SECTION 7.1

SECTION 7.1 – The Ways in which ICT is used

ICT applications in our everyday life

Information Technology has entered into many of our everyday lives and has made a huge impact at work and in our homes. The following examples show where information technology has changed the way we communicate information to people. Take a look at the CIE syllabus (Sections 9 to 16) and think about what you have learnt in your practical lessons.

Communicating applications

Desk-Top Publishing (DTP) Programs (e.g. Microsoft Publisher or Adobe InDesign)

DTP programs allow the user to combine image and text to create magazines papers, posters, leaflets, business cards, catalogues, etc. They are used by both general users and professionals and there are products on the market aimed at both groups. There are similarities with word-processing packages, and the latest versions of word-processing software have many of the same features as DTP programs. The difference is one of emphasis: word-processing programs focus on the creation of text-based documents; DTP programs focus on the manipulation of graphical objects on the page (including text) to create a photograph or other image that is created by a combination of multiple images on a single sheet.

Newsletters

A newsletter is a regularly distributed publication generally about one main topic that is of interest to its subscribers. Newspapers and leaflets are types of newsletters. Additionally, newsletters delivered electronically via email (e-Newsletters) have gained rapid acceptance for the same reasons email in general is gaining popularity over printed correspondence. Many newsletters are published by clubs, societies, associations, and businesses, especially companies, to provide information of interest to their members, customers or employees. Some newsletters are created as money-making ventures and sold directly to subscribers.

A pamphlet is an unbound booklet (that is, without a hard cover or binding). It may consist of a single sheet of paper that is printed on both sides and folded in half, in thirds, or in fourths (called a **leaflet**), or it may consist of a few pages that are folded in half and stapled at the crease to make a simple book. A flyer (also spelled flier) is a single page leaflet advertising a party, event, service, or other activity.

Flyers are typically used by individuals or businesses to promote their products or services. They are a form of mass marketing or small scale, community communication. Flyers are handed out on the street, posted on bulletin boards, or given away at events. Bulletin boards are found in school, in cafes, universities and small markets.

Flyers, along with postcards, leaflets and small posters, are vital and free forms of communication for people who want to engage the public but do not have the money or desire to take out classified advertising in a local newspaper. However, as marketing became more direct in the late 1980s and 1990's, flyers have evolved and currently there are many formats to be found.

Poster

A poster is any piece of printed paper designed to be attached to a wall or vertical surface. Typically posters include both textual and graphic elements, although a poster may be either wholly graphical or wholly textual. Posters are designed to be both eye-catching and convey information.

Posters may be used for many purposes, and they are a frequent tool of advertisers (particularly of events, and films), propagandists, protestors and other groups trying to communicate a message. Posters are also used for reproductions of artwork, particularly famous works.

Another type of poster is educational posters, which may be about a particular subject for educational purposes. Related to these are academic or conference are generally low-cost compared to original artwork. Many people also collect posters, and some famous posters have themselves become quite valuable, collectors and vintage posters are usually framed and matted. Posters may be any size.

What a DTP application can't do for you

A DTP application is for creating a layout of a document; its purpose is not to structure a text. It may not build summaries or a table of contents for you; there is no function to add/manage footnotes to your text.

Generally, it will be difficult to connect a DTP application with external data sources like databases. That's where word processing software will be needed (see page 14 for more details).

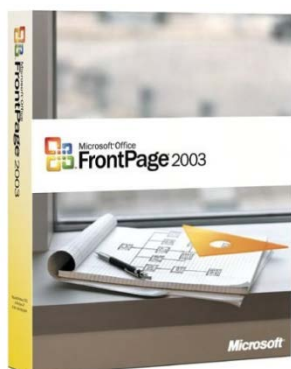## Advantages of DTP applications

- Absolute control of your layout. DTP applications never rearrange your frames to fit to text or printer requirements. Instead, you have to set up the text or printer correctly.
- Text flow around irregular shapes (which is difficult to do in a word processor.
- Guidelines, margins and rulers are very useful for an exact placement of frames.
- Professional output when ready to print.

Note: Desk-Top Publishers do not allow video, sound and animations to be used within the document, unlike Presentation software and Web Authoring software.

Websites
Web-Authoring Software (Microsoft FrontPage or Macromedia Dreamweaver)

One of the most revolutionary aspects of the internet is the way it allows users with varying levels of experience and only minimum resources to create their own websites. In order that individuals with little or no programming experience can produce websites, software has been developed that facilitates this in a user-friendly way.

This is referred to as web-authoring software. This facility has led to an increase in small-scaled companies challenging the market domination of established companies.

The functionality of web-authoring software

Code view or HTML:

Web pages are visual representations of programming code, usually HTML (Hyper Text Mark-up Language). However, most web-authoring packages do not require the user to write any code. Rather, they use a 'graphical user interface' (GUI) to construct the pages by creating tables and adding text and pictures, and other objects. The user can choose to switch to code view if needed to amend the code manually.

Links or Hyperlinks:

Web pages usually contain links to other related pages. These are called hypertext links, the activation of which sends a request for a different web page to be downloaded. This can be done in the same window or in an external window. The web-authoring program will allow the user to add new links to the site.

Formatting:

The final look of a web page is something that the user will want to determine. The program should offer formatting facilities such as: backgrounds, text, lines, colour options, font and point size options for text objects, general layout item e.g. tables with rows and columns, which can also be merged.

Templates:

A pre-developed page layout in electronic or paper media used to make new pages with a similar design, pattern, or style. Many web-authoring packages are aimed at the general user and so assume that they need help in constructing their website. This includes templates that outline website structures where a user can add details to it and wizards that take the user through a series of dialogue boxes writing in the information step by step.

Object Access:

These include a clip-art library of pictures and more professional, sophisticated packages will enable the importing of animated graphics, video clips, sound files, charts and graphs can also be added.

Note: Other than text and images, other features which can be inserted into a web page include; sound, video / animation, tables, charts / graphs, hyperlinks to other pages or websites, hot spots, buttons for navigation / moving around the site, numbers, hit counters and forms.
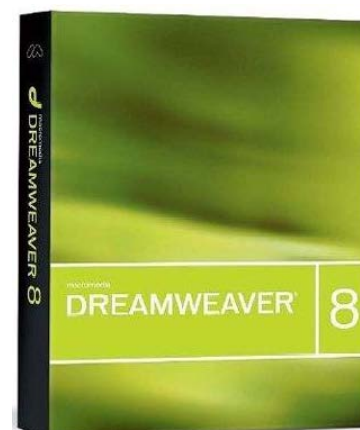
Advantages of Presentation Software

- The quality of presentation is superior to that which can be produced by photographic slides and overhead transparencies.
- It has the potential to utilise full multimedia facilities, thus expanding what material can be included in the presentation, like sound and video animations.
- The finished product can be economically stored, easily edited and used again as often as necessary without any diminishment of quality.
- The user has much more control over the final appearance of the slide show.
- It can run automatically in 'loop' mode on a TV monitor e.g. as used in some exhibits, etc.

Disadvantages of Presentation Software

- Some files, especially those that contain multimedia elements, can take up a lot of memory (megabyte) resources.
- In order to show the presentation effectively, a good quality computer projector is required. These can be costly.
- The whole system can be complicated to set up, requiring a computer with the file, a computer projector, screen, cabling etc. This is especially difficult if one has to show the presentation in different locations.
- As with all computer-based technology, there is a danger of the document being lost or corrupted as the result of a system crash.

Music scores

Scorewriter

A scorewriter, or music notation program, is software used to automate the task of writing and engraving sheet music.
A scorewriter is to music notation what a word processor is to written text.

Functionality

All scorewriters allow the user to input, edit and print music notation, to varying degrees of sophistication. They range from programs which can write a simple song or piano piece, to those that can handle the complexities of orchestral music, specialist notations, and high-quality music engraving.

Music can usually be input by using the mouse and computer keyboard, although some scorewriters will also allow input to be played to them from a MIDI keyboard. As scorewriters tend to use their own unique file formats for storing music, many will include utilities to translate from foreign formats, or MIDI files, to their own. Also a few will allow input by scanning scores using musical OCR software.

The output of scorewriters can usually be fine tuned, either by dragging graphical objects around in a GUI or by adding parameters to text-based input files.

A few scorewriters allow users to publish scores on the Internet using their own formats, thus making them accessible only to other users of the same program. However more allow the exporting of the score to a PDF file for distributing the score and MIDI for distributing the music. More recently there have been Flash-based scorewriters developed that allow distribution and advanced interaction of sheet music online to any user with a modern web browser.

Using past paper questions we will use an example of how to produce a chart or graph from a spread sheet.

Question: If a deputy head wanted to compare the average exam score of three subjects (listed in the spread sheet (a) example below), and he then wanted to produce a graph (b) from the spread sheet. What would be the steps in order to produce the graph?

	A	B	C	D	E	F	G	H
1	Second name	First name	Gender	English	Maths	Science	Average	
2								
3	Allen	Jeffrey	M	72	71	52	65	
4	Bi	Sabina	F	53	80	53	62	
5	Johal	Jatinder	M	72	61	68	67	
6	Ke Wong	Su	F	54	81	78	71	
7	McDonald	Calum	M	59	67	63	63	
8	Mohammed	Ali	M	71	60	82	71	
9	O'Neill	Michelle	F	50	49	45	48	
10	Rowlands	Jean	F	89	91	96	92	
11								

a)

b)
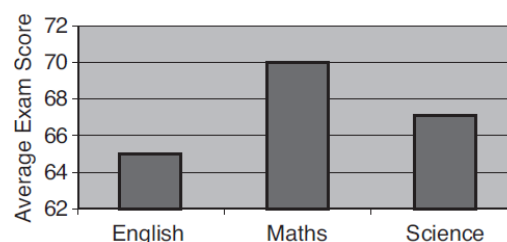
Answer:

Type formula in D11 =AVERAGE(D3:D10) (same for E11 and F11)
To calculate average of D3:D10, E3:E10 and F3:F10
Highlight D11 to F11
Highlight D1 to F1 or type in category access label
Click on the graph icon
Select the bar or column chart
Type in the value or y axis heading

A school has just received its IGCSE examination results which are better than the previous year. The results for the last three years are stored in this spread sheet.

	A	B	C
1			Percentage of
2	Year		students passing
3			
4	2001		89.4
5	2002		92.3
6	2003		94.6
7			

Question: The head teacher wants to include this graph in a multimedia presentation to parents. Describe how he would do this.

Answer:

Highlight column A / delete / hide column B
Highlight column C / highlight A1 to B6 / select columns A & B
Select chart icon / select insert chart
Select type of chart
Label axes
Alter scale of y axis

Address lists (book)

Address book

An address book or a name and address book (NAB) is a book or a database used for storing entries called contacts. Each contact entry usually consists of a few standard fields (for example: first name, last name, company name, address, telephone number, e-mail address, fax number, mobile phone number). Most such systems store the details in alphabetical order of people's names, although in paper-based address books entries can easily end up out of order as the owner inserts details of more individuals or as people move.

Many address books use small ring binders that allow adding, removing and shuffling of pages to make room.

Contact list

A contact list is a collection of screen names in an instant messaging or e-mail program or online game or mobile phone. It has various trademarked and proprietary names in different contexts.

The contacts list just a list: generally a window that has a list of screen names that represent actual other people. Double-clicking on any name will open an instant messaging session and allow you to talk with that person. Usually, if somebody shows up in your contact list, your screen name will show up in theirs.

Some text message clients allow you to change your display name at will (MSN Messenger), while others only allow you to reformat your screen name (Add/remove spaces and capitalize letters). Generally, it makes no difference other than how it's displayed.

With most programs, the contact list can be minimised to keep it from getting in the way, and is accessed again by double-clicking its icon (on a PC).

The style of the contact list is different with the different programs, but all contact lists have similar capabilities.

Such lists may be used to form contact networks, or social networks with more specific purposes. The list is not the network: to become a network, a list requires some additional information such as the status or category of the contact. Given this, contact networks for various purposes can be generated from the list.

Salespeople have long maintained contact networks using a variety of means of contact including phone logs and notebooks. None of them would confuse their list with their network, nor would they confuse a sales contact with a "friend" or person they had already worked with.

The use of the term contact list in an IM (instant messaging) context may be confused to some users in less technologically advanced countries where such lists are manually maintained.

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Tuck shop records

When the word 'records' is mentioned it usually refers to records held in a database.

Tuck shop (also known as a Canteen)

The term "tuck", meaning food, is slang and probably originates from such phrases as "to tuck into a meal". A tuck shop is a small, food-selling retailer, found in schools and youth clubs. The term is interchangeable with the word canteen. When the tuck shop is in a school, it is frequently the only place (other than the school canteen) where monetary transactions can be made. As such, particularly in the UK, they often sell items of stationery too, although food is still their primary source of income. A tuck shop typically sells confectionery finger-food, such as sweets, crisps, fizzy drinks and so on. In recent years, there have been moves to change to a wider variety of "healthier" foods.

Clubs and Society records

A club is an association of people united by a common interest or goal. There are several types of clubs.

School clubs

These are activities performed by students that fall outside the realm of classes. Such clubs may fall outside the normal curriculum of school or university education or, as in the case of subject matter clubs (e.g. student chapters of professional societies), may supplement the curriculum through informal meetings and professional mentoring.

Professional societies

These organisations are partly social, partly professional in nature and provide professionals with opportunities for advanced education, presentations on current research, business contacts, public advocacy for the profession and other advantages. Examples of these groups include medical associations, scientific societies, and bar associations.

Service clubs

A service club is a type of voluntary organisation where members meet regularly for social outings and to perform charitable works either by direct hands-on efforts or by raising money for other organizations.

Social clubs

Some social clubs are organised around competitive games, such as chess and bridge. Other clubs are designed to encourage membership of certain social classes.

Country clubs, athletic clubs, and sports clubs

Athletic and country clubs offer one or more recreational sports facilities to their members. Such clubs may also offer social activities and facilities, and some members may join primarily to take advantage of the social opportunities. Country clubs offer a variety of recreational sports facilities to its members and are usually located in suburban or rural areas. Most country clubs have golf. Swimming pools, tennis courts, polo grounds and exercise facilities are also common. Country clubs usually provide dining facilities to their members and guests, and frequently host catered events like weddings. Similar clubs in urban areas are often called athletic clubs. These clubs often feature indoor sports, such as indoor tennis, squash, basketball, boxing, and exercise facilities.

Software Uses (summarised)

Throughout the past papers you will be required to identify what each software application is used for. I have included some examples below for you to understand clearly how to answer the questions.

Uses of Desk Top Publishing

Advertising posters, tickets, programmes and producing the school magazine.

Uses of Spreadsheets

Used to work out basic accounts for a fete or bazaar, keeping school tuck shop accounts and keeping track of personal finances.

Uses of Databases

Names or addresses of parents or pupils for invitation to the event/recording or displaying results, storing information about pupils or storing records of books in a library. **Note:** that if you were asked to measure the pollution of a river by using sensors and recording the results on computer, you could use a spreadsheet or database to store the results. If a graph was to be made from the results you could use DTP, word processor, presentation software or even a web page editor.

Uses of Word processors

Writing/typing or sending letters to parents/community, advertising a fete, sports day or bazaar

Uses of Computer Aided Design/Manufacture

A software package which allows a computer to automatically manufacture goods from a drawing or to design a room.

Uses of Multimedia presentation program/packages

Producing a slide show, preparing a talk to show how a computer works and can show parents what activities take place in a new school.

Uses of Control programs

Used to control a burglar alarm system, controlling traffic lights or automatic washing machine.

Uses of Measuring Programs

Used to record data in a science experiment, recording the temperature of a cooling liquid or monitoring rainfall in a weather station

Uses of Graphics programs

Advertising posters, tickets or programs.

Uses of Web Authoring programs

Used to design websites whether for personal or business use.

Integrating Software Continued

What follows are examples of how different software's integrate with each other.

1. A school has just received its IGCSE examination results which are better than the previous year. The results for the last three years are stored in this spreadsheet.

	A	B	C
1			Percentage of
2	Year		students passing
3			
4	2001		89.4
5	2002		92.3
6	2003		94.6
7			

Question: The head teacher wants to include this graph in a multimedia presentation to parents. Describe how he would do this.

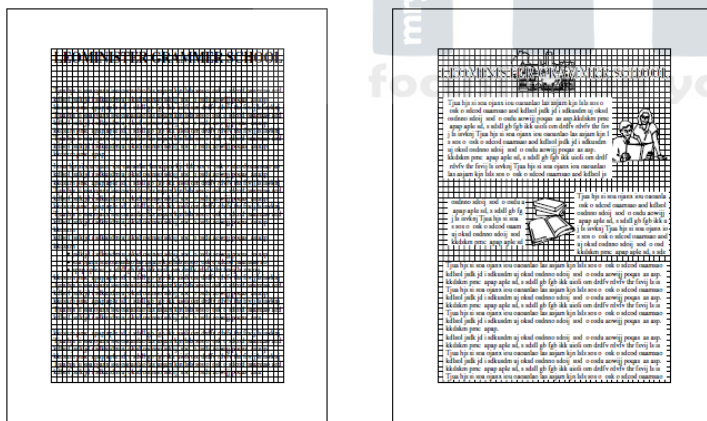**Answer:** *Once the graph has been created*

Save as chart or copy chart
Load or open the presentation software
Create frame or slide layout
Insert file or paste chart

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2. A school newsletter contains only text. The head teacher wants to use a computer to add graphics including a picture of the school.

Question: Describe how he could obtain a picture of the school and how he could place it in the document.

Answer:

Photo taken using digital camera or ordinary camera or the picture is drawn
It can also be downloaded or loaded from CD Rom or scanned
Then it is saved as a file
The magazine document loaded or opened
The saved file is imported or copied and pasted or inserted into the magazine document
Then the picture is positioned

Data Logging

A data logging system automatically collects data over a certain period of time. As well as being able to alter this time, you can alter the frequency with which the measurements are made. Since there is no human error, the measurements will be more accurate.
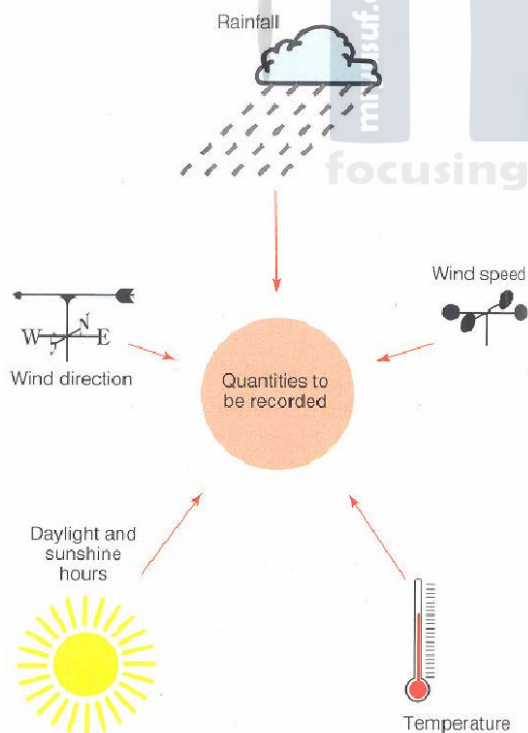
Data logging benefits

- Data logging can record information in places where humans find it hard to operate – e.g. the bottom of the sea, outer space, inside nuclear reactors or pizza ovens.
- Data can be collected over very long or short periods – you could record the growth rate of a tree, or the changing temperature of a melting ice cube.
- Intervals between measurements can be more accurate than when a human is doing the measuring – for example, a temperature reading taken every 27 seconds.
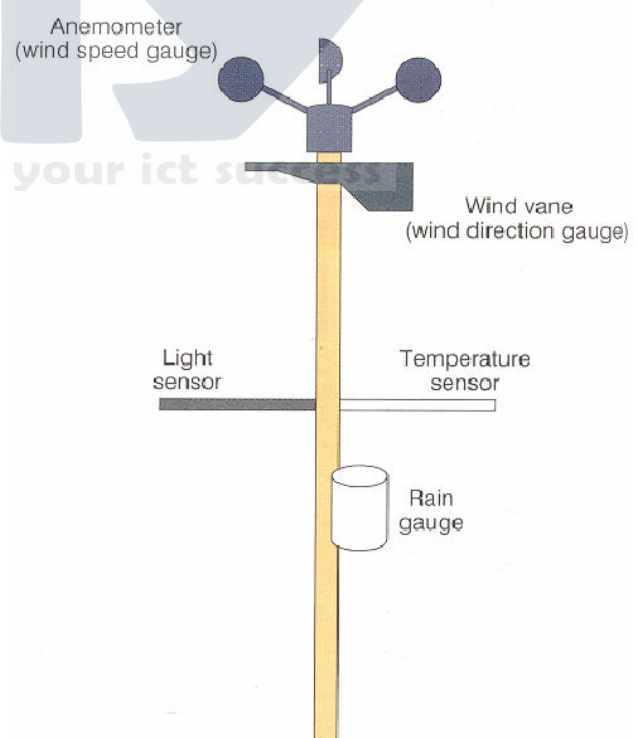- Data loggers don't require lunch breaks or sleep

Weather reporting

Weather reporting is an application of data logging. In weather reporting there are a number of quantities which need to be recorded, they are shown in the picture (on the left) below.

Most data loggers do not need to be connected to a computer all the time. They store the data in the logger for a pre-set period of time. It is also possible to display the data continuously, but this ties up a computer and prevents it being used for other things. The picture (on the right) below shows an automatic data logging weather station with its various sensors.

Quantities to be recorded in a weather station   **An automatic data logging weather station**

Control applications

Process control

Process control is a term used when we talk about controlling things. The thing being controlled could be something industrial, or it could be a plastic toy turtle that draws shapes on a piece of paper.

Process control means using sensors, computers and automated devices to control an industrial process. But people are still needed to check the computer works properly. Processes in industry controlled this way include the mixing of paint, the flow of gas or water along a pipeline, the production of paper and even chocolate. Like many other computerised systems, process control is potentially more efficient than humans, but requires precise programming and can be very expensive to install.
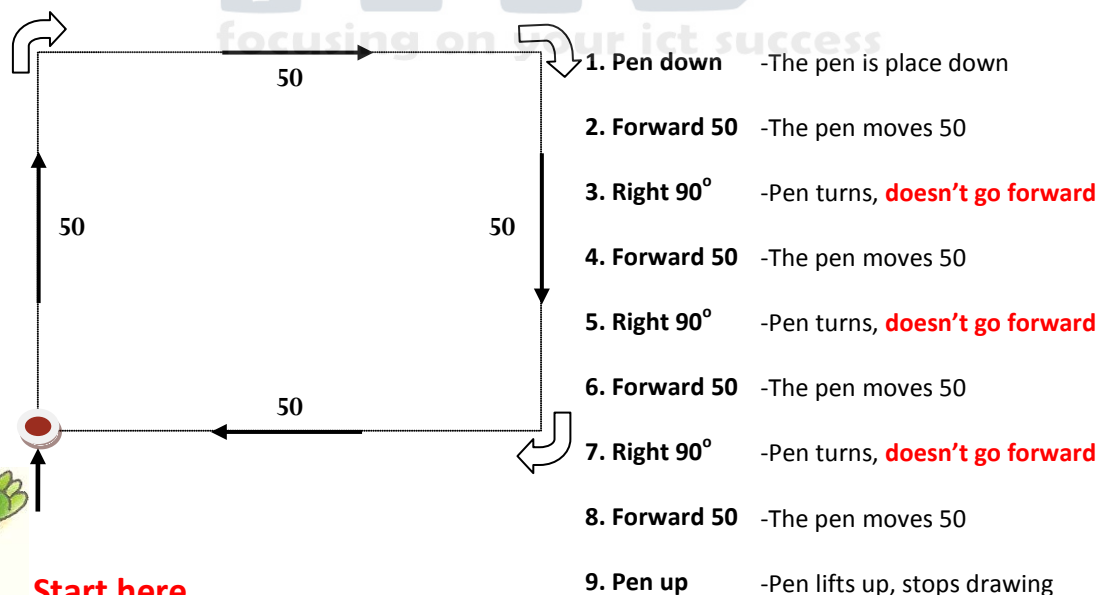
Turtle Graphics

Turtle Graphics uses a special control language. ***Note: on Programs and Languages***

- A program is a sequence of instructions that a computer can carry out.
- A programming language is basically a list of commands that the computer will accept.
- Programs are eventually translated into machine (binary) code – the sequence of 0's and 1's that he computer understands.

A simple example of this kind of language is LOGO. This is sometimes used in schools to introduce the idea of control programs. You can use LOGO to move a turtle on a computer screen and the trace of the turtle's movements is used to draw an object such as a shape or a letter. The instructions to move the turtle are very basic, i.e. pen-up, pen-down, right 90°, and forward 25. This is the same way as a robot instructed to move throughout a maze. The robot will reverse, turn at a certain degree (recording each angle), go forward or backward (recording its distances) until eventually it is out of the maze.
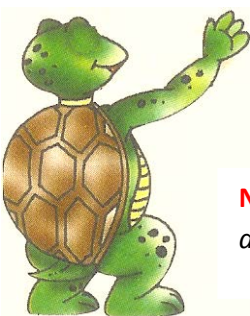
Example of turtle graphics

In order to complete the drawing of the square, the turtle would be given the following instructions:

Step	Instruction	Description
1.	**Pen down**	-The pen is place down
2.	**Forward 50**	-The pen moves 50
3.	**Right 90°**	-Pen turns, **doesn't go forward**
4.	**Forward 50**	-The pen moves 50
5.	**Right 90°**	-Pen turns, **doesn't go forward**
6.	**Forward 50**	-The pen moves 50
7.	**Right 90°**	-Pen turns, **doesn't go forward**
8.	**Forward 50**	-The pen moves 50
9.	**Pen up**	-Pen lifts up, stops drawing

Start here

Note: *Assume that the pen is up and is not touching the paper.*

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Control of Traffic Lights

Computerised traffic control systems are a feature of all large towns and cities. Their purpose is to keep the traffic moving particularly during the morning and evening rush hours. Other traffic control systems to take notice of include; Computer controlled Speed Cameras and Car Park Management Systems.

The main aim of traffic control, systems are;

- To improve traffic flow.
- To reduce accidents caused by driver frustration (e.g. changing lanes frequently due to queues).
- To make sure that delays in a journey are kept to a minimum.
- To reduce the pollution caused by exhaust fumes from stationary or slow moving traffic.
- To reduce the amount of fuel used by drivers, as cars use fuel inefficiently when moving very slowly.

Traffic lights need to be set to a sequence that can be varied throughout the day. During the morning rush hour the lights can be set on green longer for the main routes into the town and in the evening, the lights are on green longer for the routes out of town.

Inputs:	• **Pressure pad/light sensors (on the road) to detect rate of car flow** • **ADC converts reading from sensor into digital**
Processing:	• **Weight reading is compared with preset value** **If higher – signal is sent to turn lights amber then green** **If lower – signal is sent to turn lights amber then red**
Outputs:	• **Change in light (red/amber/green)**

Computer controlled greenhouse

In a control system, a heater is controlled by the computer in response to readings from a temperature sensor. When the temperature falls below a certain level, the computer sends a signal to the interface board (for the microprocessor) to switch on the heater. When the desired temperature is reached, the heater is switched off – this is an example of a feedback loop.

A water spray is controlled by a simple timer – once the timings have been programmed into the computer, the water spray will be switched on and off at regular intervals. The water spray could be controlled using a feedback loop from a humidity sensor in the soil – but this would make the system more expensive. Other things that could be controlled include opening and closing windows, and the feeding of nutrients to the plants. Having these types of fully automated systems are very expensive, so only large greenhouses will have them.

Inputs:	• **Temperature, humidity and light sensors take readings** • **ADC converts analogue reading from sensor to a digital reading**
Processing:	• **Temperature reading is compared with a preset value** **If higher – signal is sent to switch off the heater** **If lower – signal is sent to switch on the heater** • **Humidity reading is compared with a preset value** **If lower – signal is sent to turn on the sprinklers** **If higher – signal is sent to turn off the sprinklers**
Outputs:	• **Heater is switched on/off – Water sprinklers turned on/off**

Control of opening and closing of a supermarket door

Inputs:	• Pressure sensor detects the weight on the pressure pads in front of the door.
Processing:	• Weight reading is compared with a preset value If higher – signal is sent to open the door If lower – signal is sent to close the door
Outputs:	• Door opened/closed

Entry systems

Clock Card Machine

A time clock, sometimes known as a clock card machine or punch clock or time recorder, is a mechanical (or electronic) timepiece used to assist in tracking the hours an employee of a company worked or when a student or teacher arrives in a university. In regards to mechanical time clocks this was accomplished by inserting a heavy paper card, called a time card, into a slot on the time clock. When the time card hit a contact at the rear of the slot, the machine would print day and time information on the card. This allowed a timekeeper to have an official record of the hours an employee worked to calculate and pay an employee.

Automated fingerprint identification

Fingerprint recognition or fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify an individual and verify their identity.

Automated fingerprint identification is the process of automatically matching one or many unknown fingerprints against a database of known and unknown prints. Automated fingerprint identification systems are primarily used by law enforcement agencies for criminal identification initiatives. They can also be used to help identify students or teacher entering or attending a university.

Card-based System

Advantages in a school or university	Disadvantages in a school or university
• Would save teachers/office staff time • More accurate/less chance of human error recording of attendance	• Students could 'clock' other students in • Students could lose cards • Time taken to register students without cards • System could malfunction • Expensive to install

Fingerprint System

Advantages in a school or university	Disadvantages in a school or university
• Would not be able to 'clock' each other in • Would save teachers/office staff time • More accurate/less chance of human error recording of attendance	• Personal liberty issues • System could malfunction • Expensive to install