

STANWELL ICT

Paper 1 Revision Notes

WJEC GCSE

PDA

5/10/2010

5.1.1 INFORMATION PROCESSING

Data is raw facts and figures e.g. readings from sensors or survey facts

Information is processed data

Knowledge is derived from information which has rules applied to it

GIGO garbage in garbage out

Data can be coded and validated

Advantages of coding data;

- it takes up less memory on disc
- it is faster to type in
- it is easier to do searches on standardised data.

Eg

Houses coded as TR = terraced DT = detached SD = semi detached
Gender M = Male F = Female

Advantages of using a computer to process data

- Improved speed of access to data Faster processing/search/sorts
- A variety of output formats available e.g. printed reports, mailmerged documents. Etc. *Easy to transfer data*
- Improved variety of services
- Increased security
- Saves on storage/office space

Disadvantage

Initial cost of purchasing the computer

Over reliance e.g. if there is a power cut you cannot use it.

Errors that can occur

Transcription /typing errors Typing in the wrong character by accident egg 2 instead of a 7

Transposition Errors i.e. keying in, in wrong order egg 56789 instead of 57689

Data entered in wrong format e.g. date is 2002/ 09.11 instead of 11/09/02

We use validation techniques to cut down errors

Validating data 'Validation is the process of ensuring data is valid and legal'

When creating fields in a file the user often puts controls over the way in which data is entered. This ensures that;

- * data is entered into the correct format
- * data is sensible
- * reduces the risk of mistakes on data entry

Validation type	Explanation	Example
Range checks	Data is between stated ranges	Membership No must be between 1 and 1000
Format checks	Dates	12/04/03
Presence checks	There must be a character present in a particular place e.g. the first 2 letters must be SC	SC6785
Check digits	No added to a code	Bar codes

1. Physical protection of the data from accidental or deliberate destruction

- keep BACKUP copies in a safe place
- use an online tape or disc streamer which automatically backs up data on a network
- put the write protect notch on your disc
- make hard discs read only
- keep copies in fireproof boxes or computer discs in fireproof rooms.
- use grandfather father son security system in batch processing systems
e.g. payroll
- Lock computers to desks

2. Software protection of data

A. Unauthorised Access/ hacking

- **Hierarchy of Passwords**
 - Identification User Name
 - Authentication Password
 - Authorisation What files you can see and what your allowed to do
Read only write only or read and write
- **Encryption** Coding data at on end sending it and decoding it at other end.
- **Voice / hand prints** To access rooms
- **Smart cards** To access rooms and computers

B Spreading of viruses

- **Write protect** media so can't be written onto
- **Don't copy illegal software**
- Use a **virus scanning** software and **virus eradication** program. Make sure this is **kept up to date with the latest virus definitions** – available from the Internet.
- Don't download from the Internet straight onto hard disk
- **Control access to portable media** and do not let users use own disk etc on the organisations system.

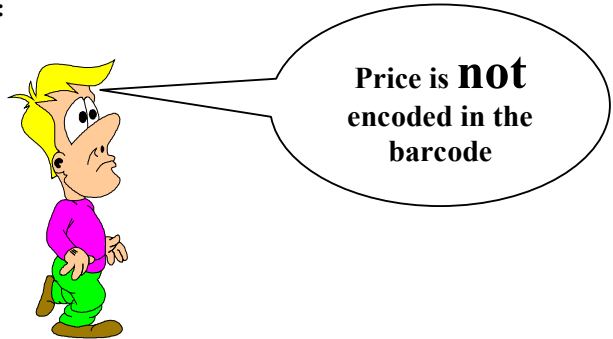
5.1.2 THE IMPLICATIONS OF THE USE OF ICT

A real-time stock control system in a supermarket :

Products now contain barcodes

Items encoded in the barcode include;

- Country of origin **code**
- Manufacturers **code**
- Product **code**
- Check digit



Simple method of working out the check digit.

eg 2 3 1 7 6

$$2 \times 5 = 10$$

$$3 \times 4 = 12 \quad 10 + 12 + 3 + 14 + 6 = 45 \quad 45 / 11 = 4 \text{ remainder } 1$$

$$1 \times 3 = 3$$

$$7 \times 2 = 14$$

$$6 \times 1 = 6$$

The number becomes 2 3 1 7 6 **1** Check digit.

The computer will do this calculation every time the number is scanned or entered and if there is a mismatch it will have to be rescanned or re-entered again. If the barcode is ripped the number will have to be entered by hand.



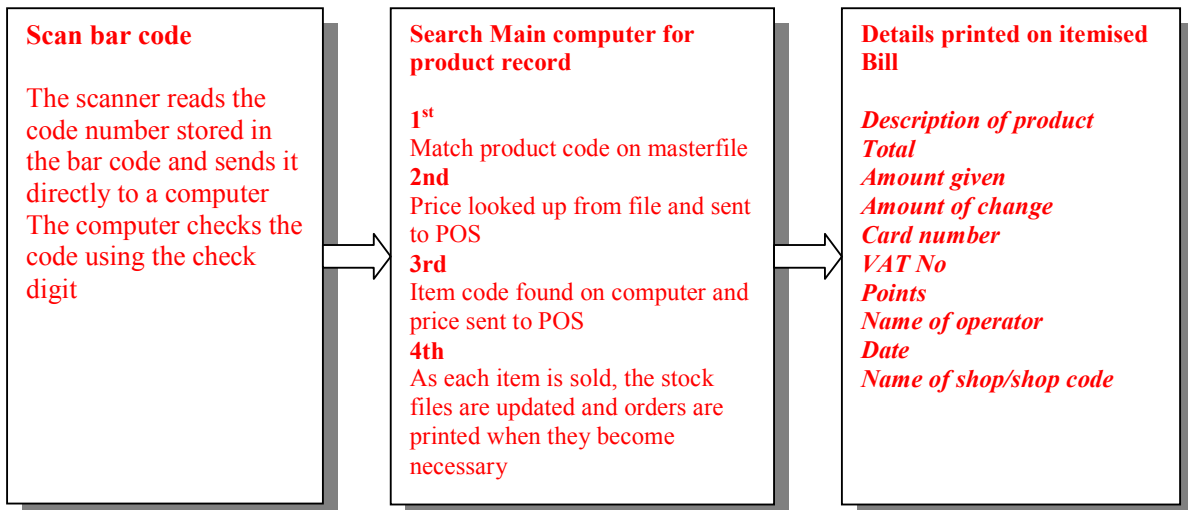
The **POS terminal** only needs to pass the **bar code** on each item past a laser scanner. looks up the product's name and price in data files held on disc. The name and price are sent back to the POS terminal. In this way the POS terminal can print out an itemised receipt. Each terminal has a keyboard to type in the number if the bar code cannot be read.

Input devices at the POS

- Bar code scanner
- Weighing scales
- Keyboard
- Card reader

Output devices (NOT the till or cash draw)

- Screen to display price
- Printer for receipt
- Speaker to output error beep



Adv to customers

- customer **service at the POS** is much quicker, reducing queues.
- **few mistakes** in charging customers.
- fully **itemised bill** can be provided for the customer.
- Offer a wider variety of payment methods e.g. credit/debit/store card/cheque/ cash and bonus or loyalty cards
offer wider range of services including **loyalty card** /buy one get one free /Cash back
- Weighing scales/ don't have to weigh goods earlier
- Scan own shopping; portable data entry
- Staff are less likely to make a mistake with the bill.
- Better stock control so more likely goods in

Adv to shop managers

- prices can be changed easily.
- no staff needed for counting stock on shelves
- increased security - less chance of staff stealing.
- Reorder levels give early warning of low stock
- Automated reorder systems with the warehouse
- Full picture of trading what is being sold so better management decisions can be made.

Why do shops give loyalty cards?

Retain existing customers

Allows them to get sales patterns

Gives them details of customers to target directly

Gives them a saleable list of people with particular spending habits.

Disadvantage

- Damaged codes could cause delays
- Files not up to date could cause delays
- Customers have to pay for printing in prices
- Over reliance on a single pricing system could cause problems
- Power cuts
- Embarrassment when won't read card because of faulty scanners
- The cost of the equipment is very high
- Prices are usually only marked on shelves and not on individual items. Customer confusion?

Supermarket Stock Control

The task of recording and maintaining stock levels is called **stock control**.

A stock control system must keep an up-to-date record of all the stock held and place orders for fresh deliveries if stock runs low.

Importance of stock control -

- adequate stocks must be maintained to supply a customer with goods with minimum delay. If customers find goods are regularly out of stock they will go elsewhere.

- to keep business expenses to a minimum, goods must not be overstocked. By keeping stocks to a minimum, a business can limit the amount of money invested in stock and also reduce the risk of stock deteriorating before it can be sold. Minimum stock levels also reduce storage costs such as warehousing, heating, lighting and security.

Example of Master File

Stock code	Stock description	Price per item	No in stock	No sold to date	Re order level	Special offer code	Supplier
DA2345	Kellogg's Cornflakes 100g	£1.89	100	45	20	3876	HQ warehouse
DA2346	Kellogg's Frosties 100g	£1.98	200	89	20		HQ warehouse

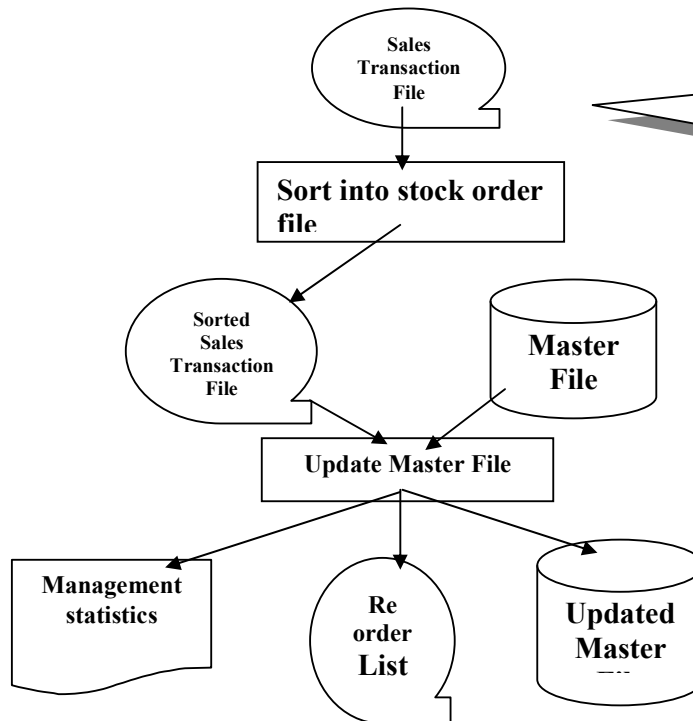
Example of Sorted transaction file

Stock code	No sold today
DA2345	30
DA2346	10

Example of updated master file

Stock code	Stock description	Price per item	No in stock	No sold to date	Re order level	Special offer code	Supplier
DA2345	Kellogg's cornflakes 100g	£1.89	100	85	20	3876	HQ warehouse
DA2346	Kellogg's Frosties 100g	£1.98	200	99	20		HQ warehouse

Updating the stock master file



You do not need to reproduce the systems diagram in the exam.

Draw a systems diagram to show how the price appears on the POS terminal screen after being scanned in.

Other methods of entering data in shops

OMR sheets for ordering stock

Portable Data Entry (PDET)

Portable Data-Entry Terminal: a calculator-sized device with a built in bar code reader attached. The PDET can be connected to a computer and data downloaded at the POS. It also makes it easier for shop assistants to perform a manual stock-check, which takes place from time to time so that the computer's view of stock levels is compared with real-life (if they differ, it is probably down to shop-lifting); speeding up data-entry and reducing mistakes means that fewer staff are needed, with less disruption to customers. e.g., Sainsbury's

Kimball tags e.g. Clothes shops

Pre-punched tags affixed to goods, containing the size and style data that speed up inventory control. Small, rectangular cardboard tags which are removed from garments at the POS and placed temporarily on a spike near the till; at the end of the day all the Kimball Tags are collected, and placed in a card-reader to input the data (e.g. Product-Code) into a computer to update the stock database for purposes of stock-control.

Touch sensitive menus or screens e.g. Mc Donalds



Online Booking Systems

Theatre and concert tickets, holidays, flights etc, can be booked using the Internet. Agencies and the home user can now access remote online databases for their computer enquiry and booking system. People can search for holidays etc. to suit their requirements and make provisional or firm bookings.

Advantages to the online booker

- Services are available 24 hours a day
- Alternatives can be proposed if first choice not available
- Access to data on a wide range of holidays including special offers.
- Bookings are instantaneous so little possibility of overbooking because once a seat or holiday is provisionally booked this will appear on the database.

Banking

- Cheque processing
- EFTPOS
- ATMs
- Credit cards
- Debit cards
- Smart cards
- Homebanking/ telebanking

Cheque Processing

A cheque is a paper form that is issued by a bank that an account holder can use to authorise payment to another person or organisation.

An account holder must write these details on the cheque for the payment to be authorised:

- **the name of the person or organisation that it is payable to**
- **the date**
- **the amount that it is for in figures and in writing**
- **a signature**

Bank of Monee	Date.....	
Pay.....		
Amount.....	<input type="text"/>	
.....		
A N Other		
46-45-90	37465327	102201
↑	↑	↑
Branch number	Account number	Cheque number

The numbers at the bottom of the cheque are written in special **magnetic ink**. These are :
The amount the cheque is for, is keyed in manually by a data input operator and printed on each individual cheque in magnetic ink. The amount in words acts as a check if the figures are hard to read. The **magnetic ink** enables the cheques to be read very quickly, in batches, by a special reader. This process is of reading characters written in magnetic ink is called **MICR** or **Magnetic Ink Character Recognition**.

A cheque guarantee card usually accompanies cheque payment. The card number is written by a retailer on the back of a cheque and guarantees that the bank will honour cheques up to a certain limit irrespective of the account holder's balance.

When the cheque is paid in at a bank it undergoes a chain of processing events and only then is money transferred from one bank account to another. The method of processing the cheque is called **cheque clearing**. This normally takes several days.

EFTPOS

Banks can move money between one bank account and another electronically over computer networks. This is called **Electronic Funds Transfer** or **EFT** for short.

BACS is one example of the application of **EFT**.

Most of us encounter EFT in our daily lives without thinking about it. When a customer pays for goods in a shop or supermarket using a debit card, the customer and retailer accounts are updated electronically. If they pay at an electronic terminal, called an **Electronic Point Of Sale** terminal (**EPOS**), then this is called **EFTPOS**, or **Electronic Funds Transfer at Point Of Sale**.

Although the processing could be completed in real-time, the transactions in the UK are usually uploaded and processed as a batch overnight and then the customer and retailer accounts are updated.

ATMs

Services available at an ATM

- Cash
- Change PIN No
- Check balance
- Transfer money between accounts
- Printed mini statement
- Order cheque books and statements
- Select language.
- Order theatre tickets
- Deposit cash

Advantages of ATMs;

For the customers

- Provide 24-hour services
- Access ATM's in many locations
- Cuts down on queues **in** banks / faster service for customers (*Not shorter queues at the ATM*)

For the bank

- Save on staff costs
- Allows staff to concentrate on other work e.g. selling mortgages or other
- Services/increase sales
- Increased security

Problems which could occur when customers use ATMs

- Could be attacked/security
- Could forget PIN
- Wrong amount of money issued
- Card could be retained
- Card might get damaged

Card crimes	Prevention
Stealing cards at ATMs	Do not write down PIN numbers Do not let anyone see you typing in your Pin number
Stealing debit and credit cards	Photos on cards Lower the amount that can be spent using cards before seeking authorisation Details of stolen cards put on POS terminals
Credit card fraud on the Internet and their misuse	Use agreed words on some sites Use a secure service
Card copying	Programmable smart cards to make data difficult to copy Use of holograms to make cards difficult to copy.

Credit Cards - Borrow money so cash does not have to be in account at time of purchase

People using credit cards do not need to pay for their goods or services until the end of the month. Credit cards can be used instead of cash or cheques for payment. Each card has a **unique number**, a date it is valid from, an expiry date, a name and a **hologram**. The hologram is the small shiny picture to the right of a card. It is there for security reasons to deter potential forgers. A dove is the hologram on VISA cards, a map of the world is on MasterCard's. On the back of the credit card is a **magnetic stripe**. This stripe stores a small amount of information about the account holder; their **account number, bank sort code, encoded PIN, and withdrawal limit**.

Debit cards - cash does have to be in account at time of purchase

A debit card has a unique number, a date it is valid from, an expiry date, issue No., a holder's name, a hologram and a magnetic stripe on the back containing **account number, bank sort code, encoded PIN, and withdrawal limit**. The transaction amount is transferred electronically from the card holder's bank account to the retailer's bank account a few days later.

An important difference between debit and credit cards - the card holder must pay almost immediately and does not have any credit / borrowing facilities with the card.

Smart cards - programmable cards

Smart cards are plastic card that contains a **microprocessor with a memory** Smart cards are also being used for various payment systems as an alternative to cash. e.g. MONDEX The memory can store much more information than a magnetic stripe on the back of a credit or debit card.

The owner of a cash card like Mondex can download additional cash onto the card at any time using a special reader connected to a telephone line, at an ATM at the bank or via a reader attached to their own PC over the Internet

The money on a cash card can be spent at any retailers with the equipment to read the card. Money can also be transferred directly from one card to another using a special electronic wallet that resembles a pocket calculator.

Unlike a credit or debit card that creates a computer record of who the transaction was made by, a cash card does not and is therefore anonymous.

One advantage of a plastic cash card is that it eliminates the need of going through expensive banking networks to move money although there may be initial hardware and software purchase costs if you want the facility at home.

Access to the cash on plastic smart cards can be protected by locking it with a 4 digit PIN.

Retailers like smart cash cards because they offer the following advantages:

- **Accuracy - mistakes can't be made with change**
- **Efficiency - don't have to waste time counting and handing out change**
- **Security - this would be vastly increased if there was no need for cash. Robbers would have to become IT experts.**

Homebanking

Customers can access their bank account details from home across the Internet

Advantages

- Customers don't have to leave home/ saves time
- Savings on postal or travel costs
- Transfer money or pay bills from home
- Pay bills anytime
- Instant balances

Problems

- Hacking of credit card / debit card details by unauthorised people who might misuse the data.
- Have to pay telephone charges whilst online.
- Lack of personal contact; - may not understand the system and you have no one to help.

Communications and Information systems

Teletext

Teletext systems provide an information service using adapted television sets. The information is broadcast along with the normal **television signal**. The BBC Teletext service is called CEEFAX. The information is divided into numbered pages, each of which fills a TV screen e.g. the latest news, the weather forecast, travel news, share prices, TV schedules, etc.

A Teletext service generates about 200 pages of information.

The system is **non-interactive**. i.e. the user may call up a page of information using a hand-held keypad, but **may not send information back**.

The **system is free** once it has been installed.

Interactive services such as those you get on the Internet allow you to send back information.

The Internet

The Internet is a **Wide Area Network** - actually it is a huge **collection of networks connected** together by what are called **gateways** - these make the system act as if it was one huge network. Many networks in industry, business, higher education and government institutions are all connected to the Internet although anybody can now get connected to the system with the appropriate hardware and software and access to an **ISP (Internet Service Provider)**...e.g. Freeserve, AOL, Demon and hundreds of others.

Hardware and software needed to access the Internet

- Computer system
- Modem or ISDN card or broadband link
- Communication software provided by the ISP

Modem is needed for analogue to digital conversion
ISDN line is faster than a normal tel. Line
Broadband is faster than both

NB telephone line is NOT hardware

Services available on the Internet

1. **Search engines** which allow you to search the World Wide Web for any topic, and each page has **links** to another and so on...
2. **Download** software and files (e.g. weather pictures)
3. **Bulletin boards** (forums) or **newsgroups** are also set up where you can leave messages, or communicate directly with other users.
4. **Chat lines** Allow online realtime 'chat' facilities with anyone who is on the Internet at that time.

Dangers

You don't know who you are really talking to. Many paedophiles try to contact young children on chat lines

Code of conduct for using Chat lines

- Never arrange to meet anyone on a chat line
- Never give them your personal details such as your name, email, home address, Tel. No. name of school or names of any of your friends.
- Don't go into private rooms with people you don't know.

4. Electronic mail

Definition:

**A system which allows messages to be sent from one person to another using a computer.
ie AN ELECTRONIC MESSAGE TRANSFER SYSTEM**

Structure of an email address

username@Service provider.country or organisation

another@Yahoo.co.uk

Asmith123@bt.com

pddaviessies456@castle.org

What do you need to access email.

- Email provider or ISP with a central mailbox facility.
- User account or mailbox with user ID
- User password

Address books

List of email addresses

Attachments text file, videos and sound files

Send a previously saved file with the email/ transfer a file

Carbon copy emails

Send a copy of the email to more than one person at the same time

Groups of people who can all receive an emailed message at the same time

Other services

- Web cards

Advantages of electronic mail**1. Advantages over the telephone**

- * People don't have to be in. The receiving computer will store the message until the receiver wishes to read their mail.
- * One letter can be sent to several user's mailboxes at the same time.
- * Letters can be printed out so you have a hardcopy.
- * Can store the message for future use or edit it and return to sender
- * More confidential than fax systems
- * Faster delivery speeds.

2. Over the post

- * Security
 - messages are automatically dated when sent and when received and read.
 - less likely to be lost and backup copies can be kept.
 - restricts unauthorised access with a good password system.
- * will not be delayed by postal strikes or transport breakdowns so important
- * contracts tenders can't be lost.
- * Send bulletins and messages to many users which are delivered at the same time. (can be cheaper than large mailshots)
- * Faster delivery speeds (instantaneous). Delivers at weekends and evenings.
- * Once the hardware is installed Email is cheaper than the post
- * Savings in stationery and telephone costs if use is frequent.

3. Over sending discs through the post.

- *Disc will need an operator at the other end to load it.
- *Disc can get lost in the post or damaged.
- *Still have delays in receiving the disc.

Disadvantages

1. Initial cost of buying hardware and software if only use it infrequently
2. Possible way of spreading viruses
3. Cant send parcels.

Businesses set up **websites** on the Internet because...

- ..they can advertise. It enables people to find out what they do and what they sell.
- ..people can email them with enquiries; orders; requests;
- ..they can reach an international audience.

E-Commerce

The Internet has opened the way for E-Commerce or Electronic Commerce. To most us this means selling goods and services over the Internet. EFT is the means by which the transactions are authorised and completed online.

Selling over the Internet offers many advantages for customers and retailers.

Advantages

- Can buy 24 hours a day, 365 days a year
- No need to handle cash since all transactions are made using cards
- the transactions are automatic, saving staff costs
- the process is almost paperless
- the customer can print off an on screen receipt
- the delivery process can often be tracked online
- goods are often discounted because of lower retail costs

To establish an E-commerce facility a firm would need the following:

- **An ISP**
- **A database of stock**
- **A web page**
- **An electronic means of payment. e.g credit card or secure site.**

EFTPOS systems consist of electronic cash registers (tills) that are connected to the retailer's main computer (usually over a local area network housed in the same building) and also to banks over wide area networks.

The retailer's main computer stores the stock control database that provides the electronic cash registers with data about each product. It also stores information about all completed transactions.

At the checkout, the operator scans the bar code of each item individually. The stock file is queried using the item's code which retrieves the record for that item. The price and description are displayed on the checkout monitors for the customer and operator to see. The price of the item is added to the total and also printed on the till receipt. The quantity of stock for that item is decremented by one.

Stock control in this situation is automatic. The retailer can use the computer system to generate stock reports at any time to view stock levels. A minimum re-order level may be set so that the retailer may be alerted to items that fall below this level and a new order can be sent to their supplier. This may help prevent the shop from running out of popular items and maintain customer satisfaction.

Conversely, items that are not selling well can be easily identified by querying the

- An authorisation and authorisation code are generated if there is enough money in the shopper's account to pay for the goods. A record is created to settle up between the shopper and retailer's banks 2 or 3 days later. Alternatively, the authorisation may be rejected because of insufficient funds in the account. The central switch system sends a message with the result to the till at the checkout.
- If authorisation is granted a debit payment slip with an authorisation code is printed for the customer to sign.
- The transaction is then completed and a card voucher (shown below) with details of the transaction is given to the customer as a record to keep. The transaction will also appear on the shopper's monthly bank statement.

The retailer's card voucher (above) has the following details printed on it on completion of the transaction:

- Date and time of transaction
- Merchant Id
- Transaction code
- The amount to be paid
- The card number, expiry date and issuing bank (payment by Switch)

Development in telephone communications**Fax**

Data electronically transmitted over the telephone line. You don't need the Internet or a computer to do this. Do not confuse this with email.

It uses paper rather than electronic storage.

Mobile phones

1. **WAP** (wireless applications protocol) Phones
Mobile phones that receive the Internet

2. Other Services available on most phones

Realtime talk
Text messages
Voice mail
Alarm clock/time
Reminders/ to do list
Change ring tone
Record greeting message
Display photos/ pictures on screen
Radio

Advantages of mobile phone

Don't have to be attached to a land line
Use out in remote areas

Disadvantages of using mobile phones

No service
No battery/ run out of credits
Fined if used when driving
Run up large phone bills
Get mugged

Video Conferencing (Tele-conferencing).

With a small video camera fixed to your microcomputer, your image can be sent down the network to another user (and vice versa). Audio signals can also be sent. This means you can see and talk to another user if you have a microphone.

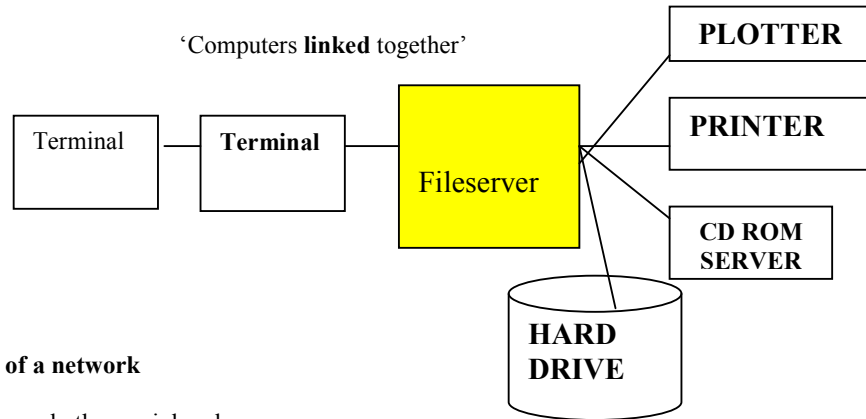
Companies can set up meetings with eyeball-to-eyeball communication between people who are not in the same room, building or even country!

Advantages

- Saving in time
- Savings travel costs
- Encourages 'teleworking'

Disadvantages

The pictures are of poor quality but with fast broadband connection the quality will improve

Networks**Advantages of a network**

Share printers and other peripherals

Email

Share programs

Share data files

Disadvantages

Open to hacking

Spreading of viruses

If file server crashes no one can use the network.

Needs extra staff to maintain the network.

Intranets

An intranet is set up entirely within a local network. Web pages can be stored and accessed from anywhere on the network and email can be sent internally within the local network. A company can set up an intranet and allow its workers to send messages to each other and use a browser to access company information saved as web pages. It can also be used for staff training.

Code of conduct for using a network and the Internet

Do not bring in discs from outside

Do not misuse email

Do not use the printer for personal work

Do not tell anyone else your password

Change your password regularly.

Don't try to access other people's files/No Hacking

Don't knowingly or by accident spreading a virus -Virus scan all discs

Do not copy programs/files

Do not steal hardware

Do not visit pornographic sites on the Internet

Do not access criminal or terrorist material

Do not Chat to dubious people

Do not use the Internet for any other purpose other than that allowed

Do not run up large phone bills

Services available through digital interactive television*(These may be extended in future years)*

TV channels

Pay to view movies / sports channels

Email

Book holidays

Play games

Teleshopping

Telebanking

There are many applications packages we could use to help in our daily lives at home or in school.

Wordprocessing;	<p>Entering and processing text using a computer</p> <p>Centre, left align, right align text, fully justify text</p> <p>Underline, italics and bold</p> <p>Change font styles and change font size</p>	Letters
Desktop publishing software	In addition to wordprocessing features it has extra features to handle images such as clipart, wordart, shading effects, rotating text and frames such as text boxes.	<p>Posters</p> <p>School projects</p> <p>Cards e.g. birthday</p> <p>Business cards</p> <p>Calendars</p> <p>Family trees</p>
Multimedia	<p>Can handle sound and video files</p> <p>Animation and transition effects</p> <p>Automatic timing effects</p>	School presentations e.g. showing previous school trips to parents
Web publishing software	<p>*sound files video files</p> <p>*has hyperlinks to other pages</p> <p>*bookmarks so it can jump to different parts of the page</p>	School website
Spreadsheet	<p>*Stores formulas and data</p> <p>*Allows 'what if' type investigations</p> <p>*More accurate than calculators or mental maths</p> <p>*Variety of output formats e.g. graphs</p>	<p>Home Accounts e.g. tax returns</p> <p>Working out the break even point for a school DT project</p> <p>Profit and loss on a school event</p> <p>Consumable sales in the tuck shop</p> <p>Stock records</p> <p>Working out nutritional values of meals</p> <p>Staff payroll</p>

Simulation programs	<p>‘ Software that represents a real life situation.’</p> <p><i>It is NOT CAD</i></p>	<p>Advantages</p> <p>1. Allows investigations which would be too dangerous to do so in real life e.g. flight training</p> <p>2. Allows investigations which would be too expensive to do so in real life e.g. economic forecasting e.g. what would happen if the banks put up their rates of interest.</p> <p>Disadvantages</p> <p>Requires complex programming</p> <p>Requires large memory computers</p> <p>Not 100% accurate.</p>
Databases or File handling	<p>Has searching and sort facilities.</p> <p>Allows export to other software</p>	<p>Home address books</p> <p>Details of pupils in school</p> <p>Details equipment needed for a school project</p>
Control in school and at home	<p>Sensors e.g. heat, light, moisture, pressure pads send data to a computer program which will activate an external device e.g. motor if needed.</p> <p>More accurate than humans</p> <p>Work 24 hours/ 7 days a week/ no need to take breaks</p> <p>Can be reprogrammed quickly</p> <p>Cheaper to operate than paying peoples wages</p> <p>Can work in dangerous environments</p> <p>Can work in unhealthy environments. Humans do not need to be there</p> <p>Feedback</p> <p>Inputs from sensors are used to control devices which will then effect the input readings from sensors</p>	<p>Burglar alarms</p> <p>Environmental control of central heating or greenhouse</p> <p>Lighting effects in a school play</p> <p>Control of Sound effects in a school disco</p> <p>Washing machines</p> <p>VCR's</p> <p>Lighting systems</p> <p>Automatic garage doors</p>
Art or CAD		<p>Drawings of sets for school play</p> <p>Costume design in school play</p> <p>Artwork to decorate the school.</p> <p>Designing logos in DT</p> <p>Designing home gardens</p> <p>Designing rooms at home.</p>
Sound		<p>Composing music</p>

Educational software Computer Assisted Learning (CAL)	Laser disc technology is being used for interactive video simulations. eg highway code, fire officer training. Authoring software allows users to create multi-media presentations. Virtual Reality systems are being developed where the user puts on a helmet which projects images into the eyes using small computer screens. a CAT (Computer Aided Tomography) scan can create a 3-dimensional picture of the human body. A surgeon can put on a VR helmet and feel as if he is walking around inside the patient! He can view e.g. a tumour from different angles.	CAL type programs Spelling programs Maths programs Distance learning / O.U. software Software tutorials Special needs software Music software Typing tutors 'Tutorial' sessions, which allow the user to learn by following simple instructions on the computer.
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Features you need to know in detail

Spellchecker <i>Checks for spelling mistakes</i>	-compares word with online dictionary -suggests alternative words -does word counts -add to users own dictionary -grammar checks Can't check Foreign words Common names Mixture of No and words e.g. postcodes. Words such as there and their which have different meanings.
Mailmerge	-Inserts fields from a separate database -into predefined positions -in a prepared WP document
Online thesaurus	-displays alternative words of similar meaning eg good, better, great
Online dictionary	look up meaning of words
Headers and footers	enables same text at top or bottom of every page automatically
Pagination	-automatic numbering of pages by computer DTP

Benefits of using ICT to help learning

Work can be edited
 Faster access to data.
 Work can be printed out in a variety of ways
 Accuracy of work is likely to be greater.
 Graphical interfaces more attractive so improved concentration span
 Programs are more interactive so different ways of learning.

Human-computer Interface (HCI)

Human must communicate with the computer via a user interface

G.U.I.'s Graphical user interface Most modern micro computers operate through a GUI

Terms such as WIMP (windows, icons, menus, pointer) or 'desktop environment' are commonly used to describe these interfaces. The user interface is the part of the system that communicates with the user usually via a screen.

The main features of such interfaces are;

W indows **to allow multitasking and display file structure**
I cons **are symbolic representations of files**
M enus **to list appropriate facilities**
P ointer **to select and choose the command or facility you want.**

Windows display the file structure and enable all file within a folder to be displayed on screen other windows can also be displayed on screen at the same time. windows can be easily opened or closed using pointers.

Modern computers also desktop features such as ;

On screen help
Customised user environments-favourites
On screen assistants
Tutorials

Alternative HCI's

Voice/microphone
 Command line/DOS
 Menus
 Touch sensitive screens (See shopping notes)
 Concept keyboards
 Braille keyboards
 Games consoles/keypads

Voice recognition

Microphone used to receive speech input. Speakers used for speech output.

This is a VOICE driven system can help disabled people.

Systems for recognising users of cash or smart cards are also being developed.

The human factor is very important in the design of these systems and recent interest in expert systems and artificial intelligence has made such features as

Natural language interfaces more common place making machine human interfaces more user friendly.

Problems:

- Users may speak different languages;
- local accents may not be recognised;
- Some words sound the same - two, to, too

Braille keyboards These are special keyboards for blind or partially blind people

OCR Optical Character Recognition Some hand-held computers allow users to 'write' on the screen.; scanning document,

OMR Optical Mark Recognition e.g. lottery tickets, school registers

Health effects from using computers

Health hazard	Prevention
Repetitive strain injury	Wrist and feet supports
Epileptic fits	Screens to reduce screen flicker
Radiation	Screen filters
Eye strain	Screen filters/ take breaks
Headaches	Take regular breaks/ screen filters
Circulation problems	Take regular breaks
Back problems	Use adjustable chairs
'Sick building' syndrome	Better ergonomic design including lighting to reduce glare

5.1.3 THE IMPACT OF ICT

Changes in working practises

Employment issues

- Redundancies; some manual jobs have been lost
- Some staff have needed retraining e.g. accountants need to use spreadsheets; typists use wordprocessing packages; managers use database packages. etc.
- New jobs have been created e.g. computer programmers, systems analysts

Changes in working practises

Use email
 Use the Internet
 Saving backups
 Virus scan discs
 Use of smart cards
 Use of software packages
 Videoconferencing
 Lack of personal contact

Teleworking

‘People who work from home using **computer networks**’

Advantages to employees

Savings in journey to work time
 Savings in travel cost
 More flexible working hours

Advantages to employers

Savings on office space
 Retain skilled staff due to maternity or who have children at home – flexible working hours.
 Cut down on absences due to babysitting problems

Disadvantages

Loss of personal contact with colleagues
 Initial cost of providing the hardware.

See banking notes for e-commerce and networks for codes of conduct)

Computer crimes

1. Hacking unauthorised access to confidential data

Prevention

- **Passwords** which restrict access to data files
- **Encryption** of files. If these are transmitted remember the receiving end must also have the codes to de crypt the data.
- **Restrict physical access** to files e.g. smart cards to control entrance to rooms, voice or hand prints; retina scans; write protect notches on discs etc.
- **Backup procedures-** keep multiple copies off site; in fireproof boxes; see files for GFS etc

2. Spreading a computer virus

These are programs introduced into computer systems which destroy or alter files by rewriting over data or by copying themselves over and over again until computer system is full and cannot continue. Egg Melissa

Prevention

- **Write protect** media so can't be written onto
- **Don't download** unknown programs from the Internet straight to hard disc. Only use reputable sources.
- **Don't copy illegal software**
- Use a **virus scanning** software and **virus eradication** program. Make sure this is **kept up to date with the latest virus definitions** – available from the Internet.
- Use **diskless workstations** on networks
- **Control access to portable media** and do not let users use own disk etc on the organisations system.

3. Computer fraud – white-collar crime (NOT 'fraud' by itself)

- **Bogus data entry** when entering data
- **Bogus output** -output may be destroyed to prevent discovery of fraudulent data entry or processing
- **Alteration of files** e.g. employee alters salary rate or hours worked
- **Program Patching – introduction of an additional subroutine or code e.g. channel funds into a fictitious account or transmit codes to get free telephone calls**
- **Suspense accounts rejected or unreconciled accounts may be redirected into a colluding account.**
- **Blackmailing with threat of virus**
- **Deliberate data destruction to cause havoc and financial loss to a competitor**

Prevention or 'White Collar' computer crimes

Companies must implement security procedures

- **Monitor** all programs and users actions should be monitored and logged. All users should be identifiable and all files capable of being audited keep online transaction logs
- **Auditing procedures** to detect fraud
- **Divide up programming tasks** so no one programmer has responsibility for writing a program common in banks.
- **Control access** to hardware and software.

Often companies are unwilling to disclose crimes against them because

- It could lead to loss of public confidence in the security of the data.
- Often their own security teams can be involved and this would again question their efficiency.

Computer crime is often relatively easy because

- Users do not have a great deal of technical knowledge
- Many external auditors do not have the expertise to trace programs but rely on printouts.

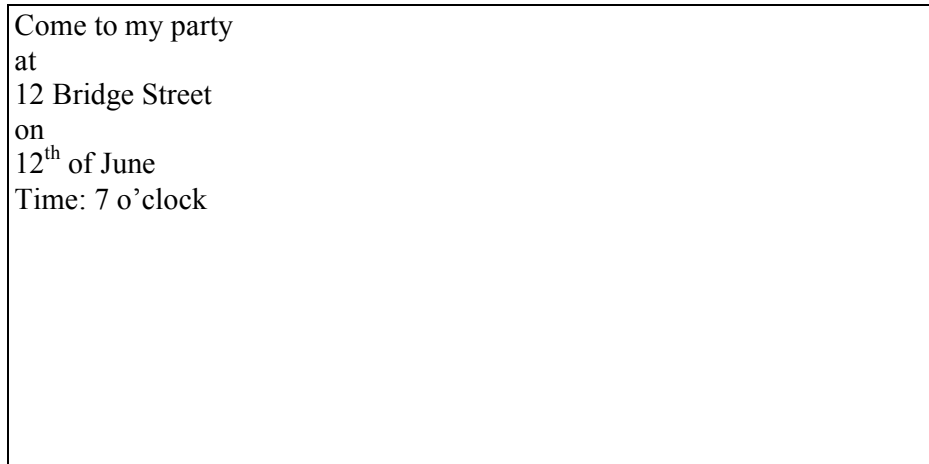
4. **Software piracy** is illegal copying but users do not get any technical support or upgraded versions.
5. **Physical theft of computer equipment – use locking devices – restrict access to rooms with smart cards, hand or voice prints, retina scans**
6. **Deliberate theft of files- keep back up files - offsite - and in fireproof containers**

5.1.4 PROBLEM SOLVING

1. John wants to use desktop publishing (DTP) software to produce his birthday invitations.

His first attempt is shown in Figure 1

Figure 1



He uses some of the facilities of his DTP software to improve the invitation and his final design is shown in Figure 2.

Figure 2



- a) Give **FOUR** facilities of his DTP software used to produce the invitation in Figure 2.

Clipart

Scanned pictures

Pictures from the Internet

Pictures from a digital camera

Border art

Wordart

Different font styles (*Not word 'font' by itself*)

Different font sizes (*Not word 'size' by itself*)

Centre text (*Not word 'centre' by itself*)

- b) John wishes to use the mailmerging facility of his DTP software to create personalised party invitations.

What is meant by mailmerging?

-Inserts fields from a separate database

-into predefined positions

-in a prepared WP document

2.A School Club is organising a summer concert and has produced a poster using desktop publishing (DTP) software to advertise the event.

- b) Give **two other** documents which could be produced to help in the organising and administration of the concert.

Ticket; programme; seating plan; letters to sponsors; cast lists; etc.

- c) The School Club secretary wishes to use presentation software to advertise the concert on the school's intranet.

Give **one** advantage of using presentation software over DTP software.

Animation; video clips; sound clips.

3. The section of a spreadsheet shown in Figure 3 holds a table of pupil's marks. Each mark is out of 50.

The teacher has used the spreadsheet to work out the total number of marks out of 200.

She has also worked out the percentage total.

Figure 3

	A	B	C	D	E	F	G
1	Name	Mark1	Mark2	Mark3	Mark4	Total out of 200	% out of 100
2	J. Evans	23	45	38	36	142	71
3	R. Adams	42	42	39	43	166	83
4	T. Jones	22	19	21	33	95	47.5
5	S. Smith	31	29	35	46	141	70.5
6	A. Khalid	39	40	36	45	160	80
7	H. Kelly	17	22	29	29	97	48.5

a) Which of the following formulas could be used to give the Total number of marks out of 200 in CELL F2?

- A **B2+C2+D2+E2**
- B **F2+F3+F4+F5+F6+F7**
- C **SUM(B2:E2)**
- D **B3+C3+D3+E3**
- E **E2 * 4**

b) The pupil H Kelly improves his mark for Mark1 and the teacher changes the mark in Cell B7.

What other two cells would also change? **F7 ; G7**

c) What formula could the teacher have typed in to give the % total in Cell G2?

F2 / 2

d) The teacher wants to put the % marks into rank order.

Describe how they might do this.

Select whole spreadsheet

Sort on column G

Or similar

e) Give two *other* examples of the use of a spreadsheet in the school

School accounts ; Payroll; Stock records ; Working out nutritional values of meals

f) One advantage of using a spreadsheet is the automatic recalculation of other cells and columns when data changes.

Give **two other** advantages of using spreadsheets.

***Stores formulas and data**

***Allows 'what if' type investigations**

***More accurate than calculators or mental maths**

***Variety of output formats e.g. graphs**

4. A spreadsheet could be used to produce a simulation model of traffic queues on a main road.

- a) Give a definition of a simulation model.
 ‘ **Software that represents a real life situation.**’

(Not anything that could be interpreted as CAD)

b) Give two reasons why *spreadsheets* are useful in producing simulation models.

Save formulas with data
Do ‘what if ‘type investigations
Can be displayed graphically

5. The school Geography department uses sensors to collect weather data.

a) Give **THREE** sensors used in collecting weather data.

Temperature
Rainfall
Humidity / moisture
Wind speed
Pressure
Wind direction
Any reasonable answer

b) Give **two** ways of displaying weather data on computer screen.

Tables
Graphs
Spreadsheet

c) Give **two** methods of *permanently storing* the weather data collected.

Printout ;
Magnetic medium (Disc or tape but not both) ;
Optical medium CDRW

d) Give **two** statistical methods of *analysing* the weather data collected.

Max Min Mean/ Average Total

e) Give **two** advantages of using the computerised weather station to collect data rather than using traditional methods of collecting weather data.

Datalogging 24 hours/7 days a week / humans not present
Accuracy or readings
Accuracy of time intervals
Accuracy of recording

g) Name **two other** applications that use simulations, explaining the reasons in each case for the use of the simulation.

Training pilots - dangerous to do so in real life
Economic forecasting -too expensive to do so in real life

6. A computer uses the following control port to monitor and control a house hold security system

0	1	2	3	4	5
0	0	0	0	0	0

Output bits

- 0 - alarm light
- 1 - motor to close shutters
- 2 - siren

Input bit

- 3 - sensor on front door
- 4 - pressure mat

1. If the burglar stands on the pressure mat an alarm light would come on.
2. If a burglar opens the front door the siren would come on
3. If the burglar stands on the pressure mat and opens the front door the alarm light would come on, the siren would come on and the window shutters would close.

All the bits are set to zero but if the input bits are set to one the corresponding output bits would also be set to 1

Write down the display of bits in the following situations

a) A burglar has stepped onto the pressure mat

0	1	2	3	4
1	0	0	0	1

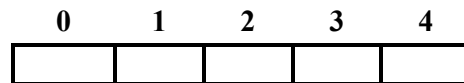
b) A burglar has opened the front door

0	1	2	3	4
0	0	1	1	0

c) If the burglar stands on the pressure mat and opens the front door, the alarm light would come on and the siren would come on and the window shutters would close.

0	1	2	3	4
1	1	1	1	1

7. A computerised greenhouse uses a thermostat and the following control port to monitor and control the environment in the greenhouse.

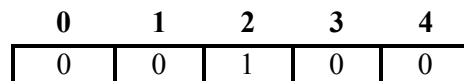
**Output bits**

- 0 - heater (1=on, 0=off)
- 1 - motor to open or close the greenhouse window (1=open, 0=close)
- 2 - sprinkler (1=on, 0=off)
- 3 - fan (1=on, 0=off)

Input bit

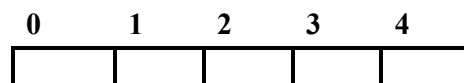
- 4 - temperature (0 if temperature below temperature level required, 1 if = or above the required temperature)

e.g. if only the sprinkler is on then the control port would look like that shown below;

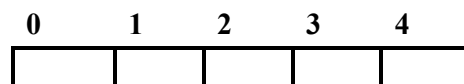


a) Write down the display of bits in the following situations following.

- (i) Switch on the heater only.



- (ii) Open the greenhouse window if it gets too hot and turn on the fan



b) Write a sequence of steps needed to keep the temperature of the greenhouse between 20⁰ C and 22⁰ C, and keep it there, using only the heater and thermostat.

If temp on thermostat > 22⁰ C turn off heater
If temp on thermostat < 20⁰ C turn on heater
If temp between 20⁰ C and 22⁰ C do nothing / leave alone

c) The computerised greenhouse system will use *feedback*.

In this system explain what is meant by *feedback* in this context.

The sense of;

Inputs from sensors are used to control devices which will then effect the input readings from sensors

8. The table below shows part of a membership database for a leisure centre.

Membership No	Name	Telephone Number	Gender	Club
9385	A. Ap Dylan	01564 968473	F	Gym
9283	R Peters	01523 987543	F	Badminton
9110	K. Lewerson	01537 748234	M	Gym
9223	D. Davies	01572 987639	F	Badminton
8923	L. Jones	01567 928572	F	Gym
8769	H. Allen	01537 898222	M	Soccer
9200	B. Jones	01571 342111	F	Gym
9612	W. Harris	01532 888326	M	Soccer

a) Which field is the '*keyfield*' **Membership No**

b) What data type is the key field? **Integer**

c) What is the purpose of the *keyfield*? **Unique identifier**

d) The manager has used coded data the gender field. e.g. F instead of writing female.

Give **two** advantages of using coded data when storing data in files.

- it takes up less memory on disc
- it is faster to type in
- it is easier to do searches on standardised data.

e) The manager of the leisure centre wants to search for all members of the soccer club and display their details on screen.

Describe how he could select only these members.

Club + Soccer

f) The manager is organising a female gymnastics competition and wants to search for all female members of the Gym club and display their details on screen.

Describe how he could select only these members.

Gender = F and Club = Gym

9 A school stores their pupil records on a computer system.

Design a form that could be used to collect information about a new pupil entering the school. The secretary could then use this form to update her pupil records file. (4)

Admission No	KEYFIELD
Name	GENERAL FIELD
Address	GENERAL FIELD
Form	SPECIFIC TASK RELATED FIELD