisations with data use the information for direct marketing, criminals / hackers can find private information about people.

Misuse of computers at work - employees can abuse computer resources by playing games when they should be working, by installing illegal software, by viewing 'questionable' websites, circulating offensive or irrelevant material via company e-mail. Many companies have a code of conduct to deal with such matters.

Data Protection Act - 1984 (revised 1988) Act designed to cover storage of personal data on computer systems.

Data subject - an individual who is the subject of stored data. Data subjects have rights under the Data Protection Act.

#### Details of Data Protection Act:

Data must not be acquired and processed unlawfully.

Personal data must not be passed to other organisations without the consent of the data subject.

Data must only be used for a specific purpose.

Personal data should be accurate and up to date.

Suitable measures must be taken to ensure the safety of personal data.

Data should be the minimum required for the purpose and must not be kept longer than is reasonable.

Other legislation includes: Computer Misuse Act (1990) and The Copyright, Designs and Patents Act (1989).

