

ICT Applications

- 6.1 Communication applications
- 6.2 Data handling applications
- 6.3 Measurement applications
- 6.4 Microprocessors in control applications
- 6.5 Modelling applications
- 6.6 Applications in manufacturing industries
- 6.7 School management systems
- 6.8 Booking systems
- 6.9 Banking applications
- 6.10 Computers in medicine
- 6.11 Computers in libraries
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- 6.15 Monitoring and tracking systems
- 6.16 Satellite systems

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ICT Applications

6.1 Communication Applications

Paper Based

Types of Communication & Purpose		Use of Computers
<p>News Letter: Used by companies to communicate certain information to staff and customers. May contain information on recent events and identify success company may have experienced.</p> <p>Brochures/Leaflet: Can be used to advertise a company or to be informative. Brochures are normally printed on glossy paper with a high quality finish.</p> <p>Flyers: Informative document which can be distributed to promote or create awareness of an up and coming events.</p> <p>Posters: larger then flyers and are strategically positioned to promote and create awareness. Displayed on billboards, notice boards, buildings as part of an advertising campaign to target a specific target audience.</p>		<ul style="list-style-type: none"> • Save and insert pictures from clipart, Internet, scanned images & digital camera. • Adjust the page layout. • Create and Insert Tables/charts • Formatting the layout of the document. • Applying effects to images (crop, colour scale, rotate etc.) <p>Text Formatting</p> <ul style="list-style-type: none"> • Font Style • Bold • Alignment (left, centre, right and fully justified) • underline • Italic • colour
<p>Advantages</p> <ul style="list-style-type: none"> • Not necessary to have a computer or internet connection. • You have a physical copy of the document. 	<p>Disadvantages</p> <ul style="list-style-type: none"> • These communication would mainly be distributed by hand. • Printing costs • Restricted to a smaller target audience. 	



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6.1 Communication Applications

Computer Based

Types of Communication & Purpose

Websites

- Companies use websites as a means to communicate with existing and potentially new customers.
- Websites can be easily updated and can provide relevant and up to date information.
- Websites can be used to research, social network, online gaming or for online shopping and banking.

Multimedia Presentations

- A common use for presentations is to provide training in businesses or places of education. The presentation will be a focal point on the projector whilst the speaker is presenting.

Advantages

- Can include interactive elements such as sound, video, animation and hyperlinks.
- Can be available on different platforms.

Disadvantages

- Websites can be hacked and information may be altered.
- Setting up website and maintaining would be expensive and would require a special skill set.

Cartoons (Animations)



Animations can also be created using specialist software to promote new products.

Music Scores



Music can now be created and edited on computers. Can be used as part of adverts or slogans.



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6.1 Communication Applications

Mobile Based

Types of Communication & Purpose

Phone Calls: Allows users to make a audio phone calls to each other from any location within the network coverage area.

Text Messages: Allows user to send simple messages to each other even if the recipients phone is turned of or not within network coverage.

Accessing the Internet: Email and social networking applications are now available on mobile phones which makes it easier for users to stay in contact with each other. Businesses can also use these apps to advertise and communicate with customers.

Advantages

- Mobile phone is portable and can be used on the move.
- Mobile phone contracts can offer free minutes and texts.

Disadvantages

- Long distance calls or phones calls in different countries could be expensive.
- Mobile signal could be weak or non existent in some places.

Voice Over Internet Protocol (VoIP)



When voice calls are taken place over an internet connection (e.g. Whatsapp, Viber).



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6.2 Data Handling Applications

Advantages of Data Handling Applications for Storing Data:

- Data can be updated, organised, sorted and searched in different ways.
- Data can displayed or printed in different formats.
- Data can be backed up or moved using storage media.
- Huge storage space not required (filing cabinets)



Address Lists



Mobile phones include address books which include contact names, numbers, email addresses etc.

Surveys



Information from surveys could be held on a database so that data could be analysed and queried.

School Records



Student records including assessment and behaviour data. Also staff data could also be held on database

Club/Society Records



Information on current members including names and contact details. Also members methods of payment to pay membership fee.



Libraries



Information on current books which are available to borrow and members of the libraries.

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6.3 Measurement applications

Role of Measurement Applications

Sensors are placed to measure physical variables. The data from sensors are measured in analogue. The analogue signal is then converted to a digital signal using a convertor.

Examples

Weather Stations



Thermometer for measuring temperature
Anemometer for measuring wind speed
Wind vane for measuring wind direction
Hygrometer for measuring humidity
Barometer for measuring atmospheric pressure

Green House



Sensors are placed in the green house to measure whether plants are growing in the correct conditions:

- **Light, Moisture, Humidity, PH Levels**

Patients Vital Signs



Sensors will be attached to the body to monitor:

- **heartbeat, blood pressure, temperature etc.**

1 - Input devices called **sensors feed data into the computer.**



2 - The computer then processes the input data.
Sensor readings are compared to the preset values.

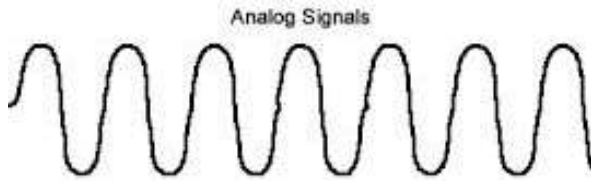


3 - As a result of the processing, the computer can send a signal to the output devices called **actuators which could change physical conditions.**

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6.3 Measurement Applications

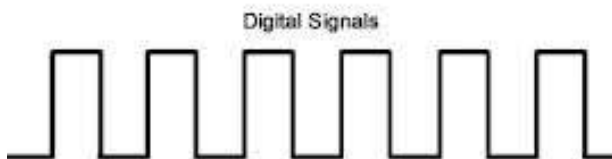


**Data collected from
Sensors is in Analogue**



ADC - Analogue-to-digital converter

**Analogue Signal now can
be understood by
computers.**



Why Use Computers to Measure Things?

- Computers do not require breaks .
- Readings are more accurate compared to humans.
- Readings are taking more frequently.
- Data can be analysed and compared with existing data.
- Automatic graphs can be created.
- Sensors can work in extreme conditions which could be dangerous for humans.
- People can complete other tasks whilst the systems works automatically.
- If human intervention is required then a signal will be sent to the buzzer.



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6.4 Microprocessors in Control Applications

Role of Microprocessor in Control Applications

- Sensor readings are compared to the pre-set value which are inputted by the user.
- If sensor readings are below or higher than the pre-set value then a signal will be sent to the actuator to change the physical conditions.
- Process is constantly will be repeated.

Example	Process Microprocessor	Output
Green House 	Compares light, temperature, moisture to Pre-set value. Sends signal to actuator is necessary. Process is constantly repeated	<ul style="list-style-type: none"> • Light on/off • Heater on/off • Motor open/close windows
Patients Vital Signs 	Compares Vital signs (heartbeat, blood pressure, temperature) to Pre-set value. Sends signal to actuator is necessary. Process is constantly repeated	<ul style="list-style-type: none"> • Buzzer will alert staff to any vital signs which are below the expected values.

1 - Input devices called **sensors** feed data into the computer.



2 - The computer then processes the input data.

Sensor readings are compared to the preset values.



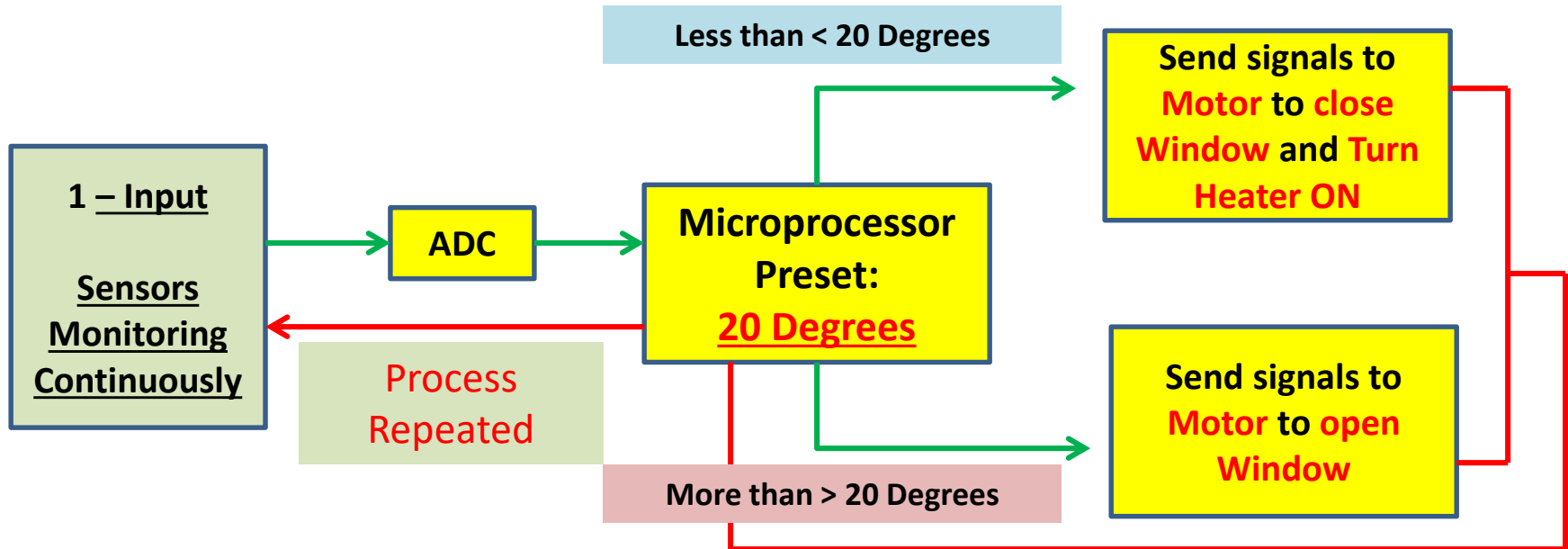
3 - As a result of the processing, the computer can send a signal to the output devices called **actuators** which could change physical conditions.

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6.4 Microprocessors in control applications

Green House (Temperature Example)



Examples in a Green House

- Light
- Moisture
- Humidity
- PH Levels

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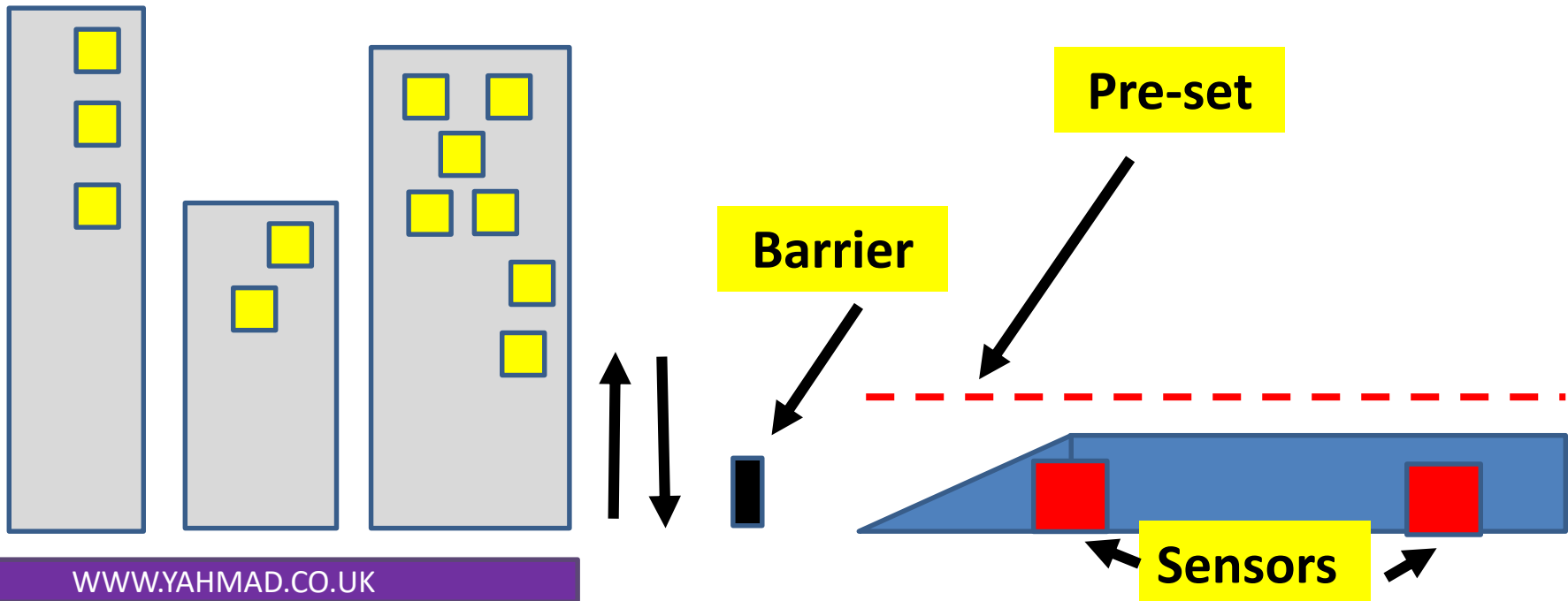
The developers have used the results from the model to choose a computer controlled flood defense system. It will have a barrier which can open or close.

Describe the role of the microprocessor in such a system.

Keywords: Sensor, ADC, Microprocessor, Preset, Higher, Lower, Barrier, Continuous (Repeat)

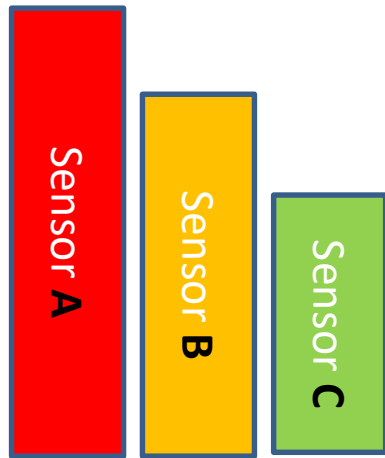
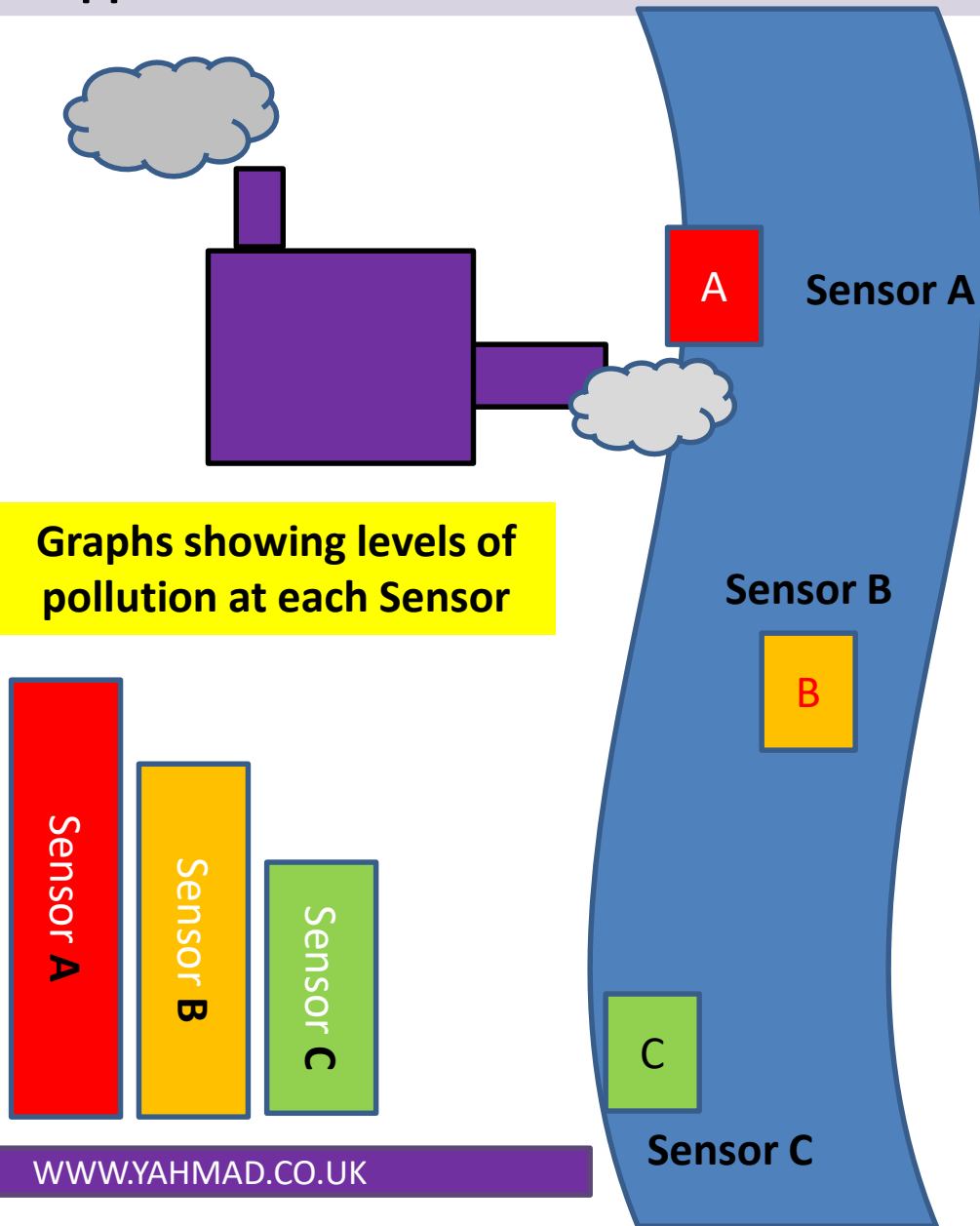


Exam Question

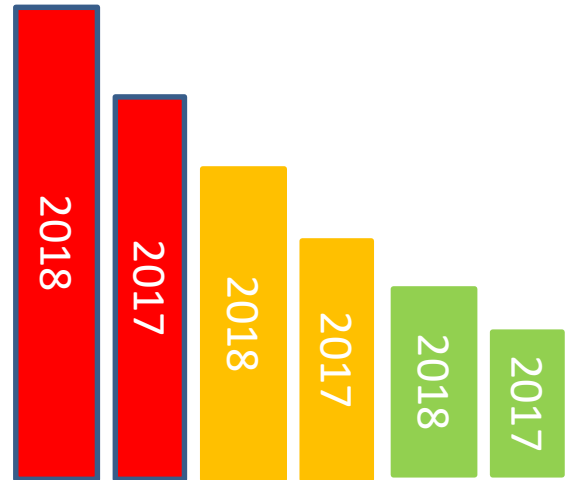


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Graphs showing levels of pollution at each Sensor compared to the previous year



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6.4 Microprocessors in Control Applications

Describe the role of the **microprocessor in controlling the oven temperature**.

Key Words: **sensor, ADC, Microprocessor, Pre-set, Higher, Lower, Repeat**

The **sensor takes temperature readings** in the oven. The **sensor signal** will be **converted from analogue to digital**. The **microprocessor receives the data from the sensor** and **compares to the preset value**. If the temperature is **lower than the pre-set value** then the Microprocessor will send a signal to **turn the heater on**. If the temperature is **higher than the pre-set value** then the Microprocessor will send a **signal to turn the heater off**. The process will continue to **repeat** to maintain a constant temperature.



The **weather station continuously monitors the sensors on the weather balloon**. Describe the **monitoring process**. Key Words: **Sensor, ADC, Microprocessor, Pre-set, Spreadsheet, Graphs, Time**

The **sensor feeds data into the computer**. The data is **converted from analogue to digital**. The reading are then recorded on to **spreadsheets application**. **Graphs** are automatically produced by the computer. The graphs can be **plotted against time** to examine the rate of cooling and compare against previous entries.

Sometimes you can also say the microprocessor can compare readings from different stations.



Exam Question

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6.4 Microprocessors in Control Applications

Turtle Graphics

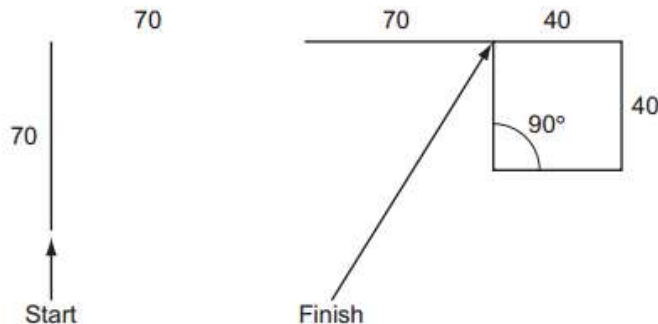
INSTRUCTION	MEANING
FORWARD n	Move n forward
BACKWARD n	Move n backward
LEFT t	Turn left t degrees
RIGHT t	Turn right t degrees
PENUP	Lift the pen
PENDOWN	Lower the pen
REPEAT n	Repeat the following instructions n times
END REPEAT	Finish the REPEAT loop

Tip: In this question you have to write out the remaining steps.

1st: Work out how many more steps you have to get around the shape. (8)

2nd: It is possible you may have to use a **repeat** to draw the shape.

3rd: Remember to end the repeat.



```

PENDOWN      FORWARD 70
FORWARD 70   REPEAT 4
RIGHT 90     FORWARD 40
PENUP        RIGHT 90
FORWARD 70   END REPEAT
PENDOWN
  
```

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6.4 Microprocessors in Control Applications

Turtle Graphics

A student wishes to use a floor turtle to draw this shape which has no two lines the same length:



Name four different instructions which the turtle graphics software could use in order to draw the shape. For each one explain the meaning of the instruction.

Tip: They may actual ask you to write possible instructions and the meanings to draw the shape shown.

INSTRUCTION	MEANING
FORWARD n	Move n mm forward
BACKWARD n	Move n mm backward
LEFT t	Turn left t degrees
RIGHT t	Turn right t degrees
PENUP	Lift the pen
PENDOWN	Lower the pen

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6.5 Modelling Applications

A computer model is a model which would replicate (simulate) the functions of a real system.

To save **costs** and **time** by **testing a system** before you build it.

e.g. Creating bridges



To **train** people how to use the system in a safe **controlled environment**.

e.g. Flight Simulators.



Why we use Computer Models?

To **investigate** the capabilities of the system in detail by **interrogating** and **manipulating** the computer model.



To make **predictions** of how the system would operate in the future.

e.g. Use of spreadsheets to track profit/loss over time



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6.5 Modelling Applications

Type of Modelling Application

Spreadsheets



- Business used can use spreadsheets to forecast spreadsheet models to forecast future profit or loss.
- Due to the use of formulas business can adjust certain values to see automatic changes in potential revenue.

Flight Simulator



- Pilots are able to learn how to fly a plane using a flight simulator.
- The controls and the interface is the same as real plane.
- Different conditions can be tested.
- Reduced costs as a plane would not be damaged in the training.

Building Simulator



- Before buildings are constructed simulations take place to ensure they are fit for purpose.
- Simulations ensure the potential building could cope with physical demands including earthquake/storm threats.

Traffic Lights



- A traffic light simulator looks at the flow of traffic (data captured from sensors).
- The simulator will adjust the lights to best control the flow of traffic.

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ICT Applications

Describe the **advantages of using computer modelling to replicate (simulate) the functions of a real system?**

Key Words: **costs, controlled environment, train, investigate, predictions**

Computer modeling simulates the **functions of a real system in controlled environment**. For example a **pilot training** to fly a plane will use a **flight simulator**. It will be a **safer environment and also reduce costs** as a real plane will not have to be used or damaged. Spreadsheets are another example of computer modelling. User can use spreadsheets to **investigate the data** and to make **predictions**. For example projected profits for a month can be calculated on spreadsheets.



Exam Question

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ICT Applications

The city of Venice is in danger of being damaged due to rising sea levels. **A new computer controlled flood defence system is being planned.** The developers of the system are using a **spreadsheet to model the plan.**

Give three reasons why computer models are used to simulate the flood defense system.

Cheaper than building the real thing

- Quicker to see results rather than building it**
- Safer than building the real thing**
- Easier to change variables in the model/can use what ifs**



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ICT Applications

6.6 Applications in Manufacturing Industries

Robots are used in **manufacturing** to help to **improve productivity, consistency** (in terms of final finish) and to reduce overall **running costs**. Robots generally make the factory a much more **safer environment** for workers.

How Are Robots Used in a Factory?

1. **Lift heavy items**
2. **Assemble parts together**
3. **Paint items (Spraying)**
4. **Manufacturing Microchips**



Robots are programmed with a sequence of instructions. The programmer may guide the robot through each step physically or by controlling the robot by remote.



Exact sequence of movement is stored in the memory.



The robot is now able to carry out the same sequence of instructions over and over again.

Advantages

- Robots can work 24/7 with the same consistency and accuracy compared to humans.
- Robots can be more productive than humans.
- Robots can work in extreme conditions not suitable for humans.
- Robots do not need to be paid.

Disadvantages

- Robots cannot easily adapt to a situation which is beyond their sequence of instructions.
- Robots can be expensive to buy and maintain.
- Some workers may lose their jobs as robots can do more labor intensive jobs.
- People are deskilled due to robots doing more complicated jobs.

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Describe the **advantages and disadvantages** to the **company** of using robots rather than humans to manufacture cars.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Work 24/7 – same consistency and accuracy • More productive • Work in extreme/dangerous conditions • Do not need to be paid 	<ul style="list-style-type: none"> • Expenditure • Jobs may be lost • Robots cannot adapt • Humans deskilled.

Robots are able to work **24/7 with the same consistency and accuracy**. Furthermore Robots do not get **tired and therefore are more productive**. However **purchasing and maintaining the robots** could be **more expensive**. **Jobs may be lost** as robots are now taking over jobs once completed by humans. As a result humans may also be **deskilled**. Alternatively **robots are unable to adapt to a change in conditions** however they can be used in **extreme or dangerous conditions**. Since the robots do not **require a salary; expenditure costs would be reduced**.

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The managers have been told they can use this robot for other tasks by replacing the existing sensors with different ones.

Give three advantages of using an **existing robot device** rather than **developing a new one**.

- More likely to be reliable as it is known that the device will work
- It is cheaper than paying full development costs
- It is quicker to get into operation as the device has been built
- Lower maintenance costs as faults will be known
- Lower costs for training staff



Exam Question

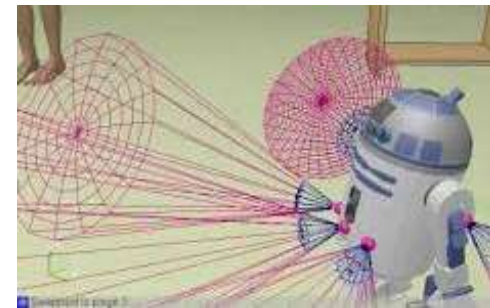
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A robot is used as a computerised postal delivery system. It drives around the corridors of a set of offices picking up and delivering post. If the **robot is close to a worker it stops and waits until the worker moves away.**

(a) A **proximity sensor** is used to detect **how close to a worker the robot is.** Describe the role of the microprocessor in stopping the robot.

- The data from the sensor is compared to the pre-set value
- The pre-set value is set to show the minimum distance of the worker
- If the values are the same/lower
 - The microprocessor sends a signal to the actuator to stop the motor/robot
- If the values are different/higher
 - The microprocessor does nothing/robot keeps moving
- The process is continuous



Exam Question

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ICT Applications

6.7 School Management Systems

School Management Systems are now used in schools by staff to complete a number of tasks on a daily basis.

Learner Registration and Attendance	<ul style="list-style-type: none"> Teachers will be able to click on a particular class and complete the register. Once this is saved then other users of the management system can see who has been register for that particular period. This is useful as it allows teachers to see who should be attending their lessons. Data of attendance can then be easily analysed.
Exam Timetables	<ul style="list-style-type: none"> Exam Timetables can be produced using management systems and teachers who are not teaching could be easily allocated to invigilate exams.
Creating Timetables or Cover	<ul style="list-style-type: none"> Timetables can be produced using management systems. They are generally quicker to create and less prone to errors compared to a paper based system. Timetables can also be produced cover classes when teachers are absent and lessons need to be covered.
Learner Performance	<ul style="list-style-type: none"> Teacher are able to log student data (grades/applications/reports/behaviour) into a school management system. This data is then available (central storage of data) to anyone other members of staff. The data can analysed and reports can be produced.
Benefits to school/parents	<ul style="list-style-type: none"> Parents are able to log in and access student reports online. They can be kept up to date about exam results and general student progress in subjects. Also they can receive immediate feedback. There would be no need for printed reports which would reduce costs.



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A school has introduced a **system** so that parents of its students can access data about their **children**.

Give three reasons why the school has introduced this system.

- To save printing costs of reports
- To ensure test results, etc. are received by parents
- To allow immediate feedback to parents after tests/exams
- To keep parents up to date with child's progress/targets



Exam Question

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ICT Applications

6.8 Booking Systems

Online booking systems use real time processing which allows users to make and confirm bookings instantly. Once payment has been received and booking is confirmed then booking can not be double booked.

Example Uses:

Transport: Flight, Trains and Buses

Entertainment: Theatre, Cinema and Stadium

Accommodation: Hotels, Apartments and Villas



Advantages:	Disadvantages
<ul style="list-style-type: none"> User can check availability of tickets and compare prices on comparison websites. Confirmation message is sent instantly once payment has been authorised. They prevent double booking as the process is real time. This means if somebody makes a booking then it instantly becomes unavailable. You may receive special offers if you regularly book using a particular booking website. 	<ul style="list-style-type: none"> It may be difficult to cancel a booking and get your money back. Online booking services have known to crash to high level of traffic to the website. You are unable to receive specific advice on your booking if it is done online. Websites may not be user friendly and may make the booking process more difficult.

Input: User will select the requirements of the booking. E.g. date of flights, Airports, Location etc.

Processing : involves checking if bookings are possible (availability)

Outputs:
booking confirmations
/rejections
alternatives/Payment



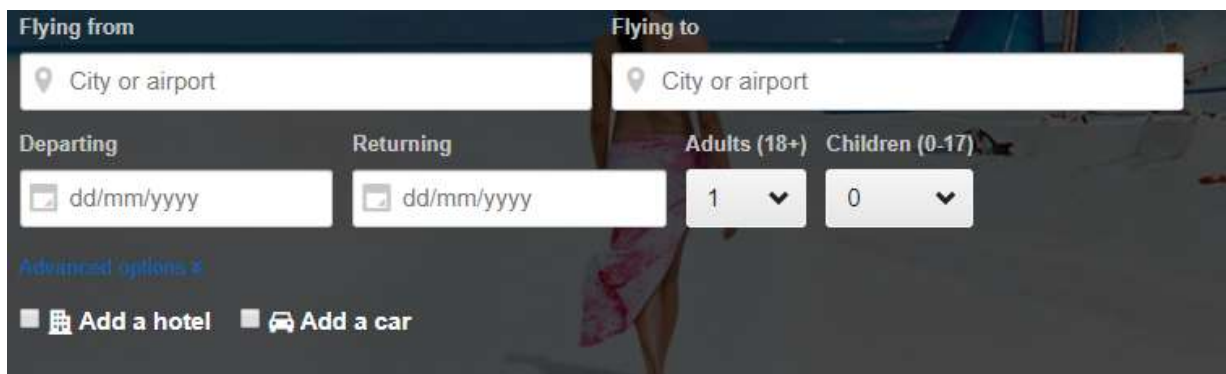
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Describe the **inputs and processing** involved in **booking flight tickets online?**

Key Words: Requirements, availability, confirmation, payment, booking reference, e-ticket

The customer would first select the **number of tickets (requirements)**, **arrival** and **destination airport**, **date and time** of the **flight**. The computer will then check for the **availability of the seat**. Alternative tickets may be offered on a different day if tickets are not available. The customer will then select and **confirm the ticket** and the **payment details** will be entered. Once the payment has been processed a **booking reference** will be generated and the seats will become unavailable. **Confirmation (e-ticket)** could be sent over email.



The image shows a flight booking interface. It includes two input fields for 'Flying from' and 'Flying to', both with location pin icons and placeholder text 'City or airport'. Below these are 'Departing' and 'Returning' date fields with 'dd/mm/yyyy' placeholders. To the right of the date fields are two dropdown menus for 'Adults (18+)' (showing '1') and 'Children (0-17)' (showing '0'). At the bottom, there are two checkboxes: 'Add a hotel' and 'Add a car', each with a small icon to its left. A link for 'Advanced options' is also visible.



Exam Question

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Give four advantages of using **online booking systems** for the customer rather than using manual systems.

- Speeds up the booking process
- Customers may not have to travel to the theatre so save money in travelling
- Customers may not have to travel to the theatre so save time in travelling/queuing
- Can make/cancel/change a booking at any time
- Can book several shows at same time
- Booking can be carried out anywhere



Exam Question

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A theatre manager wishes to **introduce an online booking system**. A **programmer has been asked to write the software**. She could continue on her own or discuss the ideas with the theatre manager.

(a) Explain **why is it beneficial to discuss ideas** with the **theatre manager** before **writing the software**.

- The programmer will not be familiar with the workings of the theatre/to understand the requirements of the system
- The solution may be easy for the programmer to use but not the users/make it user friendly
- The theatre manager is paying the programmer
- The theatre manager may want enhancements that the programmer has not thought of
- The progress of the solution needs to be checked with the theatre manager in case the he/she changes his mind
- The budget needs to be discussed (as it may involve purchasing new hardware/software)
- The timescale needs to be discussed



Exam Question

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ICT Applications

6.9 Banking Applications

Electronic Fund Transfer (EFT) allows money to be transferred electronically from one account to another. An example of EFT is when an Employer pays their employees their salaries.



Advantages:	Disadvantages
<ul style="list-style-type: none"> No physical money is transferred which makes the transfer more secure. Transfer of salaries can be regulated by the government (e.g. Used in Qatar to ensure employers are paying their employees on time). Customers can set up standing orders (direct debit) to pay bills on specific dates. 	<ul style="list-style-type: none"> Money could be transferred from the incorrect account. Incorrect amount of money could be transferred by mistake. If you have a poor credit rating then you may not be declined to use EFT as a method of payment (e.g. paying monthly for a mobile phone contract).


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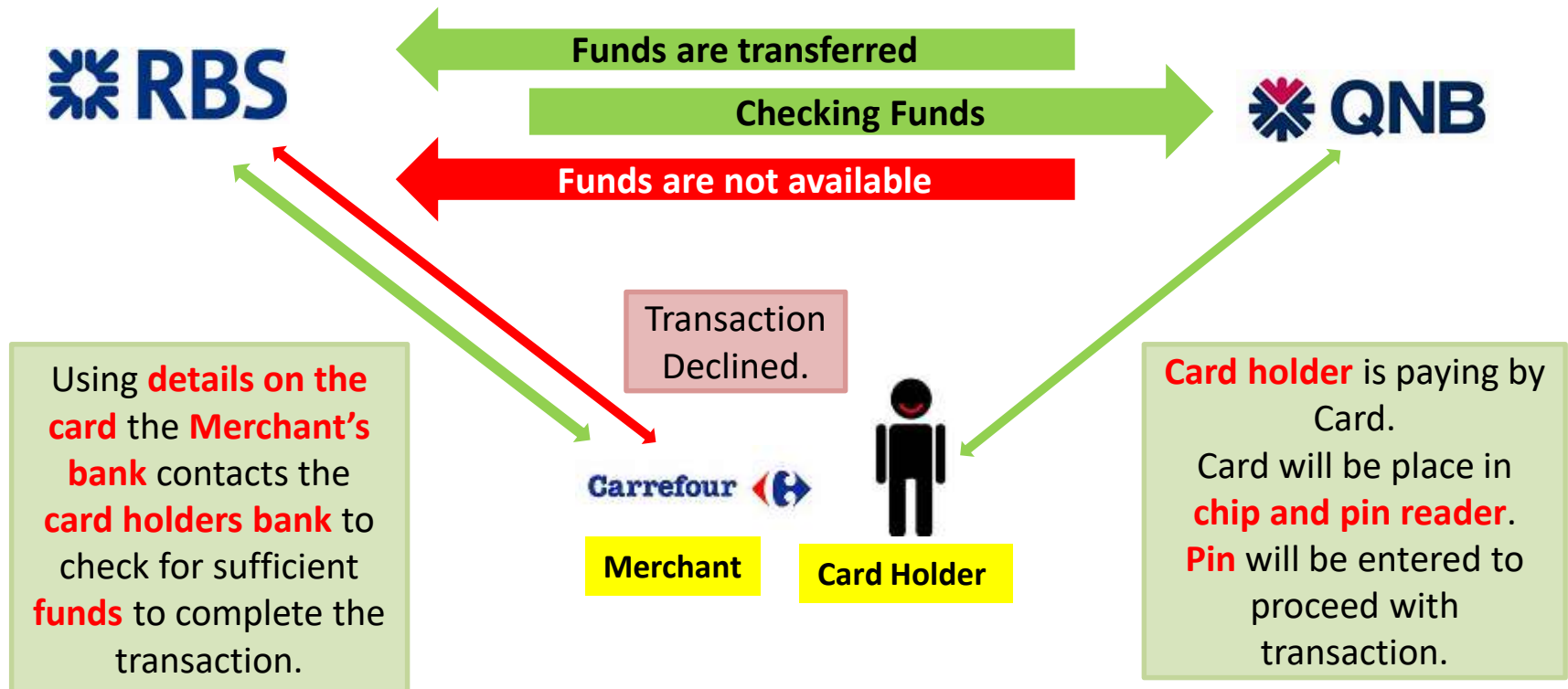
6.9 Banking Applications

Processing credit/debit card Transactions



 **QNB** Customer's Bank (Card Holder's Issuing Bank)

 **RBS** Merchants' Bank (Acquiring)



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Describe the **processing that takes place at POS** to make **payment using a debit card**?

Key Words: PIN, Validity of Card, Account, Balance, Sufficient funds, Transfer, declined, receipt

Once the customer has entered the Pin it will be compared to **Pin on the Chip**. If the Pin is correct then the **card will be checked to see if this is valid** (not stolen and expired). If the card is valid then the transaction will continue. Using the **account details on the chip** the shops computer will make contact with the customer's banks. Checks will be made for **sufficient funds** to complete the transaction. If **funds are available then the amount will be transferred from the customer's account to the shops account**. If funds are not available then **the transaction will be declined**. If the transaction has been successful the **receipt will be printed** and the card will be given back to the customer.



Exam Question

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When a debit card is read by computer, data on the card can be used for transactions.

List **four items of data found on a debit card** which can be **read by computer**.

- Sort code
- PIN
- Debit card number
- Bank account number
- Valid from
- Expires end



Exam Question

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Contactless debit cards are replacing standard debit cards. Some countries are introducing **contactless debit card transactions at ATM** machines. Discuss the advantages and disadvantages to the bank of using these cards at an ATM.

Disadvantages:	Advantages:
<ul style="list-style-type: none"> • The cards last longer as they are not in contact with the machine • Attracts new customers • Reducing the cost of replacement cards • Reduction in fraud as less money taken out • Cards not retained therefore less cost for replacements • The transactions are faster 	<ul style="list-style-type: none"> • The cost of producing new cards • The cost of producing new readers • The cost of re-writing the ATM software • They are liable to fraud therefore compensate customers... ...Increasing costs • Less money removed at transaction therefore potentially more small transactions <ul style="list-style-type: none"> ...Increased administration ...Increased hardware use



Exam Question

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ICT Applications

Contactless debit cards are replacing standard debit cards. Some countries are introducing **contactless debit card transactions at ATM machines**. Give three disadvantages to the customer of using these cards at an ATM.

- The card may be read accidentally
- Only small amounts can be withdrawn
- More chance of fraud if card is stolen/lost
- May not be able to use the ATM as not everyone will be contactless due to cost
- Devices can read the cards wirelessly to steal money



Exam Question

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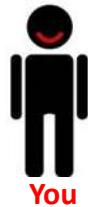
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6.9 Banking Applications

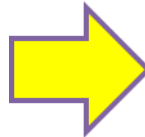
Clearing of Cheques



You receive a check from your employer which you pay into your bank account.



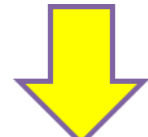
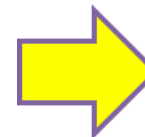
The cheque is then sent to a **clearing centre** where it is sorted and cheque data is created.



The **cheque data** is sent electronically to the **payers bank** (the person who wrote the cheque).



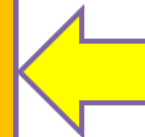
Employer
RBS



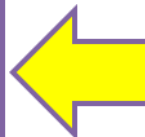
The **payers bank** checks for **fraud** and also checks if **sufficient funds** are available.



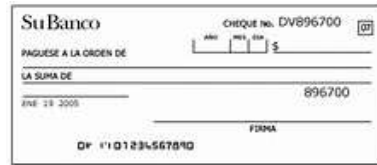
If **funds** are available then the money is sent electronically to the **bank of the person who paid in the cheque**.



Money is received electronically from the **cheque payers bank** and deposited into the account of the person who **paid in the cheque**.



After **4 working days** the person who paid in the cheque should have access to the money.



ICT IGCSE Theory – Revision Presentation

ICT Applications

Bank cheques are sometimes used to pay bills.

(a) Name **four pieces of information** that the **bank's computer may read** from the bank cheque.

- Bank/city/branch code
- Cheque number
- Account number, Amount
- Account holder's name/payee/drawer
- Date written on the cheque



(b) Describe **what is involved in the clearing of bank cheques** which the bank has collected in the course of the day.

- The cheques are sent to the clearing bank/centre
- The amount is read using OCR
- The bank code/branch code/sort code/cheque number/account number is read using MICR
- Sort the cheques into bank code order
- The cheque is scanned using OCR and stored



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

6.9 Banking Applications

ATM (Cash machines) can be used for various purposes (including cash withdrawal/deposit, checking/printing statement).

The **PIN** number is compared with the **PIN stored in the chip**. If Pin is the same then the customer can Proceed.

If not customer will be requested to re enter the Pin.

The customer's account is checked to see if it has **sufficient funds**.

The amount is also checked against the card limit or daily withdrawal limit.

Customer may be asked to select a **language**.

The customer types in the **PIN**.

If **Pin is correct** then the customer will select a **service**.

If customer selects the **Cash Withdrawal** then they are requested to select an amount to withdraw.

If there are **sufficient funds** and the amount is within the card limit the required notes are issued.

Customer is requested if they would like a receipt.
The card is then returned to the customer.





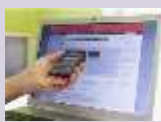


Cash Withdrawal
Cash Deposit
Check Balance
Print Statement
Phone Topup



ICT IGCSE Theory – Revision Presentation

ICT Applications

6.9 Banking Applications

	Banking	Advantages	Disadvantages
Online Banking    	<p>Customers can now access their bank accounts online on secure websites using authentication techniques. Some banks have also developed online banking applications to allow customers to access their accounts via mobile phones and tablets.</p> <p>Customers can use the on-line banking system to:</p> <ul style="list-style-type: none"> • Check their balance and print statements • Manage direct debits • Transfer money internally and externally to other accounts using EFT. • Apply for loans or credit cards. 	<ul style="list-style-type: none"> • Can be accessed from various platforms and used 24/7 including whilst on the move. • Save time and costs- No Travelling or money spent on travelling or parking. • Statements can be downloaded from a given time period. • Several layers of authentication. 	<ul style="list-style-type: none"> • Internet connection required. • Less personable for those who would prefer direct communication with a bank representative . • Your account could be hacked or passwords stolen from key logging software.
Phone Banking 	<p>Phone banking is very similar to online banking in that customers can complete similar tasks. Customers will have to enter in their account details to authenticate them to the system. Then they will have to select from various options by the specified numbers keys.</p>	<ul style="list-style-type: none"> • Can talk directly to a representative from the bank. • Ask additional queries which are not available online. 	<ul style="list-style-type: none"> • Call costs • May be put on hold for a long time. • Call times (9am-5pm) are not flexible.

ICT IGCSE Theory – Revision Presentation

ICT Applications

People can manage their bank accounts in different ways. One way is **telephone banking**. A person wishes to use **telephone banking without speaking to an operator to transfer money from one bank account to another**. Describe the steps needed to do this.

- User telephones the bank telephone centre
- System asks for the long number on the credit / debit card / sort code and
- account number / customer ID number
- The user taps out on the phone keypad / speaks the number
- System asks for certain characters in a password and other security details
- The user taps out the characters asked for
- System ask for options required
- Users tap in the number (transfer from one account to another)
- System asks number of account transfer from ...User taps in account number
- System connects with the bank account ...System asks for number of account transfer money to
- User taps in account number
- System asks amount to transfer
- User taps in the amount
- System asks when the transfer should happen
- The user taps in the date
- System ask you to confirm it/sends a text message / send email





Exam Question

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ICT Applications

6.10 Computers in Medicine

Type	Use of Technology	Advantages	Disadvantages
Information Systems in Medicine 	<ul style="list-style-type: none"> Keeping patient records in a database so correct diagnosis can be given according to patients medical history. Monitoring patients (vital signs) using measure and control systems The use of expert systems to diagnose an illness. 	<ul style="list-style-type: none"> Computers can take more accurate and more frequent readings of patients. Computers can respond quicker to any changes in patients condition. Staff are available to complete other tasks. Data can be stored in central place. Saving physical space which would be required to store paper records. 	<ul style="list-style-type: none"> Equipment could be expensive. Training would be required. Regular maintenance of the system would be required. Systems could stop responding.
3D printers 	<ul style="list-style-type: none"> Surgical and Diagnostic Aids Prosthetics Tissue engineering Artificial blood vessels Designs of medical tools and equipment 	<ul style="list-style-type: none"> Printing is relatively cheap. Printing can be faster compared to manufacturing parts. 	<ul style="list-style-type: none"> Technology is still in the early stages of development. Limited selection of materials available.

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ICT Applications

6.11 Computers in Libraries

Computers are used in libraries to keep a track on which books have been **borrowed** by which **members**. Databases software is typically used to store **details of the books and the members**.

Issuing of Books	Advantages:
<ul style="list-style-type: none"> Books and members can be identified by unique barcodes which can be scanned in directly by barcode scanners. When a book is taken out the bar code is scanned as well as the barcode on the members card. The due date is worked out by the date the book was issued. 	<ul style="list-style-type: none"> Data from the books and the members are entered quickly and more accurately compared to manual methods.
Automatic Processing	Advantages:
<ul style="list-style-type: none"> The library's database is checked on a daily basis to check which books are due. Liberians can quickly check if a book is available to be borrowed or could provide specific dates to members when the book will be returned. Automatic emails could be sent to the members to remind them of the due date. 	<ul style="list-style-type: none"> Members would be able to extend the lease period on the book borrowed online.



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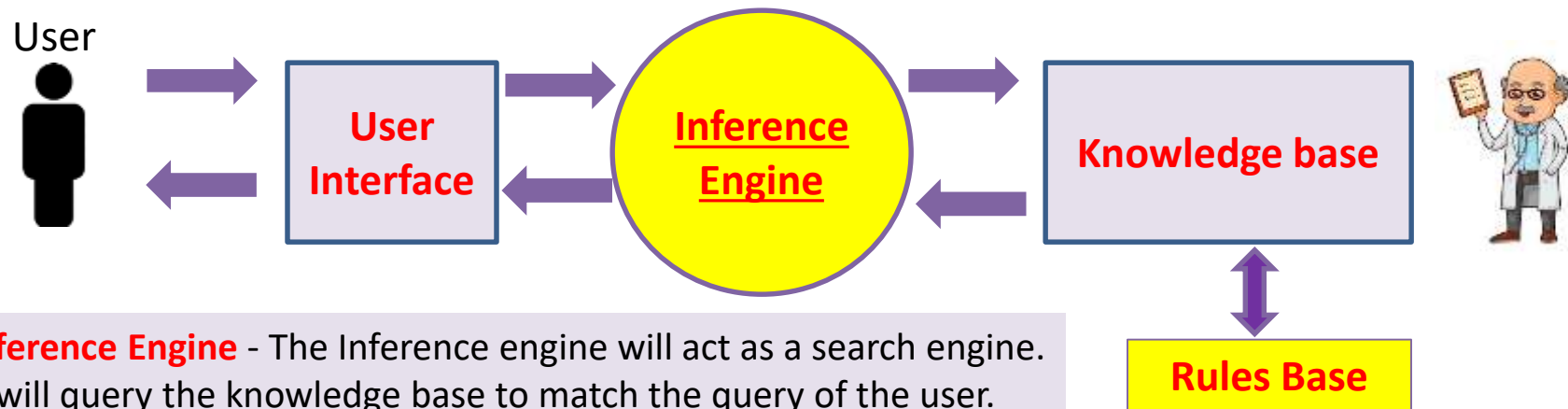
ICT Applications

6.12 Expert Systems

Expert systems are used to provide **expert opinions without the need for the expert** by using a system allowing the **user to query the knowledge base** to find solutions to their problems.

User interface - Will allow user to interact with the system to receive feedback.
For example the user may be prompted to enter their symptoms for a medical issue.

knowledge base - Information is developed by experts based on a collection of facts and rules.
For Example a medical diagnosis expert system would be developed by doctors.



Inference Engine - The Inference engine will act as a search engine. It will query the knowledge base to match the query of the user. **Additional questions could be to user to provide a more specific diagnosis**

ICT IGCSE Theory – Revision Presentation

ICT Applications

6.12 Expert Systems

Creating an Expert System

1. Data is gathered/collected from experts to create a **knowledge base**.
2. The **rules base** is designed/created based on the information from the knowledge base.
3. A **user interface screen** is designed/created which would provide the user with the ability to interact with the system.
4. The **inference engine** is designed/created as link between the user interface and the knowledge base.
5. The system is **tested**.

Examples

Car Diagnostic Expert System



Car engine will be connected to the diagnostic expert system. The expert system will automatically test certain functions and provide feedback for repair.

ICT IGCSE Theory – Revision Presentation

ICT Applications

A mining company has asked a **knowledge engineer to devise an expert system** to help them with their **prospecting for valuable minerals**. Describe **how this expert system would be created**. Key Words: **Experts, Knowledge base, Rule base, user interface, inference engine**

Data is collected from the experts to develop the **knowledge base**. The **rules base** is then created based on the information from the knowledge base. The **user interface screen** is designed/created which would provide the user with the ability to **interact with the system**. The **inference engine** is designed/created as search engine between the user interface and the knowledge base. The system is then tested.

Doctors often use **expert systems to diagnose illnesses of patients**. Describe how an **expert system diagnoses illnesses**. Key Words: **user interface, inference engine, knowledge base, rules based**

User will **interact with the user interface** and enter their symptoms. **Inference Engine** will act as a search engine and compare the data which is held in the **knowledge base**. The knowledge base will use the **rules base** to give an appropriate match. Further questions could be asked via the **user interface** until the system suggest a probable illnesses.



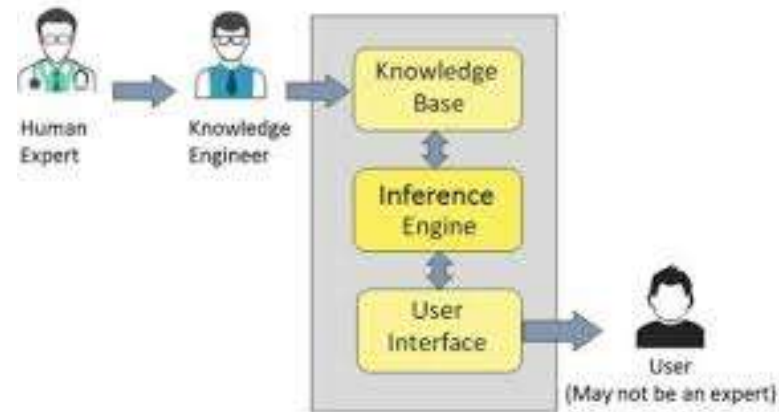
Exam Question

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ICT Applications

Describe **three benefits of the doctor using an expert system to help diagnose a patient's illness.**

- An expert system may help the doctor make a more accurate diagnosis
- An expert system uses data from many experts therefore it contains more knowledge than a single doctor
- Cheaper than regularly re-training the doctor
- The expert system's knowledge may be more up to date than the knowledge of a single doctor
- Cheaper than employing many specialists
- The diagnoses given are more consistent



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

Describe how an **expert system** can be used to **suggest car engine fault diagnoses**.

Any five from:

- Enter data into/use the interactive user interface
 - Questions are asked about the car engine fault
 - The user answers the questions/Yes or No answers to the questions are typed in
 - Further questions are asked based on the previous answers
 - The inference engine compares data
 - Compares data with that held in the knowledge base
-using the rules base/set of rules
-until it finds a match/matches found
- System suggests probabilities/possible solutions
 - The explanation system explains how the solutions were arrived at



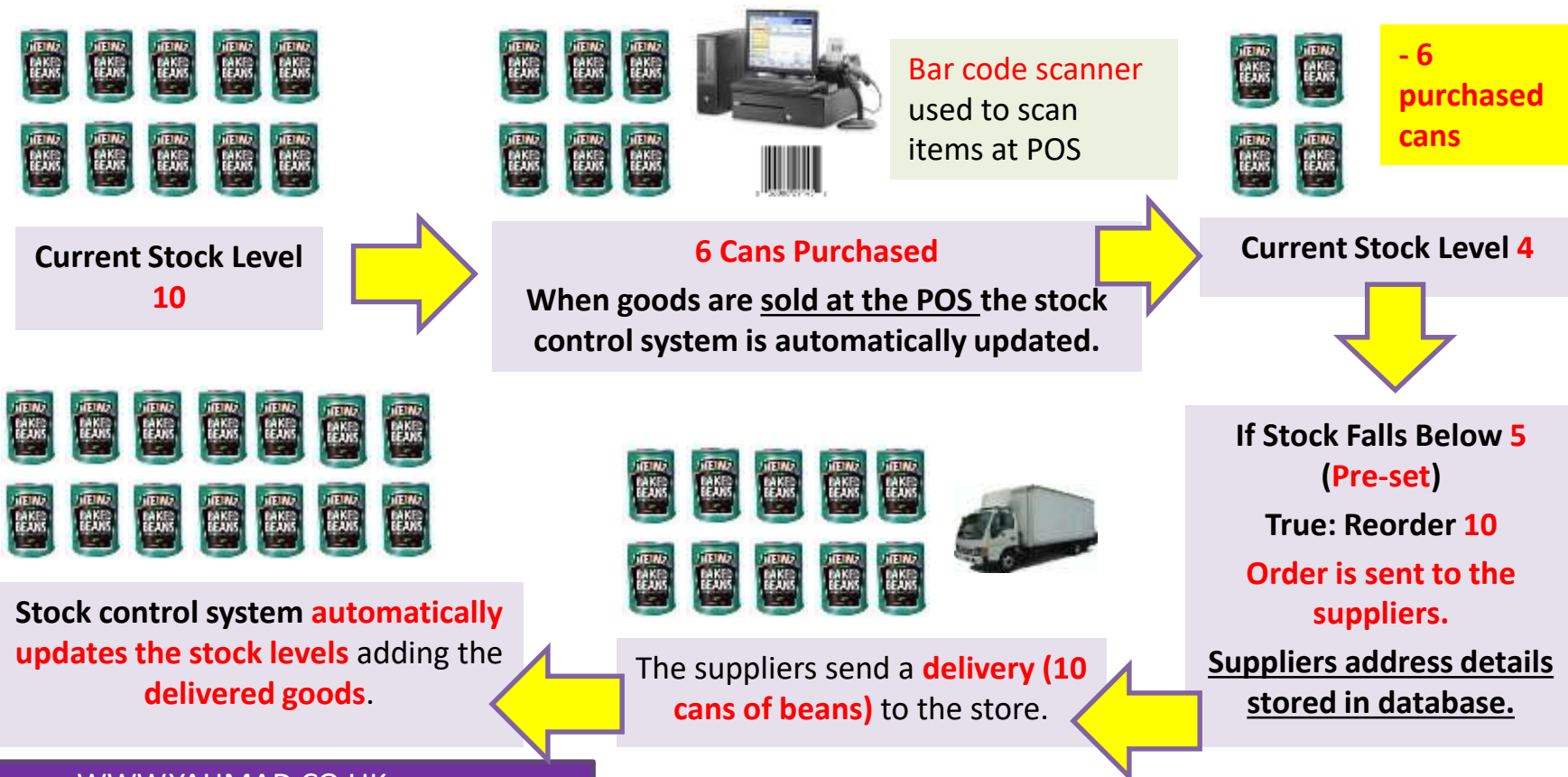
Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

6.13 Computers in the Retail Industry

POS (Point of Sale) is the place a transaction takes place. Customers can pay by cash or using their debit/credit cards. **Stock control systems** can **automatically update stock records** when items are purchased at the POS.



ICT IGCSE Theory – Revision Presentation

ICT Applications

Describe the processing that takes place in an automatic stock control system?

Key Words: POS, Stock Level deducted, Preset, Lower, order, delivery, stock level updated

Stock is purchased at the POS and the amount is automatically deducted from the overall stock level. If the stock level falls below (lower) than the pre-set value then an automatic delivery request is sent to the supplier. A preset value will be reordered and will arrive in the next delivery. The stock levels will automatically update.



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

6.13 Computers in the Retail Industry

EFTPOS (Electronic Fund Transfer Point of Sale) is when a customer uses a card to complete a transaction.

Pin entered has to be correct for the transaction to continue. The card will also be checked for validity (expiry date/stolen).



1. Customer gives **bank card** to cashier at POS.
2. The cashier **enters the card** in to the chip and pin reader and **confirms the value of the purchase**.
3. The customer is requested to **enter their pin**. If **Pin matches the Pin stored on the chip** then the transaction can continue.
4. The shops computer will use the **account details on the chip to connect to the customers bank account** and check the **balance**.
5. If funds are **sufficient** then the transaction will be **approved**.
6. The purchase amount is **subtracted from the customer's account** and **deposited into the shops banks account**.
7. Once the transaction is complete **receipt will be printed**. The cashier will give the card and receipt to the customer.



If **funds are not available** a declined message will be sent to the stores computer. The cashier will then request for another method of payment



ICT IGCSE Theory – Revision Presentation

ICT Applications

6.13 Computers in the Retail Industry

Internet banking and shopping is becoming more popular to users due to the development of the internet and the advancement of mobile internet technology.

Advantages	Disadvantages
<ul style="list-style-type: none"> Internet is now available on more platforms including applications available on phones and tablets. Internet can be accessed 24/7. No need to travel (saves money on travel/parking) Saves time (No need to queue in the banks or shops) Access to wide range of goods on the internet. Useful for individuals who find it difficult to travel and goods can be delivered directly to your home. People can spend more time doing other leisure activities. 	<ul style="list-style-type: none"> Online accounts could be hacked/cards details could be stolen. Users require a internet connection and need to be computer literate. Lack of socialising/exercising. You can not see the goods before you buy (try on clothes). Delays in delivery.

Effect on the company

- Less retail outlets required which means no rent or utility costs.
- Less staff required in retail outlets however specialist staff would have to be employed to maintain the website and run the dispatch department.
- Online presence would attract more customers (Global).
- Lack of customer interaction.



ICT IGCSE Theory – Revision Presentation

ICT Applications

6.14 Recognition Systems

Recognition Systems are used to **directly enter data** into a computer system. Recognition systems tend to be more **accurate** and **quicker** method of entering data into a computer system compared to **manual methods**.

MICR



Magnetic ink which are found at the bottom of the checks are **scanned in** to MICR (Magnetic Ink Character Reader).

OMR



Pencil or pen marks are **scanned in** by the OMR (Optical Mark Reader).

OCR



Scanned text is converted into a format which can be edited.

RFID



Uses **radio waves** to capture and store information on a tag.

Number Plates



Sensors are used to **detect a car** (if its gone over the line) and a signal will be send to the microprocessor to **take the image of the number plate**.

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ICT Applications

Describe how **RFID technology** reads the details from the chip.

- The chip is presented near a computer with a radio-frequency scanner
- The scanning antenna puts out radio-frequency signals in a relatively short range.
- It provides a means of communicating with the transponder/the RFID tag
- The scanning device provides energy...
- ...so that the chips can broadcast the information in them...
- ...for the computer to read.



Explain why **RFID technology** is used for **reading data from passports**.

- More secure than a traditional passport as biometric measurement data difficult to forge
- Counterfeits can be more easily identified than non-RFID passports
- More rapid flow at security check points/quicker than reading it manually



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

When **a bank cheque** is presented to a bank it is sent off to a **cheque clearing centre**.
Give three **items of information that are pre-printed on the cheque in magnetic ink**.

- Account number
- Bank/branch sort code
- Cheque number



Describe how MICR is used to read these details from the cheque.

- Requires a special Magnetic Ink Character reader/scanner/Details are scanned
- The magnetic ink on the cheque passes over a magnet in the reader/scanner which
- charges/magnetises the ink
- The MICR reader/scanner then reads the magnetic signal given out by the magnetic ink
- characters on the cheque.
- Each character produces a unique signal which is read and translated by the MIC reader

Explain why magnetic ink is used rather than bar codes on a cheque.

- More difficult to forge
- Even if overwritten/damaged can still be read by computer
- Information is human readable



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

A **student exam answer sheet consists of boxes** which the **student shades** in to **indicate their choice of answer**.

Apart from the details of the test and the lozenges, give two items of information, essential to the student, that are pre-printed on the answer sheet.

- Student id number/prompts for student number
- date of birth
- student name
- Instructions on how to complete the form
- Question numbers
- Centre number/Centre name



Describe how Optical Mark Recognition is used to process the details from the form.

- Dedicated scanner device shines a beam of light onto the form
- Light is reflected back to sensors
- Marks reflect less light so sensors used to identify position of marks
- Computer compares these with correct answer positions



Exam Question

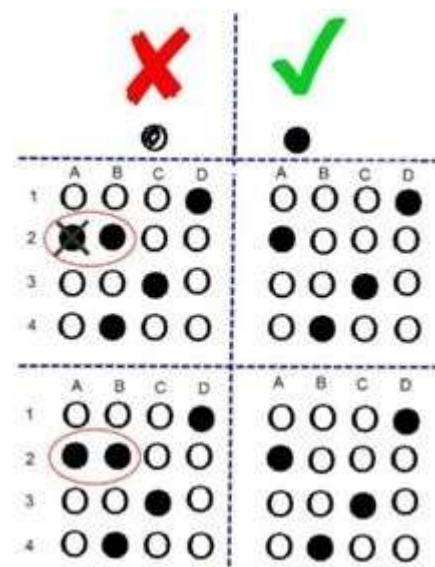
ICT IGCSE Theory – Revision Presentation

ICT Applications

A **student exam answer sheet** consists of **boxes** which the **student shades in** to indicate their choice of answer.

Describe the **drawbacks of using Optical Mark Recognition**

- If the marks don't fill the space completely they may not be read correctly/overflow the space/smudged
- If the marks are not in a dark enough pencil they may not be read correctly
- If more than one lozenge shaded in result is invalidated
- Only suitable for recording one out of a selection of answers, not suitable for text input
- Have to use prepared forms which may be expensive
- Examinations could consist of mainly multiple-choice questions changing the nature of what is being tested



Exam Question

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ICT Applications

6.15 Monitoring and Tracking Systems

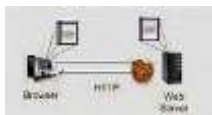
Reasons for Monitoring and Tracking Systems:

- Surveillance (Potential Criminals/Terrorists)
- Tracking released prisoners to ensure they stay within an agreed location(Ankle monitors)
- Monitoring customers buying patterns.



Key Logging

Key logging software monitors which **keys have been pressed**. **Passwords** and **personal details** can be **obtained for malicious** purposes by **hackers**.



Cookies

When a user visits a website a cookie is created which could **store the user browsing preferences**:

- Language settings
- Items in the shopping cart
- Links which have been click on

Cookies essentially **leave an electronic footprint** on user browsing habits.



Call Monitoring

Calls can be **monitored by police** as part of **surveillance operations**.

Calls may also be **monitored** as training tool in call centres to **improve employees performance** the **quality of the customer service**.



Number Plate Recognition

Number plates can be **tracked by cameras situated in specific locations** to keep **track of whereabouts of a specific individuals** to whom the car is licenced too.



ICT IGCSE Theory – Revision Presentation

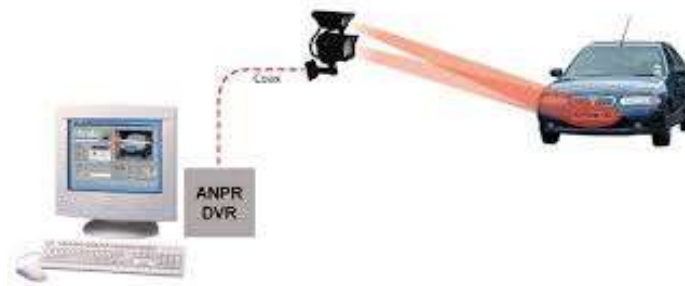
ICT Applications

A new toll road that drivers pay to use has just opened. The company that owns the road uses **Electronic Number Plate Recognition Systems to collect payments from drivers automatically**. Describe how an Electronic Number Plate Recognition System works.

Key Words: CCTV cameras, Number plate captured, OCR, database, car owner details

The system has **CCTV cameras**. The images and the text from the **number plate are captured** by the **camera**. The system uses **optical character recognition** to input the data into the computer system.

The **number plate** is checked against its database to find the **car owner's details**. Using the car owner details the **payment** can be processed.



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

Key-loggers are thought to be **security risks but they can be used to monitor and track the use of employees on a computer system**. Describe how a key-logger monitors computer usage.

- A key-logger records the key strokes of a person using the computer
- Transfers / transmits the data back to the supervisor / manager
- The supervisor can then monitor what the employee has been doing / how hard they have been working

A small minority of employees in a company have been using the computers for non-business use, so the company has had to introduce other methods of monitoring their use of ICT. **Apart from key-logging list three other ways that employees could be monitored in their use of ICT.**

- Monitoring phone call usage, Monitoring emails
- Monitoring the time spent on and websites visited
- Monitoring where employees log in / log out
- Monitor the amount of storage space used
- Monitoring where they send data to print



Exam Question

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ICT Applications

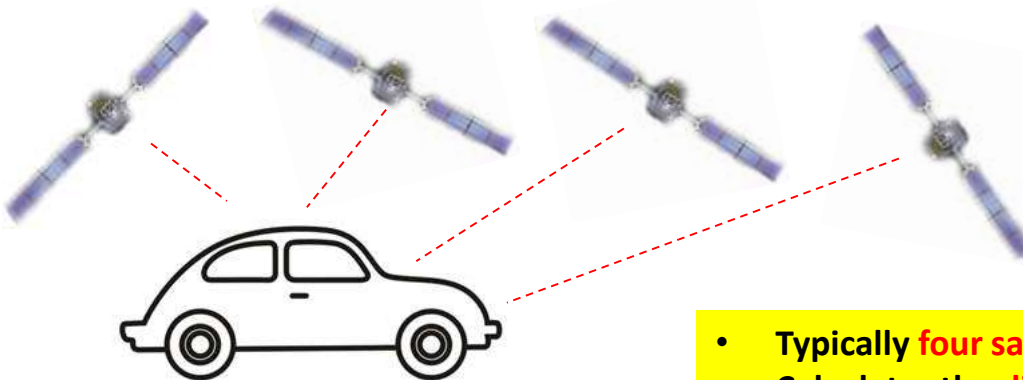
6.16 Satellite Systems

GPS (Global Positioning Systems)

GPS can **determine a specific locations** using **satellite navigation systems**.

- **Cars, Ships, Planes** can use GPS when navigating to specific locations.
- **Walkers** to locate position on hills/mountains.
- Used by **runners** to calculate distance.

Advantages:	Disadvantages
<ul style="list-style-type: none"> • Drivers do not have to use maps • GPS can re-route and find quickest routes. • Can provide useful locations of amenities (e.g Petrol stations) 	<ul style="list-style-type: none"> • Loss of signal • Maps have to be updated (New roads may not be shown)



- Typically **four satellites** must be visible to the **receiver**.
- Calculates the **distance from a receiver** to the **satellite**.
- Calculates the **position of the receiver**.

ICT IGCSE Theory – Revision Presentation

ICT Applications

Describe how a **satellite navigation system (sat nav)** in a motor vehicle **would calculate the quickest route from Destination A to Destination B.**

Key Words: Destination inputted, Position of motor vehicle calculated using data from 4 satellites, Algorithm calculates distance from A to B, traffic, road speeds

Destination **B is input** by driver. The Position of the motor vehicle at **A is calculated using GPS** using data transmitted from 4 satellites. **Algorithm calculates** shortest distance from A to B. The algorithm makes allowances for **traffic** and takes into account **average road speeds** to calculate the time it would take to reach the destination.



Exam Question

ICT IGCSE Theory – Revision Presentation

ICT Applications

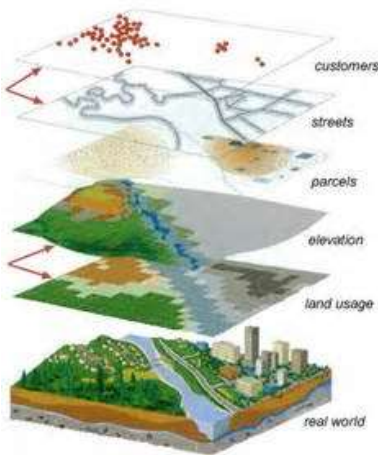
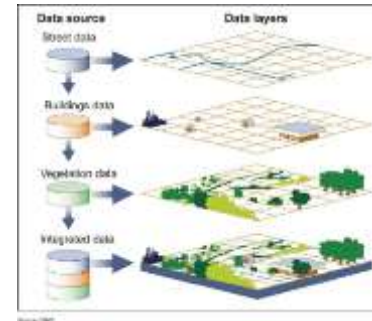
6.16 Satellite Systems

GIS (Geographic Information System)

GIS allows for **potential locations to be analysed based on specific queries**.
GIS will allow users to see **specific details on a location**:

- Road Networks
- Community Services (e.g. Schools)
- Environmental Features (e.g. Rivers)
- Properties Details (e.g. rental properties)

GIS will then combine these specific details and allow the user to specify certain criteria about a particular location.



Business can use GIS to identify a suitable location for their business taking into consideration:

- Road links which could be easily accessible for customers and suppliers.
- Proximity of Customers to potential retail outlets.
- Availability of potential retail outlets mapped by the GIS to give options to the business.
- Environmental features to avoid being close to flood risk zones.