AS Level ICT Revision Guide

Summer 2003

Basic Examination Technique

Anything in the specification can be used as a question. Get a copy of the specification and use it as a revision checklist. Specification can be obtained from www.aqa.org.uk

Answer all the questions on the paper in the right order. Fill in the question numbers on the front page of the exam paper.

Use correct English and not "text message language." Make sure your handwriting is readable. Don't use correction fluid.

The best way to calm yourself down at the start of the exam is to read each question twice.

Every word in the question is there for a reason.

If the question asks you about a certain scenario, make sure that your answer is relevant to this scenario.

All answers require more than a single word or phrase.

Use correct technical terms. Do not use trade names e.g. talk about a "Database Management System" not "Access". Talk about a "Spreadsheet Package" and not "Excel".

Look at the mark allocation for each question.

When asked for an example, use ICT examples.

It might be a good idea to start every answer on a different piece of paper.

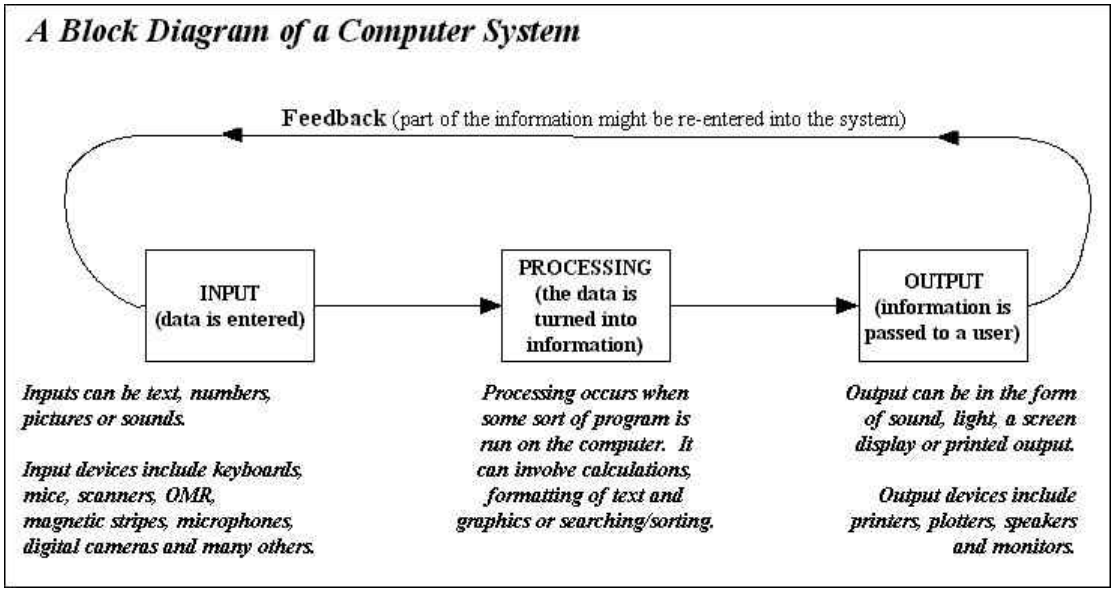
Think about what the examiners are asking you to do:

Name	Give the name of something
List	Give several names
Define	What is meant by
Outline	A brief summary of the main points
Describe	Give a description (requires several sentences)
Explain	You have to show your understanding of something
Suggest	There are several possible correct answers and you have to make a suggestion and explain why your answer is a good one
State	List but give reasons

What is ICT?

You need to be able to define (and give an example of) the following terms:

- Input
- Process
- Output
- Feedback
- Data
- Information
- Knowledge
- Information and Communication Technology



Example (1): Getting a balance of account from an ATM (cashpoint machine)

The INPUT (data) would be the card (magnetic stripe) and the pin number and instructions entered via a keypad.

The PROCESS will be the computer doing a search (and possibly a calculation) to ascertain the user's balance.

The OUTPUT (information) would be the balance, which will either appear on the screen or be printed on a slip of paper (or both).

Example (2): A Bank Statement

250 is DATA (because this figure is meaningless when out of context)

£250 on a bank statement is INFORMATION because it is meaningful.

"If I only have £250 in my bank account, I haven't got enough money to pay my bills" is KNOWLEDGE

The Quality and Importance of Data

Factors Influencing the Quality of Data

Data is useful if it is ACCURATE, UP-TO-DATE and COMPLETE.

Information becomes less valuable over time (e.g. stock figures that are a week old will probably be very unreliable). However, keeping information up-to-date is expensive because there has to be more frequent data collection and more regular input, processing and output. For example, consider how up-to-date the information in the school's student database is. How often is this information updated? What problems can be caused by out-of-date information? Why is it not updated more frequently?

Data based on VALUE JUDGEMENTS may be unreliable.

Good quality data can have a monetary value. Consider the value to Tesco of the data that is generated by the Clubcard scheme.

Data can take the form of numbers, letters, pictures or sounds)

The form in which the information is presented (e.g. tables, graphs, charts) can affect its quality.

Encoding Information as Data

If we need to enter "Male" or "Female", it is easier to enter M or F. This saves storage space, probably makes the database run faster, reduces data input errors and reduces time spent on data entry.

The problem with encoding information as data is that PRECISION can be lost.

A popular example is the holiday customer satisfaction form. Customers may be asked to "rate on a scale of 1 to 5" the quality of the hotel, helpfulness of the rep, etc.

Direct and Indirect Sources of Data

If you wanted to find out which schools/colleges offered AQA AS Level ICT, the direct source would be to write to each school and ask them. An indirect source would be to ask AQA for a list of centres.

When a person buys a can of baked beans in a supermarket, the POS terminal records the transaction. The direct use of this data is to bill the customer and to record the transaction for stock control purposes. An indirect use of the data is for managers to compare weekly sales totals or to analyse the popularity of certain products.

Capabilities and Limitations of ICT

N.B. When asked to describe advantages of ICT, answers like "quicker", "cheaper", "more efficient" etc. are NEVER satisfactory.

Advantages of computerised information systems include:

- Speed of processing
- Reliability
- Accuracy
- Improved presentation – giving a business a "professional image" (don't say "makes your work neater").
- Vast storage capacity
- Saves staff
- Gaining more customers
- Communication

Disadvantages include:

- Job losses
- Faults in software (bugs or badly designed programs) can cause chaos, especially if an organisation has become over-reliant on ICT.
- GIGO (Data Validation can reduce the problem but not eliminate it)
- Information overload (e.g. people can be flooded with Email)
- Security problems (e.g. hacking, viruses)
- The initial investment for the equipment

Personal Qualities of ICT Professionals

- Should be a good listener and communicator
- Ability to take the initiative (should be able to work flexibly and to prioritise tasks)
- Good organisational skills (ability to use time and resources effectively)
- Good teamwork skills
- Problem-solving skills
- Design skills
- Ability to adapt to new technologies and systems
- Business/Management skills (understanding how ICT can solve business problems)
- Good written communication skills

Social Impact of ICT

Think about the use of ICT in:

The Home (e.g. teleworking, video games for entertainment, use of home computers for multimedia CD ROMs, the Internet, E-mail, and so on)

Education (use of the Internet for research, distance learning, school web sites, "Successmaker" for Maths)

Health Service (use of computers to model the effect of new drugs, robot surgeons, GPS for blind people, databases of organ donors, expert systems for diagnosis)

Shops (e-commerce, EPOS systems, Tesco Clubcard)

Small Businesses (small businesses use ICT in a very different way to large ones)

Banking (direct debit, internet banking, ATMs, MICR, credit and debit cards, the concept of the cashless society)

Manufacturing (CAD systems, robots)

Consider the effect of ICT on the "technological underclass" (e.g. bank closures in rural areas).

Communication Systems

You need to know the hardware and software necessary to access the Internet (web browser, modem, telephone connection, computer or other device)

You need to have some examples of facilities/services that are available on the Internet (e.g. information services, online banking, e-commerce, live events, newsgroups, chat rooms, search engines).

You need to be able to describe the advantages and disadvantages of certain methods of communication, especially e-mail, fax, video-conferencing.

Remember that "mobile phones" are not the answer to everything. You can sometimes talk about "WAP phones".

Protecting ICT Systems

You should understand that many organisations are reliant on the quality of their data. Consider the effect of a large loss of data by organisations such as an airline or a bank.

There are many THREATS to DATA INTEGRITY, such as:

- Input errors (GIGO)
- Hardware failure
- Viruses and logic bombs
- Theft (from dishonest employees or external hackers)
- Natural disasters
- Terrorist attack
- Faulty procedures or procedures not being followed (e.g. backup procedures)

An organisation must take steps to protect their IT system, including:

- Backup (think about media, frequency and location)
- Installing anti-virus software
- Training
- Validation and verification procedures
- Vetting of prospective employees
- Physical restrictions
- Passwords and access levels
- Encryption
- Firewalls
- Audit trails

The Legal Context

1. Computer Misuse Act

The three levels of offence are:

Level One: Unauthorised access (e.g. someone who breaks into a system to be nosey or just for the hell of it).

Level Two: Unauthorised access with a further intent (e.g. someone who breaks into a network to steal money).

Level Three: Unauthorised access to modify data (e.g. someone who breaks into a network to plant a virus, which corrupts data).

The computer misuse act is not used as much as it should be because many businesses (e.g. financial institutions) do not want to acknowledge that their systems are vulnerable. If it became public knowledge that their systems had been hacked, the bad publicity could affect their share price.

2. Copyright, Designs and Patents Act

When you buy a piece of software, you do not own the software itself. What you own is a licence to use this software on one computer at a time (a single user licence).

If an organisation wants to install the software on a network, it could buy a network licence or a site licence.

It is illegal to duplicate, download or transmit copyrighted software.

Software companies can guard against software piracy by the use of registration numbers, dongles, or by trying to make disks or CDs "impossible" to duplicate.

Organisations should have policies to ensure that they are always fully licenced.

3. Health and Safety

There are several laws governing health and safety at work. Organisations can be sued by their employees if they are guilty of not following guidelines. Consider the example of the HSBC bank. Remember to refer to IT health and safety problems only!

Health and Safety problems can include:

- Eye-strain (breaks, brightness controls, lighting)
- RSI (breaks, ergonomic keyboards, adjustable chairs, software design)
- Stress (software design, training)
- Neck-Strain (tilting monitors, adjustable seating)

4. Data Protection Act

Why was the data protection Act introduced? (Because of privacy concerns about large amounts of personal data being held. Because computers can store vast quantities of data and process it very quickly. Consider the case of James Wiggins)

What sort of data does it cover? (personal data on living and identifiable individuals that will be automatically processed)

What is the data register? Anyone wishing to hold personal data must say what data will be held, who the data will be passed on to, how long the data will be held for, the purpose for which the data is held, the sources from which it will be obtained).

What is the role of the Information Commissioner? (to maintain the register, to spread information about the DPA, to encourage organisations to introduce codes of practice, to consider complaints and to prosecute offenders).

What are the 8 principles of data protection?
Data must be . . .

1. Obtained and processed fairly and lawfully
2. Held for a lawful purpose as described in the register
3. Adequate, relevant and not excessive in relation to registered purpose
4. Accurate and up-to-date
5. Held no longer than necessary for the registered purpose
6. Used only for the registered purpose
7. Accessible to the individual concerned
8. Surrounded by proper security

What are the rights of data subjects? (the right to see information, the right to have errors corrected, the right to complain, the right to compensation)

What are the Exemptions from the Act? (payrolls, pensions, national security, recreational, electoral roll, tax, credit reference agencies).

Data Capture

You need to understand methods of data capture, such as voice data entry, scanners and OCR, MICR, magnetic stripes, smart cards, OMR, barcodes, keyboards.

For each of these methods, ask the following questions:

- What is it?
- What does it do?
- What equipment is required?
- When would it be appropriate to use this method?
- What are the advantages and disadvantages?

Verification and Validation

VERIFICATION means checking to see if something is correct.

VALIDATION means checking to see if it is reasonable.

When you fill in a form on a web site they want your real e-mail address. There is usually a validation check on the e-mail address, which means that anyone@anything.com will usually be accepted. However, some clever companies then send an e-mail to the address given to VERIFY its accuracy.

You need to be able to name and describe different validation checks (i.e. you must know what each one does):

- Presence check
- Range check
- Format check
- Uniqueness check
- Look-up list
- Length check
- Type check
- Check digit check

Databases

Advantages of Databases:

- Vast storage capacity
- The ability to search, sort and combine data
- The ability to share information
- The ability to set passwords/access levels

Flat File v Relational Databases

- Data Redundancy (the same data entered over and over again takes up unnecessary space and can slow down the performance of the database)
- Data Inconsistency (if the same thing is entered repeatedly, mistakes will inevitably be made
- Time spent entering data

Systems Software

There are two types of systems software – Housekeeping Utilities and Operating Systems.

Housekeeping utilities are tools to ensure the smooth running of the system e.g. virus checkers, disk checkers, disk defragmenters.

The Operating System is software that provides a platform for applications to run. Tasks of the operating system include:

- Memory management
- Resource Allocation
- Interrupt Handling
- Backing Store Management
- Providing the user with an interface

Applications

Understand the distinctions between:

- Applications Software v Systems Software
- Generic Software v Specific Software
- Bespoke Software v Off-the-shelf Software
- Integrated Software v Stand-alone software

Applications Generators and Report Generators

Software like Microsoft Access can be used to generate applications (e.g. stock-control or booking applications) without the need for programming.

RDBMS systems can also be used to print off high-quality reports. The user can define how the information is formatted.

Word Processing

Understand what is meant by WYSIWYG and don't confuse it with a GUI.

WP applications offer facilities such as spell checking, tables, indexes, templates, mail merge.

Spreadsheets

Understand what is meant by "data modelling".

Spreadsheet applications offer such facilities as automatic generation of graphs, functions, macros, templates, cell formatting.

E-Mail Clients

Understand the difference between a stand-alone e-mail client and web mail.

Facilities include address book, forwarding, attachments

Web Browsers

A web browser displays HTML pages in understandable form.

Facilities include: display, save, print HTML pages, bookmarks (favourites lists), browse back and forward, offline viewing.

Presentation Graphics

A computerised presentation has advantages over alternative means (e.g. flipchart or OHP) because sound and video can be included, the presentation can be self-running, there can be animated slide transitions.

Design considerations for a presentation are that there should be a consistent style, there should not be too much text on one page, a large font size should be used, there should be a title page, there should not be too much movement).

Selecting Software

You should also understand some of the issues involved when selecting software, such as:

- Upgradability (advantages and disadvantages in upgrading)
- Portability (problems of compatibility)
- Reliability (problems of thoroughly testing software)
- Protocols and Standards

Criteria for Selecting Software

- Cost (including cost of technical support, upgrades, and so on)
- Availability of technical support
- Training needs
- Ease of use (not always the same as ease of learning)
- Results of benchmark tests
- Documentation
- Compatibility of existing hardware and software
- Is there an "industry standard"?

Processing Different Types of Data

You should understand that different types of data are stored and processed in different ways:

Type of Data	**How it is Stored**	**How it is Processed**
Number	Binary	Calculated
Text	ASCII	Formatted, edited
Sound	From analogue to digital format	Sampled, edited
Image	As bitmapped or vector graphics	Cropped, re-sized

You should understand the importance of distributing information in the right format e.g. charts/graphs, tables, text, e-mail, sound, presentation. Think about the advantages and disadvantages of each.

Modes of Processing

Transaction Processing	Data for each transaction is processed very shortly after the transaction occurs. Each transaction is completed before the next one is begun.
Online Processing	Processing takes place almost immediately (e.g. airline booking).
Interactive Processing	Processing is immediate (or psuedo-real time) and there is interaction with the user e.g. the controls of a plane.
Batch Processing	Data is collected over a period of time. It is processed in batches of a set size. The batches are processed without human intervention. The batch processing is scheduled for a certain time. Batch processing can take place when computers would otherwise be idle. Batch processing is suitable for large quantities of documents of the same type.

Storage Devices

When you are asked to give "a medium" or "media", this means a storage device.

Consider the advantages and disadvantages of floppy disks, Hard Disk Drives, Zip Disk, Magnetic Tape, Microfiche.

Don't get confused between CD-ROM, CD-R, CD-RW, CD

Output Devices

You need to know about VDUs (monitors), plotters and different types of printer (laser, inkjet, dot matrix).

You should understand the difference between parallel and serial transmission (serial transfers one bit at a time).

Networks

You should be able to explain the difference between a LAN and a WAN and to give an example of each.

The advantages of LAN networks are:

- File and printer sharing
- Communication over a network
- Ease of administration

The disadvantages are:

- In a server-based network, users are reliant on a server
- Security problems
- Cost of hardware (e.g. cabling, servers)

You need to understand the difference between a "server based network" and a "Peer-to-peer" network. You need to understand the advantages and disadvantages of each.

You need to understand the different types of "Network Topology". You should understand the differences between a RING, BUS and STAR network. You should be able to draw a diagram of each.

User Interfaces

HCI stands for both "Human-Computer Interface" and "Human-Computer Interaction". The two should not be confused. Human-Computer Interaction refers to much more than just the interface.

When thinking about interfaces, consider things like ATM machines, cashpoints and planes as well as computers.

Interface styles are:

- GUI (Graphical User Interface)
- Command Line Interface
- Natural Language Interface

If applications have a common interface, it increases speed of learning and, therefore, reduces training costs.

Practice Exam

1. State two factors that affect the value of information and give an example of each one. (4)

2. A software house is advertising for an analyst programmer to join one of their development teams. State four personal qualities that the company should be looking for in the applicants. (4)

3. What is an "application generator" (2)

4. Many market research firms use questionnaires as a means of gathering raw data for companies about the popularity of their products.

(a) Explain why Information Technology is widely used in market research. (4)
(b) Once the data has been collected, it can be used to give the clients information about their products. Explain the difference between information and data in this context. (4)

5. (a) State the three levels of offence under the Computer Misuse Act of 1990. Illustrate each answer with a relevant example. (6)
(b) Describe four separate measures that can be taken to prevent accidental or deliberate misuse of data on a stand-alone computer system. (8)

6. The use of Information Technology equipment has brought Health and Safety risks for employees. Describe four such risks, and the measures that an employer should take to protect their employees from them. (8)

7. The owner of a small newsagent uses a computer to manage her orders and deliveries. Every week she copies the files onto a number of floppy disks and puts the disks into a drawer next to the computer.
(a) State three problems that may be caused by this method of backup (3)
(b) Describe a more appropriate backup procedure (1)

8. The manager of a small hotel uses a stand-alone computer to administer the booking and billing systems. He is considering setting up a small local area network to replace the stand-alone computer, with workstations in reception, in his office and in the dining room.

(a) State two different types of network that would be suitable. (2)

(b) (i) Give two advantages of this change for the manager. (2)
(ii) Give two advantages of this change for his customers. (2)

(c) A friend suggests that a connection to the Internet would also be an advantage to allow customers to book electronically. Explain the extra factors that need to be considered if the customers are allowed to pay a deposit electronically over the Internet. (4)

9. An electricity supply company needs to arrange for householders' meters to be read regularly. Meter readers visit each house and record the current meter reading for each account on a paper data capture document. At the end of the day all the documents are read directly into the computer system to avoid transcription errors.

(a) State two items of data that should be printed on the data capture document before it is given to the meter reader. (2)

(b) Describe two validation checks that should be performed when the data is read into the computer system. (4)

(c) How is it still possible for incorrect data to be stored in the computer system? (2)

(d) Since the company has a large number of accounts, the billing process is run overnight at regular times. Explain why batch processing would be appropriate. (3)

10. Many schools and colleges use local area networks of personal computers to allow their students to access packages and to store their tiles. Most students word process their assignments and use packages to assist their learning. Some students also learn to use database packages, and others write large programs for project work.

(a) List three of the main functions performed by a network operating system.

(b) After logging onto the network, students are presented with a personalised graphical user interface (GUI).
(i) State two main features of a GUI. (2)
(ii) Explain why a GUI is preferable to a command line interface. (2)
(iii) Explain a benefit for the students of having a personalised GUI. (2)

(c) The college needs to upgrade the version of the word processing package currently in use. However the network manager asks the management to wait until the end of the academic year. State two reasons why this is a sensible request. (2)

11. Describe three reasons why a building society might experience problems if they had a flat file database system. (6)

12. Data protection legislation was introduced into the UK in 1984; it has since been superseded by the 1998 Act.

(a) State why the legislation was originally introduced. (1 mark)
(b) State what type of data is the subject of the Data Protection Act 1998. (2 marks)
(c) A company wishes to collect data from order forms submitted by its customers to sell to other companies. State two actions that the company must take so that it can legally collect and sell that data.(2 marks)
(d) The Data Protection Act gives individuals the right to see what data is being held about them.
(i) State how an individual must ask to do this. (1 mark)
(ii) Could an individual have to pay to receive a copy of his or her data? (1 mark)