

Introduction

GCSE ICT Theory Packs 1 and *2* have been written to comply with the AQA Specification A for GCSE ICT. The material has been revised to match the changes made to the specifications in 2005, and is also suitable for the 2007 specifications. With the convergence in theory content introduced in 2003, the packs can also be used with other examination boards.

These two packs cover the theory elements of the course, replacing the need for a traditional textbook. The questions at the end of each chapter can be used to reinforce and test understanding when a section of work has been taught. They can also be set prior to covering a topic formally, when students can use the text to research their answers. The questions have been closely matched to the text to make this possible. This approach works particularly well if the *GCSE ICT Theory Packs* are used in conjunction with the *GCSE ICT Worksheets* pack. A topic can then be covered by setting an initial homework from the theory packs, using the lesson to explain any difficulties the students may encounter and then setting the corresponding worksheet in the lesson to consolidate learning. This approach has the advantage that there is no need for students to copy notes in lessons.

The key points at the end of each chapter, together with the glossary at the end of each pack, form a sound starting point for final examination revision.

While the *GCSE ICT Theory Packs* can be used on their own, they can also be used with the *Worksheets* and *Practical Course Packs 1* and *2* to form a complete GCSE ICT course. The three elements have been written to complement each other with the minimum amount of duplication.

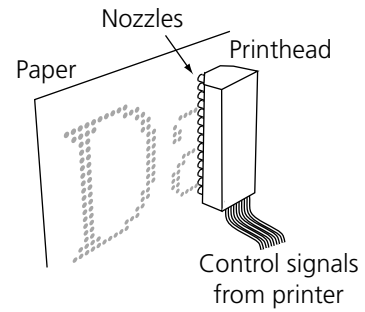
Other titles in the series include:

- *GCSE ICT Theory Pack 2*
- *GCSE ICT Worksheets*
- *GCSE ICT Practical Course Pack 1*
- *GCSE ICT Practical Course Pack 2*

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Ink-jet printer

An ink-jet printer has a printhead that fires small bubbles of ink at the paper. The image is built up using dots in the same way as a dot-matrix printer. However, the ink bubbles are small and easily controlled so the number of dots per inch can be increased to produce a much higher resolution and print quality. Typically, 4800 x 1200 dots per inch is possible, although when the ink hits the paper the resolution may be reduced as it soaks in and spreads out.



Many ink-jet printers use three different colours (magenta, cyan and yellow) together with black to produce full colour images. Some, especially designed for printing colour photographs, use even more colours. Ink-jet printers are able to print very high quality colour images using special paper, but most will produce good quality text and graphics on ordinary paper too.

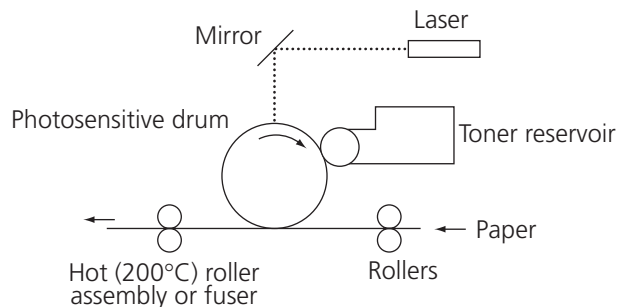
An inkjet printer using photo-quality paper will produce much better photographs than a colour laser printer.

Some of the advantages and disadvantages of ink-jet printers are as follows:

- ✓ Medium to low purchase cost.
- ✓ Almost silent printing.
- ✓ Excellent quality text and colour images.
- ✓ Can print overhead transparencies.
- ✗ High running costs.
- ✗ Faster than a dot-matrix printer but still slower than a laser printer.
- ✗ Special paper needed for best results.
- ✗ Cannot produce duplicate copies while printing top copy.

Laser printer

Laser printers work by having a laser beam scan across a special drum. Where the beam hits the drum it becomes electrically charged. The drum then rotates past a container of toner. The toner is made up of very small particles of plastic. These are attracted to the charged spots on the drum and are picked up by it. The drum rotates further and comes into contact with the paper. The toner is deposited on the paper in the pattern of the image. Finally, the paper and toner are heated so that the toner fuses onto the paper to form a permanent image.



Some of the advantages and disadvantages of CD-Rs are as follows:

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| ✓ Can be read by ordinary CD drives. | ✗ Access is not as fast as for magnetic disk. |
| ✓ Data is permanent. | ✗ The disc cannot be reused if the data on it is no longer needed. |
| ✓ Both the CD writer and the CD-R discs are reasonably inexpensive. | ✗ Disc surface is more easily damaged than a CD-ROM disc. |
| ✓ Direct and sequential access possible. | ✗ Require special-purpose CD writer. |

CD-RW

Compact disc rewritable (CD-RW) discs use crystalline material to store data. Heating the material changes the way it reflects light and in this way it stores the data. The change is not permanent, however, and the crystal structure can be restored to its original state, allowing the disc to be reused. There is a limit to the number of changes that the crystals will undergo (over 5000 cycles) so the disc has a limited lifetime.

CD-RW discs can be written to and read by the same drives used for CD-R and CD-ROM discs. They are slightly more expensive than CD-R discs and are much slower to write data to. A typical application would be for backing-up data on a desktop computer.

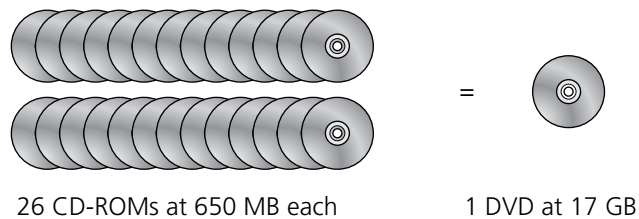
Some of the advantages and disadvantages of CD-RWs are as follows:

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| ✓ Disc can be reused. | ✗ Access is not as fast as for magnetic disk. |
| ✓ Can be read by a normal CD drive. | ✗ Discs are more expensive and slower than CD-R. |
| ✓ Direct and sequential access possible. | ✗ Requires special-purpose CD writer. |

DVD-ROM

Digital versatile discs (sometimes known as digital video discs) can store a minimum of 4.7 GB of data. They are the same size as a CD-ROM, and indeed, a DVD disc drive can read CDs as well as DVDs.

A DVD stores more data than a CD by packing the data closer together on the disc. In addition, a DVD can be made up of two layers, each storing 4.7 GB. A two-layer disc can therefore store 9.4 GB of data. Greater capacity than this is possible, since DVDs can be double-sided, giving the possibility of a total of 17 GB of storage using two layers on each side – the equivalent of 26 CD-ROMs.



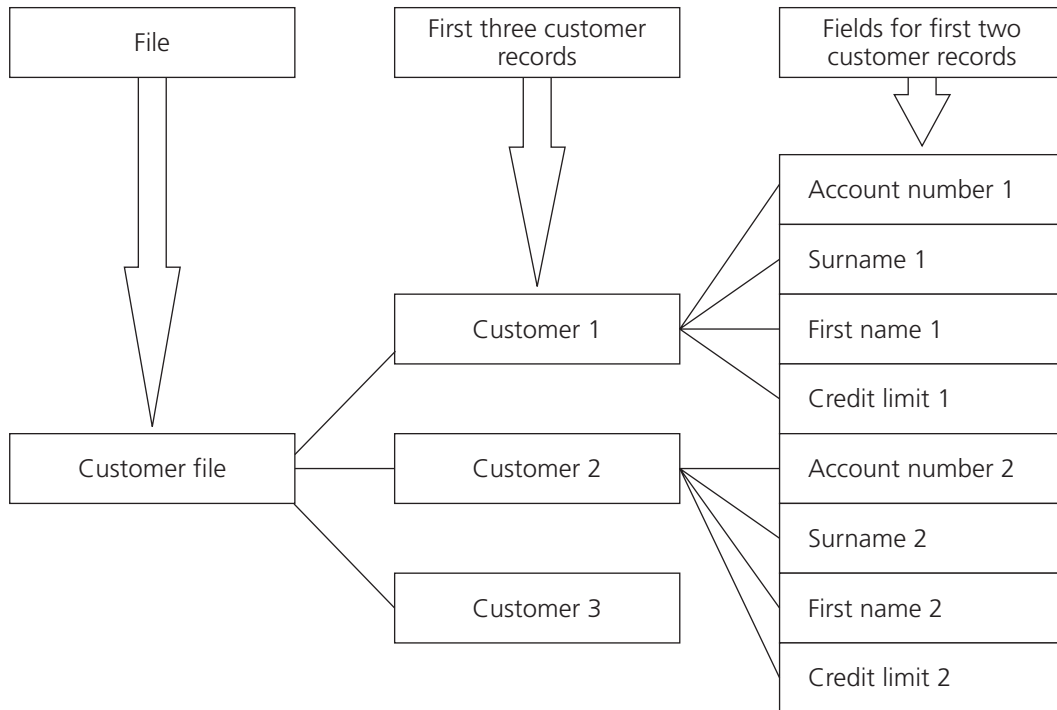
A 4.7 GB DVD can store over two hours of high-quality video. The entire *Encyclopedia Britannica*, which, in its printed form consists of 32 volumes and takes up over half a metre of shelf space, can be distributed on a single DVD-ROM with added video animations to improve the information provided.

Key field

It is usually essential to be able to identify a particular record in a file. In a customer file there may be several customers with the same name and it will be important to identify which of them, for example, owes you money.

A special field, called a key field, is used to identify each record in the file uniquely. Each record has its own unique value for the key field data. It is very unusual for a key field to occur naturally. In a customer file, two customers might have the same name or the same date of birth or even the same address.

You have to be absolutely certain when setting up a key field that there will never be two records with the same key field value. The only way to be sure of this in almost every case is to make up a key field. Usually a made-up key field will be a series of digits or perhaps digits and letters. Account number, stock number, payroll number and catalogue number are all examples of made up key fields. Even though these key fields are called numbers, they often include letters.



A traditional view of file structure

AccountNumber	Surname	FirstName	CreditLimit
Account number 1	Surname 1	First name 1	Credit limit 1
Account number 2	Surname 2	First name 2	Credit limit 2
Account number 3	Surname 3	First name 3	Credit limit 3

A table view of the same file structure

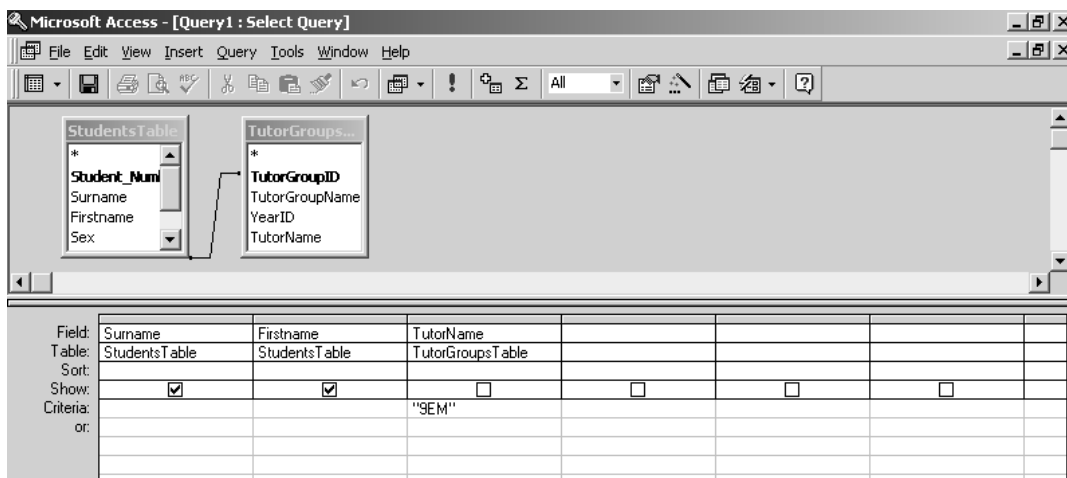
7 Searching and validation

Searching for data

A database can store a large amount of data. One of the most common forms of processing that will be carried out on the data stored in a database is to find data that matches certain conditions. Examples might be to find all customers who have bills that are more than three months overdue or to find all stock items that are running low.

There are two approaches that are used to select records. The first is called query by example. A query by example selection shows the field names in a grid. The diagram below shows a query by example that selects students who are in tutor group 9EM. An example of the data required, in this case tutor group 9EM, is placed in the appropriate column of the grid. Once the selection has been made, the view can be switched to see the data that matches the query.

Only the fields that are shown on the grid will be output. The example shown will produce a list of student surnames and forenames for all the students in tutor group 9EM:



Query by example

Another approach is to use a special database language to create an instruction that the database software can interpret. The following instruction is an example of how you might use such a language to produce a list of all the students in tutor group 9EM:

LIST Surname, FirstName FOR TutorName EQUALS "9EM"

In this instruction, the special words LIST, FOR and EQUALS have been used. LIST is used to identify which fields are to be printed. It is followed by the field names *Surname* and *FirstName* because we want the surname and first name data to be printed. The word FOR is used to identify the field that will have the selection criterion attached to it and the EQUALS gives the type of match that is to be used.

Let's consider a different example. Suppose we want a printout from a supermarket stock file of bar code number, description and stock level for all items supplied by Heinz. The instruction could look like this:

LIST BarCode, Description, StockLevel FOR Supplier EQUALS "Heinz"