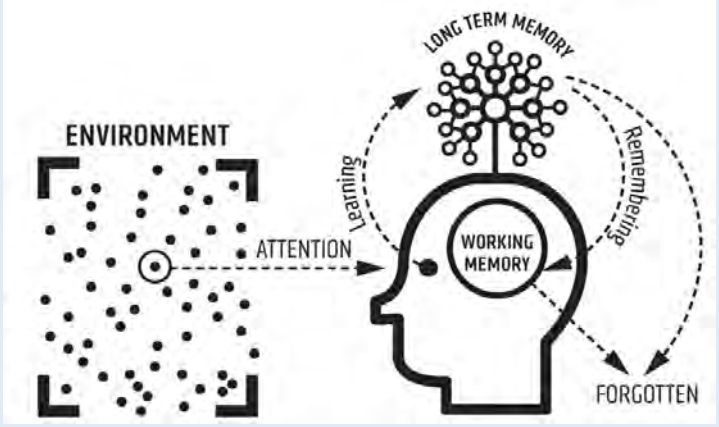
Knowledge Organiser Booklet Year 11 Term 3 Non Core

Our working memories can only store a limited amount of information, whereas our long term memories can store limitless information. To learn successfully, we need to store core knowledge into our long term memories, so we can retrieve it when we need it.

For instance, if you are at work or in the shops and need to work out a 25% discount, you can't memorise 25% of every number, so you need to be able to quickly recall the method for calculating a percentage. Committing core knowledge to our long-term memories is a life-hack. It makes thinking about difficult things easier.

Using a knowledge organiser with regular retrieval activities is a way for you to store core knowledge & subject specific words, into your long term memory so it is there when you need it.

Click here to be taken to the knowledge organiser part of the school website.



Contents

Clicking on the subjects below will take you directly to the knowledge organisers for each subject. These are to support learning that has taken place this past term. Use these to help reinforce the key knowledge. Use some of the strategies explained in the introduction to help you retain this important information.

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Blended Learning Expectations

Make sure you have **access to a computer at home** (If you don't please make pastoral staff aware or email langley.homelearning@taw.org.uk)

Download Microsoft Teams on both your phone and computer. (If you don't know how to do this please ask a member of staff or do this in your next computing lesson)

Spend at least 2 hours a week using teams EVERY WEEK. (Engagement in teams can be tracked and monitored). You need to be accessing each of your class teams and recapping on the previous learning or completing additional tasks set by your class teacher.

If you have any issues with teams (e.g. login problems or missing classes etc then please email langley.homelearning@taw.org.uk)

Teams is a tool to support ongoing learning and should **only be used for educational purposes.**

How to complete homework your teacher has set

	LOOK, COVER, WRITE, CHECK	DEFINITIONS TO KEY WORDS	FLASHCARDS	DUAL CODING
STAGE 1	Look at & study an area of your knowledge organiser	Write down the key words & definitions	Write key words, dates/formulae, equations/quotes on one side & answers on the other	Draw pictures/diagrams/ cartoon strips
STAGE 2	Cover up your knowledge organiser and write everything you remember	Cover up the definitions. How many can you remember? Repeat.	Include pictures or diagrams if it helps. Read through them.	Label your pictures/diagrams/ cartoon strips
STAGE 3	Check. Correct mistakes in green and add anything you missed. Repeat	Check. Correct mistakes in green pen. Which ones do you find hard to remember?	Test yourself and get someone to test you.	Explain out loud to yourself or family/friend what your images show

	SELF QUIZZING	MINDMAPS	PAIRED RETRIEVAL	SPEAK, COVER, WRITE, CHECK
STAGE 1	Use your knowledge organiser to create quiz questions.	Create a mindmap of everything you can remember from your knowledge organiser	Give a family member/friend the knowledge organiser to hold	Read out loud the information from the knowledge organiser several times.
STAGE 2	Write down the answers to your quiz	Check your knowledge organiser & use a green pen to make any corrections.	Get them to test you using the knowledge organiser	Cover up your knowledge organiser and write everything you remember
STAGE 3	Keep self-quizzing until you get all the answers correct	Add additional information to your mindmap or make connections to other knowledge	Write down your answers to their questions	Check. Correct mistakes in green and add anything you missed. Repear.

Retrieval Placemat

Look at your knowledge organiser. Now cover it up and write down Key vocabulary & definitons from memory:

First time: Look. Cover. State 3 facts

Second time: Look. Cover. State 3 facts

Third time: Look. Cover. State 3 facts

Look at the knowledge organiser again. Now cover it up and without looking, explain a concept or idea in your own words

Re-read your answer above. Look at the knowledge organiser again. Now cover it up and improve on your previous explanation in green pen.

Retrieval Relay

Look at your knowledge organiser. Now cover it up.

First time: Write down everything you can remember

Second time: Look. Cover. Write down everything you can remember

Third time: Look. Cover. Write down everything you can remember

Write down everything here that you didn't remember:

Vocabulary focus 1

Look at your knowledge organiser. Select a key word and write it here:

Write a definition of the key word in your own words - not the same as the one on the knowledge organiser:

Write a sentence with the key word in it:

Create a question where the key word is the answer:

What other words are connected to this key word?

Draw a picture or diagram to help you remember this key word:

Vocabulary focus 2

Definition:

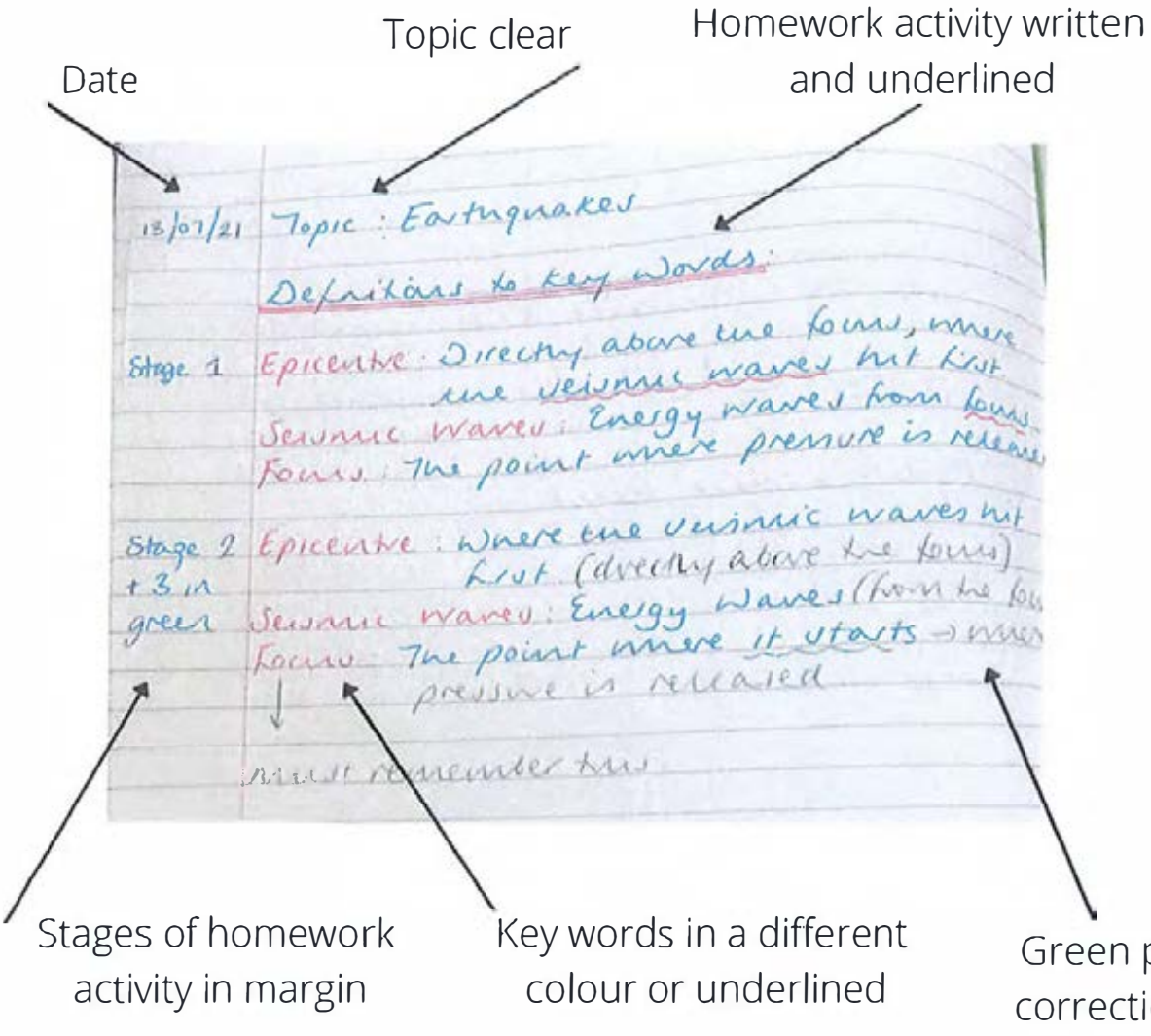
Characteristics:

Key word:

Examples:

Non-examples:

What should my knowledge organiser homework look like?

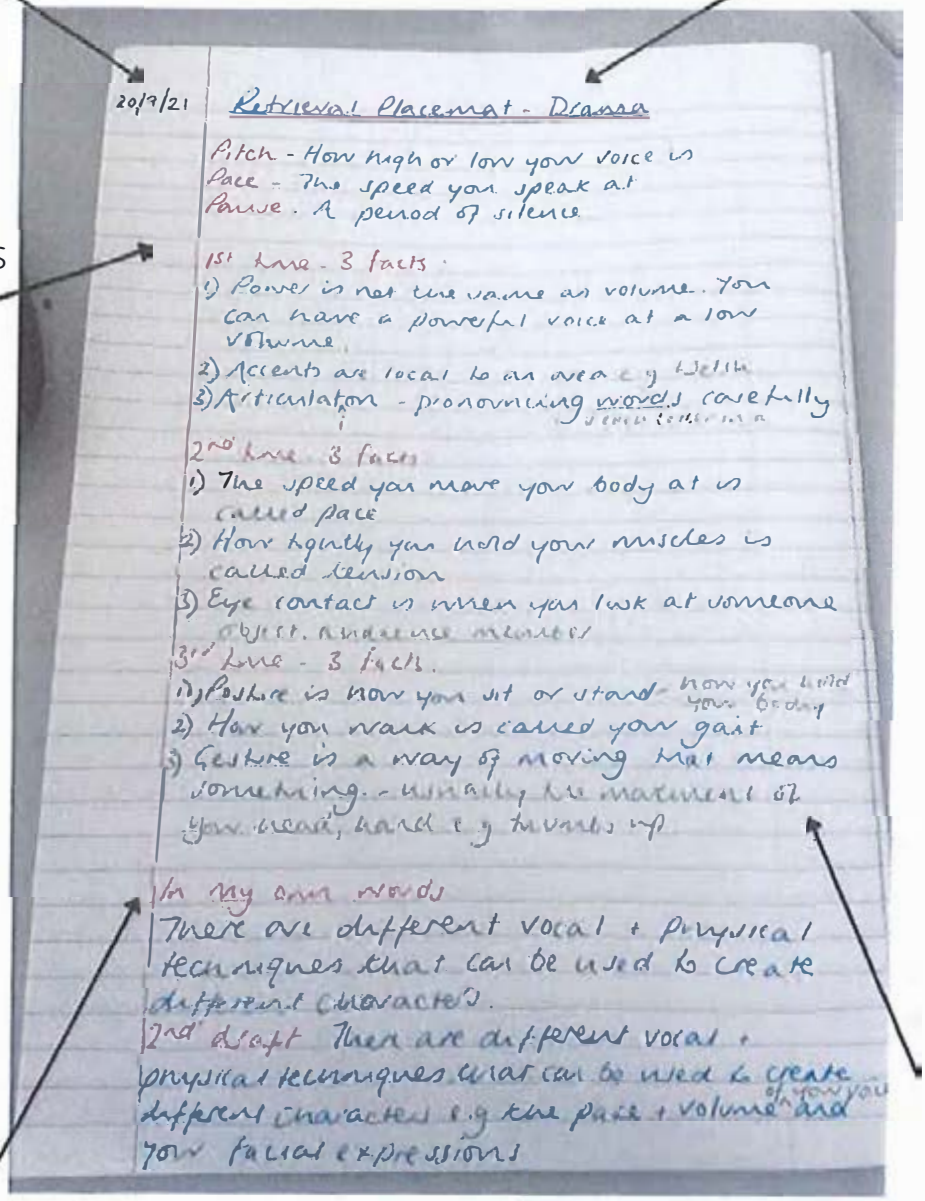


What should my knowledge organiser homework look like?

Homework activity written and underlined

Date

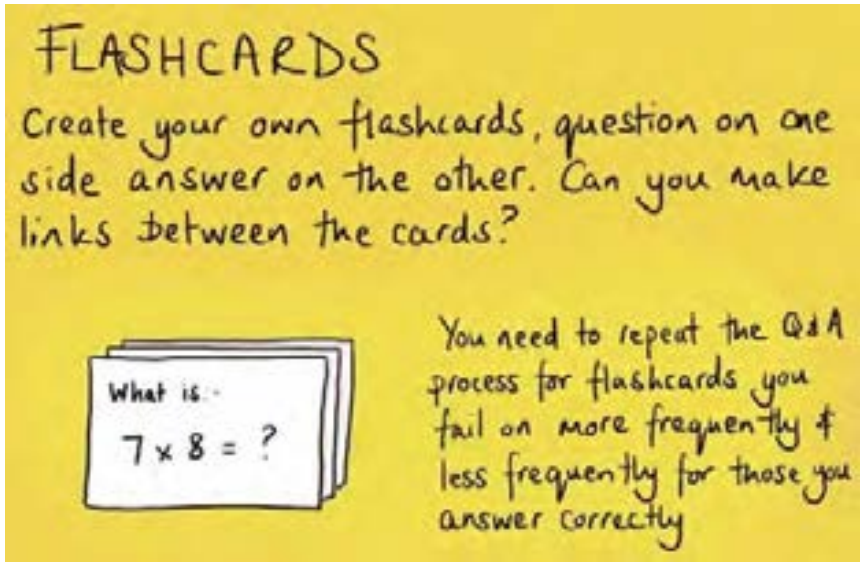
Key words in a different colour



Green pen corrections

Stages of homework activity as subtitles

Art & Design



Create a flash card with all the key facts you want to learn (this can be drawn in your book). On the next page try writing down as many facts or as much of the knowledge as you can. If you find you are getting certain facts wrong then these are where you need to focus and relearn.

Year 11: Exam Preparation (External Set Task)

Unit 6
Threshold Concept (TC57) - Understand that artwork can be influenced by many factors including the work of others.
Threshold Concept (TC58) - Understand that developing, refining, recording and presenting are fundamental to the design process and these can be undertaken in any order to achieve a final outcome.
Threshold Concept (TC59) - Understand that artwork can take many forms using a wide range of materials and processes.

Refer to Year 10 Unit 2 for artist research and photography.

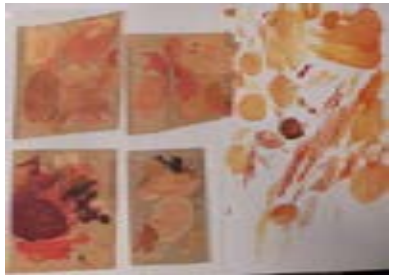
Refer to Year 10 Unit 3 for drawing.

Keywords
Develop,
Refine,
Record,
Present.

Formal Elements of Art
Colour – what you see when light reflects off something.
Line – a mark made which can be long, short, scribbled, straight etc.
Shape – a 2D area which is enclosed by a line.
Form – a shape which has 3 dimensions.
Tone – how light or dark something is.
Texture – how something looks or feels (visual or actual) rough etc.
Pattern – a symbol or shape that can be random or repeated.

AO1: Develop ideas through investigation, demonstrating critical understanding of sources
(Collect ideas and explore artists work to help inspire your own work).

AO2: Refine work by exploring ideas, selecting and experimenting with appropriate media, materials, techniques and processes.
(Experiment with various media and techniques to help improve your skills and visual ideas).



Approximately
12 weeks
of **preparation**
time leading
to the
10 hour exam

AO3: Record ideas, observations and insights relevant to intentions as work progresses.
(Show a clear journey throughout your chosen theme by producing observations, reflecting and evaluating).

AO4: Present a personal response and meaningful response that realises intentions and demonstrates understanding of visual language.
(Complete a relevant and intentional final piece that shows a journey through your portfolio.

A study of the Ironbridge in a joiner style, influenced by the artist David Hockney.

External Set Task
(40% of the your final grade)

Computer Science

Algorithms

An **algorithm** is a sequence of ordered instructions that are followed step-by-step to solve a problem. This does *not* need to be on a computer.

Decomposition is the breaking down of a complex problem into smaller more manageable problems that are easier to solve.

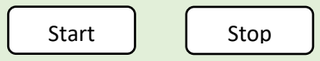
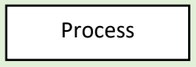
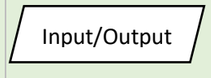
Abstraction allows us to remove unnecessary detail from a problem leaving us with only the relevant parts of a problem thereby making it easier to solve.

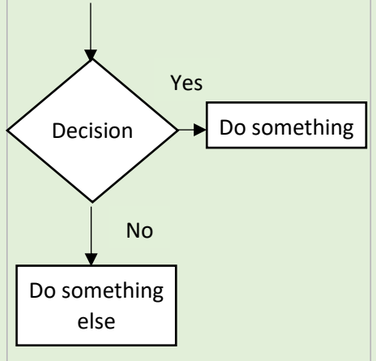
Algorithm Efficiency More than one algorithm can be used to solve the same problem. Normally we use the algorithm that solves the problem in the quickest time with the fewest operations or makes use of the least amount of memory.

Dry run testing is carried out using **trace tables**. The purpose of the trace tables is for the programmer to track the value of the variables and outputs at each step of the program and to track how they change throughout the running of the program.

Flowchart Symbols

We can represent algorithms using flowcharts

Start and Stop 	**Process – An operation that the algorithm performs** 
Connector – Links all the other symbols together 	**Input and Output of data that is read in and written out** 

Decision is the same as a selection (if then … else)
 
	`IF answer is "yes" THEN`
	`  do something`
	`ELSE IF answer is "no"`
	`  do something else`
	`ENDIF`

Pseudocode

We can represent algorithms using pseudocode

	Example	Python equivalent
Variable assignment	a ← 10	`a = 10`
Constant assignment	constant PI ← 3.142	`PI = 3.142`
Input	a ← USERINPUT	`a = input()`
Output	OUTPUT "Bye"	`print("Bye")`
Arithmetic Operators Add Multiply Divide Subtract Integer division Modulus (remainder)	 + * / - a ← 7 DIV 2 a ← 7 MOD 2	 + * / - a= 7 // 2 a = 7 % 2
Relational Operators Less than Greater than Equal to Not equal to Less than or equal to Greater than or equal to	 < > = ≠ or <> ≤ ≥	 < > == != <= >=
Boolean Operators AND OR NOT	 AND OR NOT	 AND OR NOT

Selection
 	
if ..
 	
if .. else …
 	
if … else if … else
	
	IF i > 2 THEN
	j ← 10
	ENDIF
	
	IF i > 2 THEN
	j ← 10
	ELSE
	j ← 3
	ENDIF
	
	IF i ==2 THEN
	j ← 10
	ELSE IF i==3
	THEN
		
		if i > 2:
		j=10
		
		if i > 2:
		j=10
		else:
		j=3
		
		if i ==2:
		j=10
		elif i==3:
		j=3

	j ← 3
	ELSE
	j ← 1
	ENDIF
		else:
		j=1

Iteration
 	
While loops
 	
For loops
 	
Repeat loops
	
	a ← 1
	WHILE a < 4
	OUTPUT a
	a ← a + 1
	ENDWHILE
	
	FOR a ← 0 TO 3
	OUTPUT a
	ENDFOR
	a ← 1
	
	REPEAT
	OUTPUT a
	a ← a + 1
	UNTIL a←4
		
		while a<4:
		print(a)
		a=a+1
		
		for a in
		range(3):
		print(a)

Subroutines
 	
procedure
 	
Function (with paramerters and return)
	
	SUB hello()
	OUTPUT "hello"
	ENDSUB
	
	SUB add(n)
	a ← 0
	FOR a ← 0 TO n
	a ← a + n
	ENDFOR
	RETURN a
	ENDSUB
		
		def hello():
		print("hello")
		
		def add(n):
		a=0
		for a in
		range(n+1):
		a=a+n
		return a

Built-in functions Length of array Random integer	 LEN(a) RANDOM_INT(0, 9)	 len(a) import random random.randint(0,9)

Searching Algorithms

Linear Search Algorithm

- The purpose of the linear search algorithm is to find a target item within a list.
- Compares each list item one-by-one against the target until the match has been found and returns the position of the item in the list.
- If all items have been checked and the search item is not in the list then the program will run through to the end of the list and return a suitable message indicating that the item is not in the list.
- The algorithm runs in linear time. If *n* is the length of the list, then at worst the algorithm will make *n* comparisons. At best it will make 1 comparison and on average it will make (*n+1)*/2 comparisons.
- The performance of the algorithm will be improved if the target item is near the start of the list.

Example

Find the position of letter "Z" within the following list. Assume we do not have visibility of the list

Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
position								
Value	V	A	S	Z	X	R	T	G

We compare it with the value in index position 0. We find that the value is "V" so we need to move on to the next index position. At index position 1 and 2 we still have not found Z. However, we get to index position 3 and we compare the target with the value and we find that they match, so the algorithm returns the index position and stops.

Pseudocode

```
i ← 0
x ← len(listOfItems)
pos ← -1
found ← False
WHILE i < x AND NOT found
 IF listOfItems[i] == itemSearch THEN
  found ← True
  pos ← i + 1
 ENDIF
 i=i+1
ENDWHILE
OUTPUT pos
```

Binary Search Algorithm

- The binary search algorithm works on a sorted list by identifying the middle value in the list and comparing it with the search item.
- If the search item is smaller the mid element becomes the new high value for the search area.
- If the search item is larger the mid element becomes the low value for the search area.
- The keeps repeating until the search item is found.
- When the search item is found the index position of the item is returned.
- At each iteration the search are halved in size consequently this is an efficient algorithm.

Example: Binary search in operation to find 81

Pseudocode

```
low ← 1
high ← LENGTH(arr)
mid ← (low + high) DIV 2
WHILE val ≠ arr[mid]
 IF  arr[mid] < val THEN
  low ← mid
 ELIF arr[mid] > val THEN
  high ← mid
 ENDIF
  mid ← (low + high) DIV 2
  ENDWHILE
OUTPUT mid
```

Linear search versus binary search

	Advantages	**Disadvantages**
Linear Search	• Very simple algorithm and easy to implement • No sorting required • Good for short lists	• slow because it searchers through the whole list • very inefficient for long lists
Binary Search	• much quicker than linear search, because it halves the search zone each step	• The list need to be ordered

Sorting Algorithms

Bubble Sort

- The purpose of sorting algorithms is to order an unordered list. Item can be ordered alphabetically or by number.
- Bubble sort steps through a list and compares pairs of adjacent numbers. The numbers are swapped if they are in the wrong order. For an ascending list if the left number is bigger than the right number the items are swapped otherwise the numbers are not swapped.
- The algorithm repeatedly passes through the list until no more swaps are needed.

Example

Sort the following sequence in ascending order using bubble sort: 5,3,4,1,2.

Pass 1	**5**	**3**	**4**	**1**	**2**	
	3	5	4	1	2	Compare 5 and 3 – swap
	3	4	5	1	2	Compare 5 and 4 – swap
	3	4	1	5	2	Compare 5 and 1 – swap
	3	4	1	2	5	Compare 5 and 2 – swap; end of pass 1
Pass 2	3	4	1	2	5	Compare 3 and 4 – no swap
	3	1	4	2	5	Compare 4 and 1 – swap
	3	1	2	4	5	Compare 4 and 2 – swap
	3	1	2	4	5	Compare 4 and 5 – no swap; end of pass 2
Pass 3	1	3	2	4	5	Compare 3 and 1 – swap
	1	2	3	4	5	Compare 3 and 2 – swap
	1	2	3	4	5	Compare 3 and 4 – no swap
	1	2	3	4	5	Compare 4 and 5 – no swap; end of pass 3
	1	**2**	**3**	**4**	**5**	

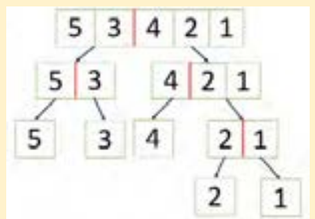
Bubble sort Pseudocode

```
A=[5,3,4,1,2]
sorted ← False
WHILE not sorted
 sorted ← True
 FOR I TO LEN(A)-1:
  IF A[i] > A[i+1]:
   temp ← A[i]
   A[i] ← A[i+1]
   A[i+1] ← temp
   sorted ← False
  ENDIF
 ENDFOR
ENDWHILE
OUTPUT A
```

Merge Sort

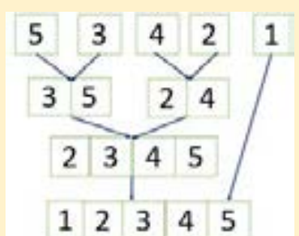
- Merge sort is a type of divide and conquer algorithm.
- There are two steps: divide and combine
- Merge sort works by dividing the unsorted list sublists. It keeps on doing this until there is 1 item in each list.
- Pairs of sublists are combined into an ordered list containing all items in the two sublists. The algorithm keeps going until there is only 1 ordered list remaining.
- Merge sort is a recursive function, that calls itself.

Step 1: Divide



Keep dividing until there is only 1 item in each list

Step2: Combine



1. The first items in the two sublists are compared, and the smallest value is copied to the parent list.
2. The copied item is then removed from the sublist.
3. When there are no items left in one of the sublists the remaining items in the other sublist are them copied in order to the parent list.

Merge sort Versus Bubble sort

	Advantages	**Disadvantages**
Bubble sort	Very simple and robust algorithm	Can be slow particularly for long lists. As the number of items increases the time taken for the algorithm to run increases dramatically.
Merge sort	Much faster than bubble sort especially when the number of elements is large	More complex to understand Step 1: Divide Step 2: Combine

Computer Networks

A network is a set of computers that are connected to one another.

Standalone computers are isolated from other devices.

Advantages of a network
- ✓ Share resources, such as software applications, files and hardware (eg printers).
- ✓ Allows communication (eg email) and can transfer files easily.
- ✓ Easier network management (eg can backup data onto a central fileserver; updates can be sent to all computers; users on a network can login to any computer)

Disadvantages of a network
- ✓ Greater security risk as computers can be hacked if they are connected to the internet.
- ✓ Worms can spread from one computer to another
- ✓ A problem with any shared resource, (eg file server goes down) can impact the whole network.

Types of Computer Networks

Personal Area Network (PAN) set up around an individual person. Many people have multiple devices such as tablets, phones and computers that can be interconnected using a PAN. A Bluetooth PAN uses radio waves to communicate wirelessly between devices over a range of a few metres.

Local Area Network (LAN) covers a relatively small geographical area typically extends over the range of a single organisation such as a university campus, school site. LANs are usually managed by a single organisation.

Wide Area Network (WAN) made up of many local area networks and covers a much wider geographical area. The internet the ultimate WAN. It is a network of networks with billions of interconnected devices. No single person or organisation has control over a WAN.

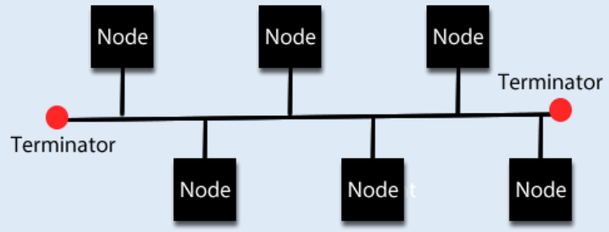
Network Topology

A network topology describes how a set of computers are arranged within a network.

Bus network topology All devices including clients, servers, printers and so on are connected to a cable called a bus. All communication is via the shared bus. At either ends of the bus is a terminator.

Advantages
- ✓ Easy and cheap to install and does not require much cable
- ✓ Easy to add more computers

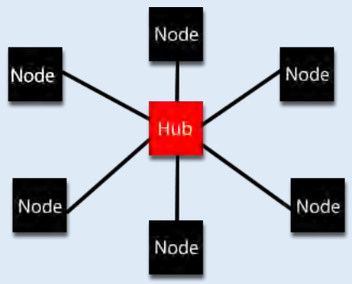
Disadvantages
- ✓ If the main cable fails then then the whole network fails.
- ✓ Less secure as data are broadcast to all devices on the network.
- ✓ Can be slow as there are collisions between data along the shared bus.
- ✓ Will get slower as more computers are added.



Star network topology all devices including clients, servers, printers and so on are connected to a central hub or switch. All communication is via the hub

Advantages
- ✓ Greater security as data are only sent to the intended recipient.
- ✓ If any of the connections fail only a single node will be affected.
- ✓ Fewer collisions between data packets

Disadvantages
- ✓ If the central hub fails then every computer on the network is affected.
- ✓ Expensive as extra cable and hardware (hubs) are needed.



Wired and Wireless

Computers can be connected using wired or wireless methods

Wired transmission methods use cables to communicate

Wireless transmission use radio waves communicate (eg Wi-Fi).

Advantages of wireless
- ✓ Can use computer anywhere and not constrained by cables

Disadvantages of wireless
- ✓ Packets can be intercepted more easily than wired connections
- ✓ Security is a much more difficult challenge, as the network can be accessed from outside the confines of a building.
- ✓ Slower than wired methods
- ✓ Signal can be interfered with by other electronic devices.

Advantages of wired
- ✓ Allows more control, security and reliability. Can restrict who has access to the network.
- ✓ Wired methods have greater speeds than wireless methods.

Disadvantages of wired
- ✓ Cables can be difficult to maintain in big organisations

Wired networks use a variety of cables, including copper and fibre optic.

Copper cables use electrical signals to transmit data. Three main types:

- ✓ **Coaxial cable** – the signal loses strength over long distances
- ✓ **Unshielded twisted pair** – A pair of copper cables are twisted together and allows data to be transmitted over longer distances
- ✓ **Shielded twisted pair** – Shielding around the twisted cables means the signal is less susceptible to interference.

Fibre optic cables are glass or plastic and use use pulses of light to transmit data

Advantages of copper cables
- ✓ Cheaper than fibre optic
- ✓ Reliable because a telephone is powered from the copper cable and does not rely on a separate electrical power supply

Advantages of copper cables
- ✓ Slow
- ✓ Low capacity
- ✓ Can only be used over short distances
- ✓ Interference can occur

Advantages of fibre optic
- ✓ Higher bandwidth than copper so can transmit more data
- ✓ Less attenuation (degrading) of the signal so fibre optic is more suitable over long distances
- ✓ Less “cross talk” interference between fibres compared with copper so the quality of the signal is better

Disadvantages of fibre optic
- ✓ Expensive
- ✓ Difficult to install

Network Security and Protocols

Why do we need network security?

- ✓ To prevent unauthorised access to our electronic devices
- ✓ To protect our data eg to prevent sensitive data being stolen
- ✓ Prevent cyberattacks

Methods of Network Security

Authentication allows us to confirm the identity an individual. There are lots of ways of confirming the identity of an individual that come under one of three factors:

- ✓ Knowledge factor: Something the user knows, eg a password
- ✓ Possession factor: Something the user owns eg a mobile phone
- ✓ Biometric factor: eg Fingerprint, iris scan

Encryption The message is garbled so if it gets intercepted during transmission it will be almost impossible for anyone without the key to read the original message.

Firewall prevents packets containing malware getting on to the computer

MAC address filtering A MAC (Media Access Control) address is a unique identifier for any device that is connected to a network. Each network interface card has a unique MAC address that is a 12 digit hexadecimal code (e.g. 12-F3-EE-56-44-A1).

- ✓ *White list filtering* only allows devices on a list to connect to the network.
- ✓ *Black list filtering* devices in a black list blocked from accessing the network.

Network Protocols

A **network protocol** is a set of rules that allow computers to communicate and exchange information over a network. There are many types of protocols depending on the application.

HTTP (Hypertext transfer protocol) is the protocol used for the World Wide Web. An exchange begins with a request for a web page from a client web browser to a web server. The server then sends the web page to the client.

HTTPS (Secure Hypertext transfer protocol) is a secure way of transferring data between a web browser and a server because the data are encrypted during transfer. Used for e-commerce and online banking.

FTP (File Transfer Protocol) is usually used to download or upload large files from a server to a client.

Ethernet is not a single protocol but a collection of related protocols. LANs most commonly use ethernet. The following is a simplified procedure:

1) Check whether there is any traffic on the ethernet
2) If so wait for traffic to clear
3) Send the packet
4) If collision detected, go to step 1 to resend.

Wi-Fi is a collection of protocol that use radio waves to transmit data between devices. Wi-Fi is a trademark and WLAN (Wireless LAN) is the generic term. Data are transmitted when the medium is clear, and an acknowledgement is received if the transmission was successful. If no acknowledgement is received, then the data are resent as it is assumed that a collision occurred, and the packets did not reach their destination.

Email protocols

SMTP (simple mail transfer protocol) Sends the mail from the user onto the mail server.

IMAP (Internet Message Access Protocol) Retrieves the mail from the mail server to the client (user) and allows access from anywhere on any device because the email remains on the server.

TCP (Transport Control Protocol) When files are sent over the internet they are broken up into small chunks called packets. When they arrive at the destination computer they are reassembled back into the original format. TCP handles and controls all this. TCP waits for acknowledgements to verify whether the packets have reached their destination. TCP will also retransmit packets of they have not arrived at the destination or become corrupted.

IP (Internet Protocol) The internet protocol is a set of rules that govern the transmission of data across the internet.

UDP (User Datagram Protocol) is used as an alternative to TCP. It is used in video conferencing and online gaming when speed is necessary as huge volumes of data are transferred in real time. It improves speed by not checking for lost packets so they do not get re-sent.

TCP/IP

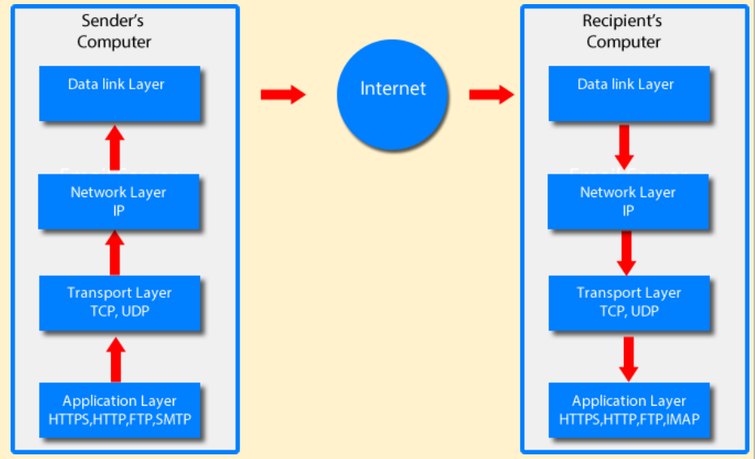
The TCP and IP protocol work closely together and are referred to as TCP/IP. The TCP/IP model consists of four layers that pass data between each layer.

Application layer contains protocols related to the application such as HTTP, HTTPS for web browsers, FTP for file transfer and SMTP and IMAP for email. The application layer interacts with the user via appropriate application software (eg web browser / ftp client).

The **transport layer** establishes the end to end connection. When files are sent over the internet, they are broken up into small chunks called packets. When they arrive at the destination computer they are reassembled back into the original format. It is the role of the transport layer to split the data into packets and pass the data onto the network layer. On the recipient's computer the transport layer reassembles the packets into the original form. The packets are numbered by this layer to allow them to the reassembled. The transport layer chooses the port number for sender and receiver. TCP and UDP are the main protocols used in this layer.

The **network layer** adds the source and destination IP address and route the packets over the network. At the destination the network layer strips out the IP addresses. The IP operates on this layer.

The **data link layer** has a network card and deals with the physical connection and adds the physical addresses (MAC address) of the hardware to the packets that it receives from the network layer. For each step the sender and receiver MAC address is removed then a new sender and receiver MAC address is added. The receiver MAC address becomes the sender MAC address.



Network Security and Protocols

Why do we need network security?

- To prevent unauthorised access to our electronic devices
- To protect our data eg to prevent sensitive data being stolen
- Prevent cyberattacks

Methods of Network Security

Authentication allows us to confirm the identity an individual with usernames and passwords. Digital certificates also provide the identity of a person or device and allow secure information exchange.

Encryption The message is garbled so if it gets intercepted during transmission it will be almost impossible for anyone without the key to read the original message.

Firewall prevents packets containing malware getting on to the computer

MAC address filtering A MAC (Media Access Control) address is a unique identifier for any device that is connected to a network. Each network interface card has a unique MAC address that is a 12 digit hexadecimal code (e.g. 12-F3-EE-56-44-A1).

- *White list filtering* only allows devices on a list to connect to the network.
- *Black list filtering* devices in a black list blocked from accessing the network.

Network Protocols

A **network protocol** is a set of rules that allow computers to communicate and exchange information over a network. There are many types of protocols depending on the application.

HTTP (Hypertext transfer protocol) is the protocol used for the World Wide Web. An exchange begins with a request for a web page from a client web browser to a web server. The server then sends the web page to the client.

HTTPS (Secure Hypertext transfer protocol) is a secure way of transferring data between a web browser and a server because the data are encrypted during transfer. Used for e-commerce and online banking.

FTP (File Transfer Protocol) is usually used to download or upload large files from a server to a client.

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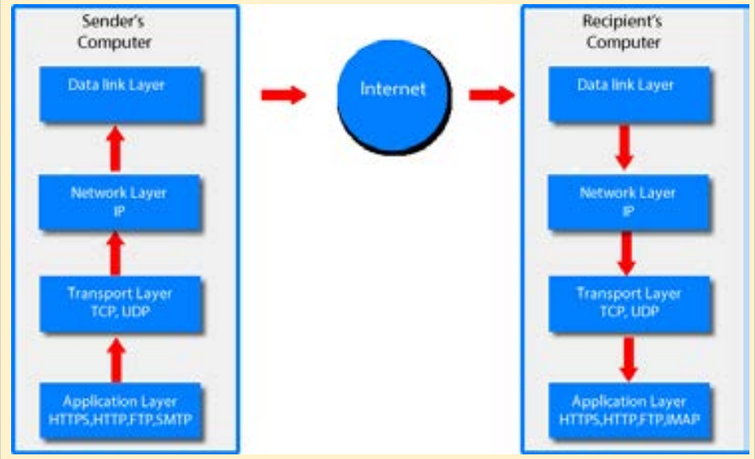


Computer Systems

A computer system has both hardware and software.

Hardware are the physical components that make up a device or computer system. These include both the internal components (eg motherboard, CPU, RAM) and peripheral devices such as printers.

Software is the computer code, programs and algorithms that give instructions to the hardware to make it perform the desired task. Without the software the hardware will not get any instructions and it will not do anything.

Software Classification

Software is split into two types: application software and system software

Application software is a program designed to perform a specific task that the user interacts directly with (eg spreadsheets, web browser and word processor, disk defragmentation).

System software is concerned with the running of the computer. Its purpose is the control the computer hardware and manage the application software. (eg operating system, antivirus, backup tools, firewall)

The **operating system (OS)** is the most important piece of system software. The OS handles management of the processor, memory, input/output devices, applications and security.

- **Application management** - Application software does not need to concern itself with interaction and complexities of managing the hardware because this is dealt with by the operating system. Application software runs on top of operating system which is an intermediary and takes care of interaction with the hardware.

- **Processor resources** – Allows multiple applications to be run simultaneously by manages the processing time between applications and cores and switching processing between applications very quickly. Multiple applications will access the processor resources via a schedule that alternates process between applications. High priority applications will have more CPU time, but it means that lower priority applications will take longer to run.

- **Memory management** – Distributes memory resources between programs and manages transfer of data and instruction code in and out of memory. Ensures that each application does not use excessive memory.

- **Security** – Tools such as anti-virus software and firewalls help protect the computer from attack. In addition requirement for passwords and control of access rights
.
- **Input / Output devices** – OS controls interaction with input (eg keyboard) outputs (eg. Monitor) and storage (eg hard disk) using hardware drivers. Allows users to save files to the hard disk and print documents for instance.

Cloud Computing

- Can store data and files on a server elsewhere that can be accesses via the internet.
- Can use applications over the internet
- Can sync files so that all your devices see the same files
- Can share documents with others
- Can access your files anywhere if you have a good internet connection

Advantages of cloud computing
- Only pay for storage that you use
- Data and files available from anywhere in the world where there is an internet connection
- Data automatically backed up

Disadvantages of cloud computing
- Need a reliable network connection
- Files are hosted elsewhere so a security concern
- the most recent versions of software is often not available
- Transfer of data over the internet will slow down performance.

Advantages of local storage
- Files can be accessed even when there is no internet connection
- More secure as files to not need to be transferred over the network and the user has more control

Disadvantages of local storage
- Users need to organise their backup solutions
- Not so easy to share documents
- Can only access the files locally

Memory

Volatile memory (main memory) When the computer is turned off the contents of volatile memory is lost. When there is no power, volatile memory is erased.

Non-volatile memory (secondary storage) Even when here is no power, the data remain unchanged and can be accessed once again once power has been resumed. This allows you to store files for he long term.

ROM (Read Only Memory) Data can only be read from the device, and cannot the memory cannot be edited or deleted. ROM is only used for situations where you can be sure that updates will not be needed. The computer's BIOS (basic input output system) which controls the boot up sequence is stored on a ROM chip.

RAM (Random Access Memory) - When applications are executed they are loaded into RAM first. RAM is volatile.

Embedded Systems

An embedded system is a computer system that is designed for a specific function, in contrast to a general-purpose computer that can carry out many tasks. Embedded systems typically have a minimal or no user interface. Thus, they can be optimised for size and power consumption, for instance. Examples of embedded systems include digital watches, MP3 players, washing machines, cars and mobile phones.

Secondary Storage

Secondary storage is necessary for saving files long and software including the operating system. Even when the computer is turned off, the data remain unchanged, and can be accessed again once the power supply has been turned on.

Magnetic Hard Disk
- Tracks on the disk platters contain tiny magnets, each holding 1 bit of data.
- The polarity (negative or positive) of the magnets determines whether the bits are 0 or 1.
- The write head modifies the polarity of the magnet as appropriate.
- The read head identifies whether each magnet is negative or positive.
- The tracks are laid out as a series of concentric rings.

Advantages
- Cheap form of storage

Disadvantages
- Less reliable because it contains moving parts that can break
- Electromagnetic surge can corrupt the data held
- Slow speed of read/write access

Optical Disks

- Tracks on the disk contain pits and lands.
- The track is a spiral.
- A laser is emitted and the laser light is reflected when it hits the lands, but is scattered when it hits the pits.
- Depending on whether the light is scattered light is encoded as a binary value of 0 and reflected light is encoded as a 1.
- The sensor is able to detect light reflected, but not scattered.
- Example: Blue-Ray (25 Gb) DVD (4.7 Gb), CD (700 Mb).

Advantages

- Can transfer easily between computers

Disadvantages

- Can scratch easily
- Not much storage compared with other methods.
- No unlimited writes to the hard disk

Solid state Drive

- Use millions of switches called floating gate transistors on microchips to store data.
- Electrons are stored in gates and this is encoded as 0 when there is an electron present and encoded a 1 when there is no electron present.
- The electros remain trapped even when there is no flow of electricity.
- Contain no moving parts and are therefore more robust that optical and magnetic storage.

Advantages

- Much faster that other means of storage
- More reliable than other means if you are only reading
- Quiet

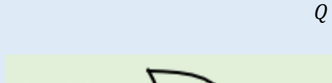
Disadvantages

- More expensive per volume of storage
- Reliability might be an issue if you do a lot of writing

Boolean Logic

NOT gate - The output is the opposite of the input

$$Q = \bar{A}$$
$$Q = NOT\ A$$

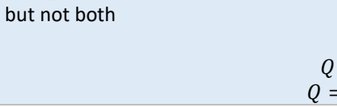


NOT truth table

Input	Output
0	1
1	0

AND gate - has two inputs and will have a true output if the two inputs are true otherwise the output will be false

$$Q = A.B$$
$$Q = A\ AND\ B$$

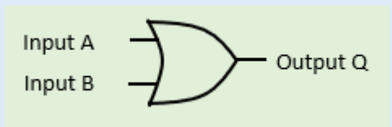


AND truth table

Input - A	Input - B	Output
0	0	0
1	0	0
0	1	0
1	1	1

OR gate - has two inputs and will have a true output if either or both the inputs are true

$$Q = A + B$$
$$Q = A\ OR\ B$$

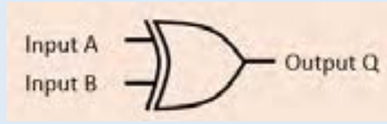


OR truth table

Input - A	Input - B	Output
0	0	0
1	0	1
0	1	1
1	1	1

XOR gate - has two inputs and will have a true output if either the inputs are true but not both

$$Q = A \oplus B$$
$$Q = A\ XOR\ B$$



OR truth table

Input A	Input B	Output
0	0	0
1	0	1
0	1	1
1	1	0

Converting a truth table to a logic circuit

There is a general approach to converting a truth table into a logic circuit.

We consider only the lines with an output of 1.
We take in the input of each and then AND.

We then OR between each statement such that
(NOT A AND B) OR (A AND NOT B). We can then draw the logic circuit.

Worked example: What is the logic circuit for the following truth table

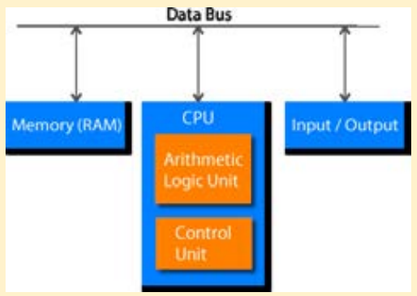
Input - A	Input - B	Output
0	0	0
1	0	1
0	1	0
1	1	1

(A AND NOT B) OR (A AND A)

System Architecture

CPU (Computer Processing Unit) or processor Fetches, decodes and executes instructions and performs logical and arithmetic operations.

Von Neumann architecture is the stored program concept, where program instructions and the data to be processed can be stored in the same memory.



Components of a CPU

Bus Wires through which data and instructions are transferred between computer components

Clock keeps all the CPU components synchronised

Arithmetic Logic Unit (ALU) Every operation takes place here. This is where the arithmetic (eg adding two binary numbers) and logic operations (eg checking to see if one number is bigger than another) take place.

Control Unit Decode the machine code instruction so that the ALU knows what to do with the instruction. Controls and monitors data transfer between different input and output hardware components

Factors affecting CPU performance

Clock speed is the number of cycles that a processor carries out per second. Each cycle of the CPU allows a single action (instruction) to be carried out. The greater the clock speed, the greater the number of operations and the faster the computer will run.

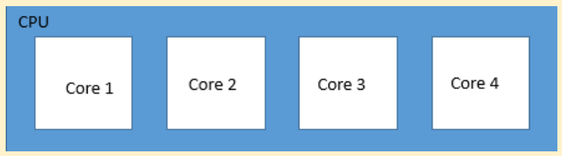
Number of processor cores A core is CPU in its own right. Nowadays most CPUs have multiple cores. Having multiple cores allows instructions to be carried out concurrently (at the same time), whereas a single core will only allow carry out instructions in serial (one at a time).

Latency Delay in transfer of data between components

Cache size Cache is a volatile memory store on the processor. Cache is much faster but smaller that RAM. Frequently used data and instructions within an application can be stored in cache instead of fetching from RAM which is quite slow. The bigger the cache the greater the volume of data and instructions that can be stored thereby reducing latency and improving performance of the CPU.

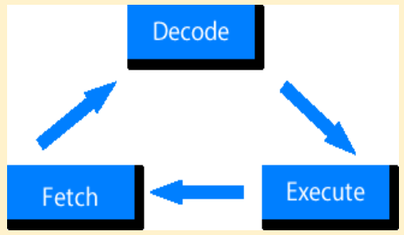
Cache type There are three levels of cache**.** Cache Level is a trade off between size and speed

- *Level 1 Cache* closest to the CPU and is the fastest cache (lowest latency), but does not have much capacity
- *Level 2 Cache* – is slower and further away from the CPU than L1 cache so latency is greater, but has more storage capacity.
- *Level 3 Cache* is the slower than L1 and L2 cache; much faster than RAM; has greater capacity than L1 and L2 cache.



Fetch execute cycle

1. Instructions are loaded into memory
2. Processor fetches the instruction from the main memory
3. Instruction is decoded so the CPU knows what to do with the instruction
4. Processor then executes the instruction
5. Result of the instruction can be stored in memory
6. Next instruction is then fetched from main memory and the cycle repeats itself.



Classification of programming languages

High level programming languages are closer to human language and is therefore easier to understand. A translator is used to convert the instructions into code that the computer understand. High level languages allow programs to be written that is independent of the type of computer. High level programming languages allow code to be written that is independent of the type of computer system. It is up to the compiler to translate the code into the right machine code for a particular code. There is a huge variety of high level programming languages, and the choice depends on the application.

Low level programming languages refer to machine code and assembly language. The Low level refers to low level of abstraction. The low level language is close to the language understood by the computer where operations map to the instruction in the processor instruction set. However it is difficult for humans to understand. Low level languages are appropriate for developing new operating systems, embedded systems and hardware device drivers

Machine code is expressed in binary values 0 and 1. This is the language that computers understand. All codes whether assembler or high level programming languages need to be translated into machine code. Machine code is specific to a processor.
Machine code instructions are made up of two parts the operator and the operand. The processor decodes the operator to identify the task that is to be carried out (eg. Add, load). The operand is the value or memory address that that instruction is to be operated on

Machine code instruction	
Operator	Operand
0011	10010100

Assembly language provides basic computer instructions for programs to run. There is a one to one relationship between machine code and assembly code instructions. One assembly language instruction maps to one machine code instruction, thus the structure of assembly language and machine code is the same, but where machine codes uses 0 and 1 which are very difficult for programmer to understand, assembly language uses mnemonics which is easier for the programmer.

Assembly language sample Instruction set

```
LOAD #23 # Load from RAM to processor
MOV a 23 # Transfer in number 23 into the variable a
ADD 2 3  # Add 2 values
STORE    # store data in RAM
```

Each type of processor has its own instruction set and therefore its own assembly language and machine code. So Assembly code written for one type of processor will not run on another.

Low level languages versus high level languages

	Advantages	**Disadvantages**
Low level	Produce code that is faster and better optimised than high level languages. Appropriate for developing new operating systems, embedded systems and hardware device drivers	Difficult to understand and modify Assembly code is written for a specific processor architecture, and so is not portable to other computer architectures
High level	High level programming languages allow code to be written that is more portable. Thus code can be run on different of the types of computer system with different processor architecture. Easier to understand Easier to modify	Needs a translator run slower because of the layers of abstraction and there is inefficiency in translator.

Program translators allow programs to be translated into machine code so the than programs can be run on a computer.

Interpreter converts high level languages into machine code one instruction at a time on-the-fly while the program is running. Each instruction is converted to machine code once the previous instruction has been executed. Interpreters are good for debugging code because the program stops as soon as the error has been found. However running code this way is much slower running compiled code. The machine code is not saved.

Compiler A program that converts high level languages into machine code before the program is run. A compiler saves the machine code,

Cybersecurity

Cybersecurity is concerned with the protection of computer systems, computer networks and data. Its purpose is to:

- to protect computers and networks from cyberattacks
- to prevent unauthorised access to computers
- to protect computers against damage caused by malicious software
- to prevent data from being stolen
- to protect against the disruption of services running on the computer

Cyber Security Threats

Malware is software that has been purposely developed to damage, disrupt or take control of computer systems.

Social engineering techniques manipulate people into giving away confidential and personal information.

Weak passwords are easy to guess. Passwords that use words are easy to crack using an algorithm that systematically goes through all the words in a dictionary until the word matches the password.

Default passwords Upon registration for an online account, users may be given a default password that they do not change. Often these passwords are sent out unencrypted via email so pose a major security vulnerability.

Removable media such as a USB pen drive can be a vector for transmitting malware.

Unpatched/outdated software Software needs regular updates to fix security vulnerabilities in computer systems. Software that remains unpatched is vulnerable to attack.

Misconfigured access rights Users should only have access to files and data that they need, but sometimes they have access that they should not.

Penetration Testing

Penetration testing is legitimate testing of an organisation's computer system to identify whether there are any vulnerabilities that an attacker could exploit. By identifying vulnerabilities, these can be patched before the system gets attacked.

White box testing testers are given some information about the network, such as network architecture, source code, and IP addresses. This is designed to simulate an attack by a malicious insider.

Black box testing testers are given very little information about the network before the test. This is designed to simulate an outside attack or cyber warfare attack.

Cyber Security Threats - Malware

Computer viruses replicate themselves and can transfer from one computer to another. They are activated by a user often as email attachments and attachment to other files and programs.

Trojan gains access to a computer by pretending to be legitimate software. The trojan allows unauthorised backdoor access to a computer without the user being aware.

Spyware records the activity on your computer such as your keystrokes, thereby logging your passwords for instance and then send the data back over the network to a hacker. Spyware can also be used to control your webcam and microphone.

Adware includes banners and popups that are automatically installed onto a computer. Whilst this does not cause any, adware is undesirable and can slow down the performance of a computer.

Worms spread like viruses but do not require human intervention. They attach themselves to network tools to spread automatically around a network very quickly.

Methods to detect and prevent cyber security threats

Biometric measures such as fingerprints, facial recognition and iris scans are increasingly being used to verify a user's identity for mobile devices. These are more secure than passwords that can be guessed and forgotten. Biometric measures require a user to be present when signing into a system.

Automatic software updates to firewalls, operating systems, antivirus and other security software are needed so that software can be kept up-to-date against new malware and to fix recently discovered vulnerabilities.

CAPTCHA is a test that can distinguish between humans and bots. It uses images that machines cannot interpret but humans can.

Password systems Virtually all accounts require passwords to access. Some secure sites such as online banking require 2 passwords. Banks may also contact you by phone to confirm a large transaction. This is called two-factor authentication. Password systems can force users to have strong passwords that regularly need to be changed.

Using email to confirm a person's identity Often when you register for an online service you need to provide your email address. You are then requested to activate a link sent to you in an email. This is to confirm that the email account is actually active. Helps to ensure that the users are human and not bots.

Anti-virus software scans the computer intermittently to identify whether there is any malware on the computer. The software compares each file against a database of known virus codes. If viruses are found (ie contains code that is in the database) the file is quarantined. That is the file cannot be run without explicit authorisation from the user. New malware are regularly being created and so anti-virus software needs to be updated to identify the new viruses. That is why anti-virus software is regularly updated.

Cyber Security Threats – Social Engineering

Blagging (Pretexting) Fraudsters make up a scenario to con victims into revealing something they would not ordinarily do. They may have found out some personal information about you from social media sites, to pretend they already know you.

How to prevent

- Use biometric measures because these cannot be divulged.
- Ensure you have your privacy settings on any social media to maximum so that fraudsters cannot find information about you such as your date of birth, where you live etc.

Phishing Normally an email or text messaging scam where victims are conned into believing that they are being contacted by their bank for instance and can give sensitive personal details such as bank account passwords.

How to prevent

- Awareness and vigilance. Be particularly aware of unsolicited texts, emails and phone calls. Do not give personal confidential information away. Official organisations such as banks will never ask for this information.
- Apply email filtering to prevent dubious emails getting through.

Pharming Users are redirected to a fraudulent website that they believe to be genuine because it looks like the real site. For instance, you could be directed site that pretends to be an online store that asks you for your credit card information.

How to prevent

- Check the URL in the web address. For secure websites such as banking or e-commerce sites the HTTPS protocol should be used.
- Website filter

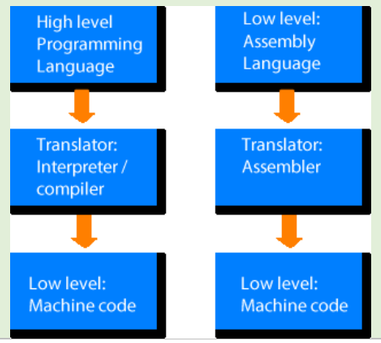
Shoulder surfing Fraudsters look over the shoulder of users to see what passwords or pin numbers that are being typed into the device. This can easily occur at computer terminals and at ATMs that are out in the street.

How to prevent

- Be aware of who is around you when typing in your pin into an ATM or into a chip and pin device. Make sure you cover your hands and they are shielded from prying eyes.
- Place computers in locations that makes shoulder surfing difficult

so the source code is no longer needed A compiler allows a program to be run faster than interpreted code. Software is normally distributed as compiled machine code. For proprietary software this is good because other people cannot copy the code and use it for their own applications.

Assembler Assembler converts assembly language instructions into machine code.



Databases

A **database** is a collection of **data** stored in an organised and logical way. Data are stored in **tables** and tables are made up of **records** (rows) which can have 1 more **attributes** (columns). An example of a table is given here:

Student ID	First Name	Surname	DateOfBirth	FormTutor
712	Bart	Simpson	1/4/10	Principal Skinner
423	Lisa	Simpson	20/5/12	Mrs Krabapple
917	Ralph	Wiggum	16/6/10	Mrs Krabapple
124	Nelson	Muntz	14/9/09	Principal Skinner

Entity

Each table contains information about an **entity**. A database entity is an object, person, item or thing about which you want the data stored. Examples of database entities are:

Person entity	Object entity	Item entity
✓ Customer	✓ Book	✓ Sale transaction
✓ Employee	✓ Car	✓ Appointment
✓ Student	✓ House	
✓ Teacher		

Data

Data are atomised facts, values and observations that are stored in a database. That is they cannot be broken up further. Data can be stored as any data type.

Field	Student ID	First Name	Height	Date of Birth	Had Flu Vaccination?
Date Type	*Integer/ number*	*Text/ string*	*Real/ float*	*date*	*Boolean – Yes/no or true/false*
Record 1	712	Bart	1.35	1/4/2010	True
Record 1	423	Lisa	1.16	20/5/2012	True
Record 1	917	Ralph	1.05	16/6/2010	False

Database Index

A database index allows for quick speed of retrieval of data from searches of tables. The index is a separate file that has a sorted column of values that link to records in a table.

Record

A record is a single row in a table that can have data stored as 1 or more fields (columns). A record needs to be uniquely identifiable and needs an entity identifier which in this example is Student ID. A table contains multiple records. The following example contains 4 records.

	StudentID	FirstName	Surname	DateOfBirth	FormTutor
Records	712	Bart	Simpson	1/4/10	Principal Skinner
	423	Lisa	Simpson	20/5/12	Mrs Krabapple
	917	Ralph	Wiggum	16/6/10	Mrs Krabapple
	124	Nelson	Muntz	14/9/09	Principal Skinner

The **Student ID** field contains unique values for each record; this means that each value is different. The **Surname** field does not contain unique values. For instance, *Simpson* appears twice.

Field

Fields / attributes form the columns of the database table and refer to the characteristics of a record. For instance, the fields of the table below include:

- ✓ Student ID
- ✓ First name
- ✓ Surname
- ✓ Date of Birth
- ✓ Form tutor

Fields

Student ID	First Name	Surname	Date of Birth	Form Tutor
712	Bart	Simpson	1/4/10	Principal Skinner
423	Lisa	Simpson	20/5/12	Mrs Krabapple
917	Ralph	Wiggum	16/6/10	Mrs Krabapple
124	Nelson	Muntz	14/9/09	Principal Skinner

Data Redundancy

Data redundancy occurs when the same data are stored in multiple places and so we have repeating data. As a result more space is needed to store the same values several times which is not efficient. In the table below notice how the Author Name fields are repeated.

BookID	Title	FirstName	Surname
1	Fantastic Beasts and Where to Find Them	J.K.	Rowling
2	Harry Potter and the Chamber of Secrets	J.K.	Rowling
3	Harry Potter and Order of the Phoenix	J.K.	Rowling
4	The BFG	Roald	Dahl
5	Going Solo	Roald	Dahl
6	Danny Champion of the World	Roald	Dahl
7	War Horse	Michael	Morpurgo
8	Private Peaceful	Michael	Morpurgo

Data Inconsistency

Data inconsistency occurs when data pertaining to the same object are in fact stored in a different format. For instance, JK. Rowling and Joanne Rowling refer to the same person, but the database may record these as two separate authors.

BookID	Title	FirstName	Surname
1	Fantastic Beasts and Where to Find Them	JK	Rowling
2	Harry Potter and the Chamber of Secrets	Joanne	Rowling
3	Harry Potter and Order of the Phoenix	Joanne	Rowling
4	The BFG	Roald	Dahl
5	Going Solo	Roald	Dahl
6	Danny Champion of the World	Roald	Dahl
7	War Horse	Michael	Morpurgo
8	Private Peaceful	Michael	Morpurgo

Relational Databases

Complex databases can be made up of multiple tables linked together by shared values called a key. These relational databases make it easier to search and find information that you want. Relational databases reduce the amount of duplication (redundancy) of data and reduces inconsistencies in the data.

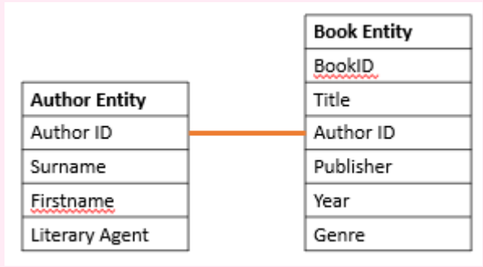
Primary Key

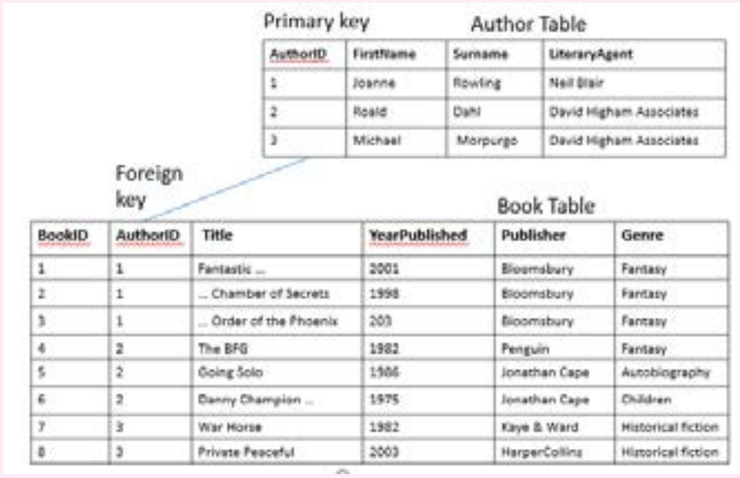
All tables have a field that is the primary key and uniquely identifies each record. This is also known as entity identifier

Foreign Key

These are primary keys that are held as fields in other tables to cross reference tables. They allow tables to be linked together.

For instance, in a book database with two tables including Author table and Book table, AuthorID is primary key in Author table and is used to cross-reference with the AuthorID in the book table which is the foreign key so the two tables can be linked.





Structured Query Language

We will use this book table in the examples that follow.

Book ID	Title	Author	Year Published	Publisher	Genre
1	Fantastic Beasts and Where to Find Them	JK Rowling	2001	Bloomsbury	Fantasy
2	Harry Potter and the Chamber of Secrets	JK Rowling	1998	Bloomsbury	Fantasy
3	Harry Potter and Order of the Phoenix	JK Rowling	2003	Bloomsbury	Fantasy
4	The BFG	Roald Dahl	1982	Penguin	Fantasy
5	Going Solo	Roald Dahl	1986	Jonathan Cape	Autobiography
6	Danny Champion of the World	Roald Dahl	1975	Jonathan Cape	Children
7	War Horse	Michael Morpurgo	1982	Kaye & Ward	Historical fiction
8	Private Peaceful	Michael Morpurgo	2003	HarperCollins	Historical fiction

Select

To retrieve data from the table

To retrieve all records data from the table we can use the SELECT statement with the wild card operator *.

```
SELECT *
FROM tableName
```

Examlpe

```
SELECT *
FROM book
```

RETRIEVED DATA

1	Fantastic Beasts ..	JK Rowling	2001	Bloomsbury	Fantasy
2	..Chamber of Secrets	JK Rowling	1998	Bloomsbury	Fantasy
3	.. Order of the Phoenix	JK Rowling	2003	Bloomsbury	Fantasy
4	The BFG	Roald Dahl	1982	Penguin	Fantasy
5	Going Solo	Roald Dahl	1986	Jonathan Cape	Autobiography
6	Danny Champion ..	Roald Dahl	1975	Jonathan Cape	Children
7	War Horse	Michael Morpurgo	1982	Kaye & Ward	Historical fiction
8	Private Peaceful	Michael Morpurgo	2003	HarperCollins	Historical fiction

We can also choose the fields that we wish to retrieve:

```
SELECT field1, field2, …
FROM tableName
```

EXAMPLE

```
SELECT Author, Title
FROM book
```

RETRIEVED DATA

Fantastic Beasts and Where to Find Them	JK Rowling
Harry Potter and the Chamber of Secrets	JK Rowling
Harry Potter and Order of the Phoenix	JK Rowling
The BFG	Roald Dahl
Going Solo	Roald Dahl
Danny Champion of the World	Roald Dahl
War Horse	Michael Morpurgo
Private Peaceful	Michael Morpurgo

We can sort the output of our SELECT statement by using the ORDER BY clause. ASC and DESC refer to sorting ascending and descending alphabetically or numerically of a specified field.

```
ORDER BY fieldname ASC|DESC
```

EXAMPLE SORT ASCENDING

```
SELECT Author, Title
FROM book
ORDER BY Title ASC
```

Danny Champion of the World	Roald Dahl
Fantastic Beasts and Where to Find Them	JK Rowling
Going Solo	Roald Dahl
Harry Potter and the Chamber of Secrets	JK Rowling
Harry Potter and Order of the Phoenix	JK Rowling
Private Peaceful	Michael Morpurgo
The BFG	Roald Dahl
War Horse	Michael Morpurgo

EXAMPLE SORT DESCENDING

```
SELECT Author, Title
FROM book
ORDER BY Title DESC
```

War Horse	Michael Morpurgo
The BFG	Roald Dahl
Private Peaceful	Michael Morpurgo
Harry Potter and Order of the Phoenix	JK Rowling
Harry Potter and the Chamber of Secrets	JK Rowling
Going Solo	Roald Dahl
Fantastic Beasts and Where to Find Them	JK Rowling
Danny Champion of the World	Roald Dahl

WHERE CLAUSE

We can filter our selection using the WHERE clause

```
WHERE fieldname operator value
```

Operator	Description
=	Value equal to
!=	Value not equal to
<	Value less than
>	Value greater than
<=	Value less than or equal to
>=	Value greater than or equal to

SELECT USING WHERE CLAUSE

EXAMPLE 1 – SELECT BOOKS WRITTEN SINCE 2000

```
SELECT Title, Author, yearPublished
FROM book
WHERE YearPublished > 2000
```

Fantastic Beasts and Where to Find Them	JK Rowling	2001
Harry Potter and Order of the Phoenix	JK Rowling	2003
Private Peaceful	Michael Morpurgo	2003

EXAMPLE 2 – SELECT BOOKS WRITTEN BY MICHAEL MORPURGO

```
SELECT Title, Author
FROM book
WHERE Author = "Michael Morpurgo"
```

Notice how the author name is in speech marks because it is a string datatype.

War Horse	Michael Morpurgo
Private Peaceful	Michael Morpurgo

EXAMPLE 3 – SELECT BY DATE

```
WHERE Date < #1/1/2010#
```

For data type date you need to use #. Eg

BOOLEAN OPERATORS

We can use Boolean and relational operators with the WHERE clause if we have multiple conditions that need to be met.

Operator	Description
OR	Allows us to combine multiple conditions. Any of the conditions can be true for the overall expression to return true
AND	Allows us to combine multiple conditions. All conditions need to be true for the overall expression to return true
NOT	Reverses the value of a condition. If it is true it will be false and vice versa

EXAMPLE – SELECT ALL BOOKS WRITTEN BY MICHAEL MORPURGO SINCE 2016

```
SELECT Title, Author FROM book
WHERE Author="Michael Morpurgo"
AND YearPublished > 2000
```

Private Peaceful	Michael Morpurgo

UPDATE - TO UPDATE RECORDS IN A DATABASE

To make changes to a record that is already in a table we can use the UPDATE statement.

EXAMPLE 1: Update the book table to change the genre of all fields to Children

```
UPDATE book
SET Genre="Children"
```

EXAMPLE 2: Update the book table to change the author name from JK Rowling to Joanne Rowling.

```
UPDATE book
SET Author="Joanne Rowling"
WHERE Author="JK Rowling"
```

Book ID	Title	Author	Year Published	Publisher	Genre
1	Fantastic Beasts .	Joanne Rowling	2001	Bloomsbury	Children
2	Harry Potter ..	Joanne Rowling	1998	Bloomsbury	Children
3	Harry Potter ..	Joanne Rowling	2003	Bloomsbury	Children
4	The BFG	Roald Dahl	1982	Penguin	Children
5	Going Solo	Roald Dahl	1986	Jonathan Cape	Children
6	Danny .	Roald Dahl	1975	Jonathan Cape	Children
7	War Horse	Michael Morpurgo	1982	Kaye & Ward	Children
8	Private Peaceful	Michael Morpurgo	2003	HarperCollins	Children

INSERT INTO - ADDING NEW RECORDS

INSERT INTO is a commonly used command in SQL for adding new records to database tables. To insert all attributes for a table we can use:

```
INSERT INTO table
VALUES(value1, value2,…)
```

EXAMPLE

```
INSERT INTO book
VALUES ('Boy', 'Roald Dahl', 1984, 'Penguin',
'Autobiography')
```

Sometimes we do not enter data into every field. Instead we can explicitly state which fields we would like to add the data to.

```
INSERT INTO table (field1, field2,…)
VALUES(value1, value2,…)
```

The values correspond to the fields in the table i.e.:

- ✓ Field 1: Book ID
- ✓ Field 2: Title
- ✓ Field 3: Author
- ✓ Field 4: YearPublished
- ✓ Field 5: Publisher
- ✓ Field 6: Genre

EXAMPLE

```
INSERT INTO book (Title, Author, YearPublished,
Publisher, Genre) VALUES ('Boy', 'Roald Dahl', 1984,
'Penguin', 'Autobiography')
```

DELETING RECORDS

To delete a record we specify which record(s) from which table we wish to remove.

```
DELETE FROM table WHERE condition
```

EXAMPLES

Remove all books

```
DELETE FROM book
DELETE * FROM book
```

The WHERE clause is used to filter records so that we do not apply a statement to a whole table.

Remove all books written by JK Rowling:

```
DELETE FROM book WHERE Author='JK Rowling'
```

Remove all books written by Michael Morpurgo and written before 2000

```
DELETE FROM book WHERE Author='Michael Morpurgo' AND
YearPublished < 2000
```

SELECT ATTRIBUTES FROM MULTIPLE TABLES

So far we have looked at a database made up of a single table. databases can be made up of multiple tables. We can link tables together using primary keys and foreign keys. We can use SQL statements to select data from multiple tables. When selecting the data from multiple tables we need to specify the name of the table from which each attribute we are wishing to retrieve.

We will use the following database table as an example case study.

Primary key — Author Table

AuthorID	FirstName	Surname	LiteraryAgent
1	Joanne	Rowling	Neil Blair
2	Roald	Dahl	David Higham Associates
3	Michael	Morpurgo	David Higham Associates

Foreign key — Book Table

BookID	AuthorID	Title	Surname	YearPublished	Publisher
1	1	Fantastic Beasts and Where to Find Them	2001	Bloomsbury	Fantasy
2	1	Harry Potter and the Chamber of Secrets	1998	Bloomsbury	Fantasy
3	1	Harry Potter and Order of the Phoenix	203	Bloomsbury	Fantasy
4	2	The BFG	1982	Penguin	Fantasy
5	2	Going Solo	1986	Jonathan Cape	Autobiography
6	2	Danny Champion of the World	1975	Jonathan Cape	Children
7	3	War Horse	1982	Kaye & Ward	Historical fiction
8	3	Private Peaceful	2003	HarperCollins	Historical fiction

We need to specify that we only wish to select the records where the primary key and foreign key match.

EXAMPLES

Retrieve data book title and author surname

```
SELECT book.Title, author.Surname
FROM author, book
WHERE author.AuthorID=book.AuthorID
```

Fantastic Beasts and Where to Find Them	JK Rowling
Harry Potter and the Chamber of Secrets	JK Rowling
Harry Potter and Order of the Phoenix	JK Rowling
The BFG	Roald Dahl
Going Solo	Roald Dahl
Danny Champion of the World	Roald Dahl
War Horse	Michael Morpurgo
Private Peaceful	Michael Morpurgo

Retrieve book title and author surname where genre is *fantasy*

```
SELECT book.title, author.surname
FROM author, book
WHERE author.AuthorID=book.AuthorID
AND book.Genre="Fantasy"
```

Fantastic Beasts and Where to Find Them	JK Rowling
Harry Potter and the Chamber of Secrets	JK Rowling
Harry Potter and Order of the Phoenix	JK Rowling
The BFG	Roald Dahl

Retrieve book title and author surname where genre is fantasy and sort in descending order Title

```
SELECT book.title, author.surname
FROM author, book
WHERE author.AuthorID=book.AuthorID
AND book.Genre="Fantasy"
ORDER BY title DESC
```

The BFG	Roald Dahl
Harry Potter and Order of the Phoenix	JK Rowling
Harry Potter and the Chamber of Secrets	JK Rowling
Fantastic Beasts and Where to Find Them	JK Rowling

Sound

Sample - Measure of the analogue signal at a given point in time

Sample rate - number of samples taken per second and is measured in Hertz.

Sample resolution - number of bits used to represent each sample

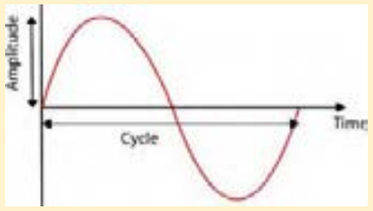
The size of sound files can be calculated using:

size of file = length (seconds) x sample rate x sampling resolution

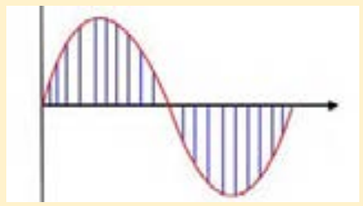
For sound to be stored digitally on a computer it needs to be converted from its continuous analogue form into a discrete binary values. The steps are:

1. Microphone detects the sound wave and converts it into an electrical (analogue) signal
2. The analogue signal is sampled at regular intervals
3. The samples are approximated to the nearest integer (quantised)
4. Each integer is encoded in binary with a fixed number of bits

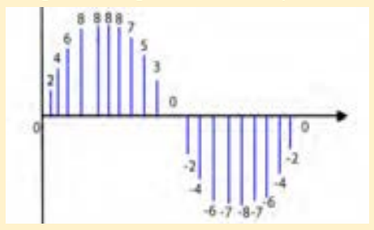
Original analogue signal



Sample signal at regular intervals



Integer values give to each sample



Encode as binary

0 2 4 6 8 8 8 8 7 5 3 0 ->

00000 00010 00100 01000

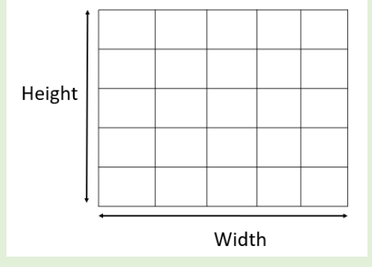
01000 01000 01000 00111

00101 00011 …

Images

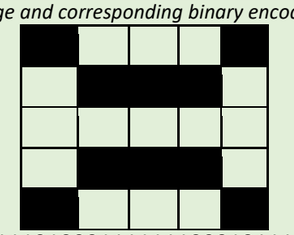
Bitmap images are made up from tiny dots called **pixels**. Each pixel will have a colour associated with it. An image can then be constructed from many of pixels which will have different colours arranged in rows and columns.

Total number of pixels in image = width in pixels x height in pixels



Colour depth is the number of bits used to represent each pixel in an image. If we have a black and white image it has two colours. Each pixel can be represented by a single pixel because a bit value of 0 is black and 1 is white.

Image and corresponding binary encoding



0111010001111111000101110

To represent more colours we can use more bits. For instance if we have 2-bits per pixel we can represent 4 colours because we know have 4 binary code combinations (00, 01, 10 11) where each code represents a different colour

Pixilation occurs when the image is overstretched. In these situations, the image looses quality and has a blocky and blurred appearance. This arises when the image is presented at too large a size and there are not enough pixels to reproduce the details in the image at this larger size.

Calculating the size of a bitmap image

File size in bits = width in pixels x height in pixels x colour depth

File size in bytes = width in pixels x height in pixels x colour depth / 8

Data Compression

The purpose of data compression is to make the files smaller which means that:

- Less time / less bandwidth to transfer data
- Take up less space on the disk

Given that there are 7 bits per ASCII character, the uncompressed size of an ASCII phrase is:

size = number of characters (including spaces) x 7

Run Length Encoding (RLE) is a compression method where sequences of the same values are stored in pairs of the value and the number of those values. For instance, the sequence:

`0 0 0 1 1 0 1 1 1 1 0 1 1 1 1`

would be represented as:

`3 0 2 1 1 0 4 1 1 0 4 1`

Huffman coding is a form of compression that allows us to use fewer bits for higher frequency data. More common letters are represented using fewer bits than less common letters. For instance, “a” and “e”, which occur in many words would be represented with fewer bit than “z” which occurs rarely.
This allows for much more effective compression than RLE.

The steps involved in Huffman encoding as are follows:

1. Do frequency table
2. Order table
3. Create the tree
4. Add 1, 0 to the branches
5. Encode letters
6. Encode message

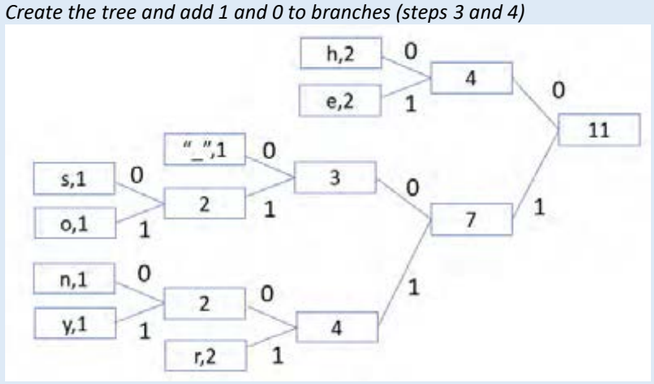
Worked Example: How much smaller is the phrase henry horse encoded using Huffman encoding compared with its uncompressed size.

Calculate the uncompressed size
In the phrase *henry horse* there are 11 characters (including the space). Therefore the uncompressed size is 11 x 7 = 77 bits

Generate ordered frequency table (steps 1 and 2)

letter	frequency
e	2
h	2
r	2
<space>	1
o	1
s	1
y	1
n	1

Create the tree and add 1 and 0 to branches (steps 3 and 4)



Encode letters

Letter	encoding
e	01
h	00
r	111
<space>	100
o	1011
s	1000
n	1100
y	1101

Encode message
00 01 1100 111 1101 100 00 1011 111 1000 01 = 33 bits

Therefore by using compression we have reduced the size from 77 bits to 33 bits a saving of 44 bits.

Data Representation

Number bases

Denary (or decimal) is base-10 and is the number system we are most familiar with. We have the columns of units, tens, hundreds, thousands and so on. Base-10 means that we have 10 possible values (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) in each column.

Binary is base-2 and has 2 values, 0 and 1. It requires a greater number of digits in binary to represent a number than denary. This is how data and instructions are stored in a computer.

To calculate the maximum value for a given number of bits we use 2^n-1 where n is the number of bits. For example for 4 bits we have 2^4-1 which is 15.

Bits	Max value binary	Max value denary
1	1_2	1_{10}
2	11_2	3_{10}
3	111_2	7_{10}
4	1111_2	15_{10}
5	11111_2	31_{10}
6	111111_2	63_{10}
7	1111111_2	127_{10}
8	11111111_2	255_{10}

Hexadecimal is base-16. To make up the 16 values we use the ten denary numbers in addition to 6 letters (A, B, C, D, E, F).

Denary	Hex.	Binary
0_{10}	0_{16}	0000_2
1_{10}	1_{16}	0001_2
2_{10}	2_{16}	0010_2
3_{10}	3_{16}	0011_2
4_{10}	4_{16}	0100_2
5_{10}	5_{16}	0101_2
6_{10}	6_{16}	0110_2
7_{10}	7_{16}	0111_2

Denary	Hex.	Binary
8_{10}	8_{16}	1000_2
9_{10}	9_{16}	1001_2
10_{10}	A_{16}	1010_2
11_{10}	B_{16}	1011_2
12_{10}	C_{16}	1100_2
13_{10}	D_{16}	1101_2
14_{10}	E_{16}	1110_2
15_{10}	F_{16}	1111_2

Hexadecimal is used a lot in computing because it much easier to read than binary. There are far fewer characters than binary. So hexadecimal is often used in place of binary as a shorthand to save space. For instance, the hexadecimal number 7BA3D456 (8 digits) is 01111011101000111101010001010110 (32 digits) in binary which is hard to read.

Hexadecimal is better than denary at representing binary because hexadecimal is based on powers of 2.

Converting between number bases

Denary to binary conversion

1. Create a grid:

128	64	32	16	8	4	2	1

2. Add a 1 to the corresponding cell if number contributes to target number and 0 to all the other cells

Worked example: convert 24_{10} to binary.

128	64	32	16	8	4	2	1
0	0	0	1	1	0	0	0

$16_{10} + 8_{10} = 24_{10}$
The binary value is $\underline{11000_2}$ (we can ignore the preceding zeros)

Binary to denary conversion

Worked example: Convert 01011001_2 to denary

1. Create the grid:

128	64	32	16	8	4	2	1
0	1	0	1	1	0	0	1

2. Add up the cells that have a corresponding value of 1:
   $64 + 16_{10} + 8_{10} + 1 = \underline{89_{10}}$

Hexadecimal to denary conversion

1) Convert the two hex values separately to denary value
2) Multiply the first value by 16
3) Add the second value

Worked example: Covert $A3_{16}$ to denary
$A_{16} = 10_{10}$
$3_{16} = 3_{10}$
$(10_{10} \times 16_{10}) + 3_{10} = \underline{163_{10}}$

Denary to hexadecimal conversion

1) Integer divide the denary number by 16
2) Take the modulus 16 of the denary number
3) Convert the two numbers to the corresponding hex values.

Worked example: Convert 189_{10} to hex
$189_{10} / 16_{10} = 11_{10}$ remainder 15_{10}
$11_{10} = B_{16}$
$15_{10} = F_{16}$
$189_{10} = \underline{BF_{16}}$

Hexadecimal to binary conversion

1. Find the corresponding 4-bit binary number for the two numbers
2. Concatenate the two binary values to give the final binary value

Example: convert $C3_{16}$ to binary
$C_{16} = 12_{10} = 1100_2$
$3_{16} = 3_{10} = 0011_2$
$\underline{11000011_2}$

Binary to hexadecimal conversion

1. Split the binary number into groups of 4 bits: 1110_2 1010_2
2. Find the corresponding Hex value for each of the 4-bit groups

Worked example: Convert 11101010_2 to hexadecimal
1110_2 | 1010_2
$1110_2 = 14_{10} = E_{16}$
$1010_2 = 10_{10} = A_{16}$
$\underline{EA_{16}}$

Units of Information

Unit	Symbol	Number of bytes
Kilobyte	KB	10^3 (1000)
Megabyte	MB	10^6 (1 million)
Gigabyte	GB	10^9 (1 billion)
Terabyte	TB	10^{12} (1 trillion)

A bit is the fundamental unit of binary numbers. A bit is a binary digit that can be either 0 or 1.

1 byte = 8 bits
1 nibble = 4 bits

Character Encoding

Character coding schemes allows text to be represented in the computer. One such coding scheme is **ASCII**. ASCII uses 7 bits to represent each character which means that a total of 128 characters can be represented.

Lower case letters	26
Upper case letters	26
Numbers	10
Symbols (e.g. comma, colon)	33
Control characters	33

ASCII encoded values for some characters

A	1000001_2	65_{10}
B	1000010_2	66_{10}
a	1100001_2	97_{10}
b	1100010_2	98_{10}
"0"	0110000_2	48_{10}
"1"	0110001_2	49_{10}

- ASCII has a limited character set (7 bits, 128 characters), but **Unicode** has 16 bits and allows many more (65K) characters.
- Unicode provides a unique character for different languages and different platforms.
- It allows us to represent different alphabets for instance Greek, Mandarin, Japanese, Emojis etc.
- Unicode and ASCII are the same up to 127.

Binary addition

Binary addition rules

$0_2 + 0_2 = 0_2$
$0_2 + 1_2 = 1_2$
$1_2 + 0_2 = 1_2$
$1_2 + 1_2 = 10_2$ (carry 1)
$1_2 + 1_2 + 1_2 = 11_2$ (carry 1)

Example

$$\begin{array}{rl} & 10101001_2 \\ & 00001001_2 \\ + & \underline{00010101_2} \\ & 11000111_2 \\ \text{carry} & 111 \quad 1 \end{array}$$

Binary Shift

The binary shift operator is used to perform multiplication and division of numbers by powers of 2

multiply/divide	x 16	x 8	x 4	x 2	/ 2	/ 4	/ 8
shift	<<4	<<3	<<2	<<1	>>1	>>2	>>3

Example: Apply shift operator to 1101_2 (13_{10})

Shift	Result	denary
<<1	11010_2	$13_{10} \times 2_{10} = 26_{10}$
<<2	110100_2	$13_{10} \times 4_{10} = 52_{10}$
>>1	110	$13_{10} // 2_{10} = 6_{10}$

Note that odd numbers are rounded down to the nearest integer when the right shift operator is applied.

Ethical, Legal and environmental impacts of digital technology on society

The Ten Commandments of Computer Ethics (From the Computer Ethics Institute)

Thou shalt:

1. not use a computer to harm other people
2. not interfere with other people's computer work
3. not snoop around in other people's computer files
4. not use a computer to steal
5. not use a computer to bear false witness
6. not copy or use proprietary software for which you have not paid (without permission)
7. not use other people's computer resources without authorization or proper compensation
8. not appropriate other people's intellectual output
9. think about the social consequences of the program you are writing or the system you are designing
10. always use a computer in ways that ensure consideration and respect for other humans

Environmental Impacts

- The disposal of computer waste is a big problem because they contain many toxic chemicals. Often old computing equipment is illegally shipped for disposal to developing countries.
- The growth in cloud computing means a greater need for storing data online. For this data centres are used but they require huge amounts of electricity, thereby contributing to climate change.
- Cobalt is a key element requited for Lithium batteries for powering mobile devices. Much of the World's cobalt is mined in the Congo even by very young children in appalling conditions.

Environmental benefits

- Less reliance on paper saving resources
- More opportunity for online global communication and collaboration thereby saving on travel and associated pollution
- Greater insight of environment and climate through using computer to model and analyse and process environmental data

Legislation

Computer Misuse Act (CMA)

The purpose of the CMA is to prevent:

- unauthorised access to computers by hackers
- intentionally impairing the operation of computer systems through denial of service (DOS) attacks on web servers or distributing viruses
- the theft of data

Three levels of offence:

1) Unauthorised access
2) Unauthorised access with intent to commit an offence
3) Unauthorised modification of data

Copyright, Designs and Patents Act (CDPA)

Copyright is a law that protects the creators of original pieces of work. No one else has the right to use or copy it without permission from the owner. This ensures that people can be rewarded for their work.

Plagiarism To pass off some else's work as one's own work.

Patent An inventor has the exclusive right to create, use and sell an invention for fixed period

Piracy Illegally copying and distributing copyrighted material.

Fair use allows copyrighted work to be used legally in certain situations

- personal or educational use (not commercial use)
- use only a small amount of the work (e.g. a short quote)
- acknowledge original source of the work

Copyleft work can be copied, modified used even used for commercial gain as long as the derived works are also distributed under copyleft.

Creative Common Licences (CCL) The creator of the work has explicitly given anyone permission to use the work.

Investigatory Powers Act This is legislation that allows public authorities to carry out mass surveillance on electronic communications.

Justification - By monitoring electronic communications security services can keep us safe from terrorists and other serious criminals

Concerns - Can infringe on our privacy and civil liberties

In a liberal democracy there will always a need to balance security and privacy, but where we draw that line will always be a matter of debate.

Some powers of the security services under the IPA

- can hack into computers, networks, mobile devices, servers
- internet service providers have to store which websites users visit for 12 months and allow access to authorities when requested
- carry out mass surveillance of communications; authorities can collect bulk data including data about people who are not suspected of anything.
- demand that an internet service provider provide access to a customer's communications including keys to encrypted data

General Data Protection Regulation (GDPR)

The purpose of the GDPR is to ensure that personal information collected by businesses and other organisations are protected.

Personal data is defined as anything that allows an individual to be identified (e.g. name, biometric data)

Six principles of the GDPR

Personal information must:

- be used fairly and lawfully
- be used only for specific purposes for which it was collected
- be adequate, relevant and not excessive
- be accurate and kept up to date
- be kept for longer than is necessary and deleted when it is no longer needed
- be kept secure against unauthorised access

Other aspects of the GDPR

- The data subject needs to be notified if their data are shared with other organisations
- Obtain consent from the data subject to their process data
- Obtain consent from parents or guardians to process children's data.
- Allow data subjects to have their data removed
- Allow data subjects to access the data held about them
- Pay big fines for a breach of the GDPR

Other Social Impacts

Artificial Intelligence is replacing people in jobs. More hi-tech jobs but less need for many lower skilled jobs.

The **digital divide** refers to the unequal access to information technology between different groups of people, and the knowledge and skills needed to use the technology.

Online trolling, cyber bulling and fake news on social media sites is undermining freedom of expression

Programming - Python

Comment – Text within the code that is ignored by the computer. A Python comment is preceeded by a #.

```
# This is an example of a comment
```

Output – Processed information that is sent out from a computer

Python	Pseudocode

`print("Hello World!")`
Hello World!
`print("Hello", "World!")`
Hello World!
`print("Hello"+"World!")`
HelloWorld!
`print("Hello\nWorld!")`
Hello
World!
	`OUTPUT "Hello World"`

Input – Data sent to a computer to be processed

`print("Enter name")`
`name=input()`
`print("Hello", name)`
`print("Enter age")`
`age=int(input())`
	`OUTPUT "Enter name"`
	`name ← USERINPUT`
	`OUTPUT "Hello", name`
	`OUTPUT "Enter age"`
	`age ← USERINPUT`

Assignment - The allocation of data values to variables, constants, arrays and other data structures so that the values can be stored.

- *Variable* – Value that can change during the running of a program. By convention we use lower case to identify variables (eg `a=12`)
- *Constant* – Value that remains unchanged for the duration of the program. By convention we use upper case letters to identify constants. (e.g. `PI=3.141`)

Data Types

Integer	`age = 12`	`age ← 12`
Float (real) number	`height = 1.52`	`height ← 12`
Character	`a = 'a'`	`a ← 'a'`
String – multiple characters	`name = "Bart"`	`name ← "Bart"`
Boolean (true/false)	`a = True` `b = False`	`a ← True` `b ← False`

Arithmetic Operators

Add	`7 + 2 = 9`	`7 + 2`
Subtract	`7 – 2 = 5`	`7 - 2`
Multiply	`7 * 2 = 14`	`7 * 2`
Divide	`4 / 2 = 2`	`4 / 2`
power	`2 ** 3 = 8`	`2 ** 3`
Integer division	`7 // 2 = 3`	`7 DIV 2`
Modulus (remainder)	`7 % 2 = 1`	`7 MOD 2`

Relational Operators – Allows the Comparison of values

Less than	`<`	`<`	`7<2`	`-> False`
Greater than	`>`	`<`	`7 > 2`	`-> True`
Equal to	`==`	`==`	`7==2`	`-> False`
Not equal to	`!=`	`≠ or <>`	`7!=2`	`-> True`
Less than or equal to	`<=`	`≤`	`7<=2`	`-> False`
Greater than or equal to	`>=`	`≥`	`7>=2`	`-> True`

Boolean Operators

`AND`	`and`	`7 < 2 and 1 < 2`	`-> False`
`OR`	`or`	`7 < 2 or 1 < 2`	`-> False`
`NOT`	`not`	`not 7 < 2`	`-> True`

Sequencing represents a set of steps. Each line of code will have some operation and these operations will be carried out in order line-by-line

Using + operator for adding
`a = 1`
`b = 2`
`c = a + b`
`print(c) -> 3`
	`a ← 1`
	`b ← 2`
	`c ← a + b`
	`OUTPUT c`

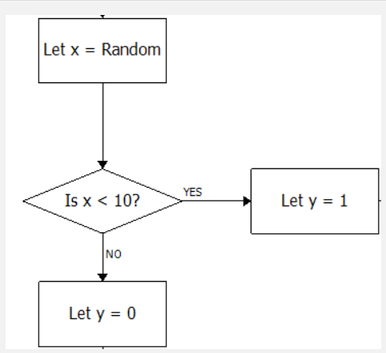
Using + operator for concatenation
`a = 'Hello '`
`b = 'World'`
`c = a + b`
`print(c) -> Hello World`
	`a ← 'Hello '`
	`b ← 'World'`
	`c ← a + b`
	`OUTPUT c`

Random number

Random integer	`import random` `random.randint(0,9)`	`RANDOM_INT(0,9)`
Choice	`random.choice('a','b','c')`	
Random value from 0 to 1	`random.random()`	

Selection represents a decision in the code according to some condition. The condition is met then the block of code is executed otherwise it is not. Often alternative blocks of code are executed according to some condition.

```
x=RANDOM_INT()
IF  x < 10 THEN
 y=1
ELSE
 y=0
ENDIF
```



IF …	`IF i > 2 THEN`
	`j ← 10`
	`ENDIF`
		`if i > 2:`
		`j=10`

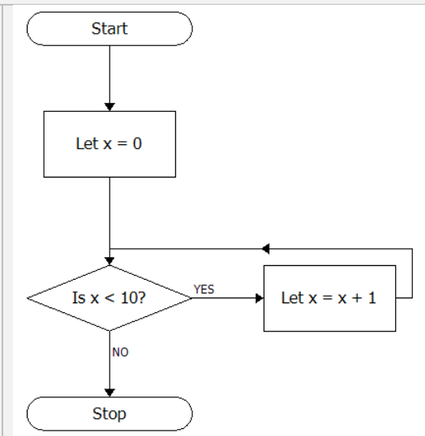
IF … ELSE …	`IF i > 2 THEN`
	`j ← 10`
	`ELSE`
	`j ← 3`
	`ENDIF`
		`if i > 2:`
		`j=10`
		`else:`
		`j=3`

IF … ELSE IF … ELSE	`IF i ==2 THEN`
	`j ← 10`
	`ELSE IF i==3`
	`j ← 3`
	`ELSE`
	`j ← 1`
	`ENDIF`
		`if i ==2:`
		`j=10`
		`elif i==3:`
		`j=3`
		`else:`
		`j=1`

Iteration Sometimes we wish the code to repeat a set of instructions

`WHILE` loops are used when the we do not know beforehand the number of iterations needed and this varies according to some condition.

```
x = 0
while (x < 10):
      x = x + 1
```



`while True:`
`print("Hello World")`
	`WHILE TRUE`
	`OUTPUT "Hello World"`
	`ENDWHILE`

`a=0`
`while a<4:`
`print(a)`
`a=a+3`
	`a ← 0`
	`WHILE a < 4`
	`OUTPUT a`
	`a ← a + 3`
	`ENDWHILE`

FOR loops are used when we know before hand the number of iterations we wish to make.

`for a in range(3):`
`print(a)`
	`FOR a ← 0 TO 3`
	`OUTPUT a`
	`ENDFOR`

Nested structures - Use constructs (e.g. `WHILE, FOR, IF`) inside another.

use a nested FOR loop to print out a grid	`for i in range (10):`
	`  for i in range (10):`
	`  print ("x ",end="")`
	`  print()`

Use a nested while and if to print out only even numbers	`i=0`
	`while i<51:`
	`  if (i%2==0):`
	`  print(i)`
	`  i=i+1`

Lists

Create a list	`shapes=["square","circle"]`
Access element by index pos	`shapes[1] -> circle`
Append item to list	`shapes.append("triangle")`
Remove item from list	`shapes.remove("circle")`
Remove item from list by index	`shapes.pop(1)`
Insert item into list	`shapes.insert(2,"rectangle")`
Number of elements in a list	`len(shapes)`
Get index pos of item in list	`shapes.index("triangle")`

Concatenating lists	`shapesGroup1["square","circle"]`
	`shapesGroup2=["triangle"]`
	`shapes=shapesGroup1+shapesGroup2`

Loop through list	`for i in range(len(shapes)):` `  print(shapes[i])`
Reverse elements in a list	`shapes.reverse()`
Order elements in a list	`shapes.sort()`

2D lists - A list if lists

Create a 2D list	`d = [ [23, 14, 17], [12, 18, 37], [16, 67, 83]]`

Another way to create a 2D list	`a = [23, 14, 17]`
	`b = [12, 18, 37]`
	`c = [16, 67, 83]`
	`d = [a,b,c]`

Access element by index position	`d[1][2] -> 37`

Strings

Get length of a string	`len("Hello")`	`LEN("Hello")`
Character to character code	`ord("a") -> 97`	`ORD("a")`
Character code to character	`chr(101) -> 'e'`	`CHR(101)`
String to integer	`a=int("12")`	`a=INT("12")`
String to float	`a=float("12.3")`	`a=FLOAT("12.3")`
integer to string	`a=str(12)`	`a=STR(12)`
real to string	`a=str(12.3)`	`a=STR(12.3)`

Concatenation -merge multiple strings together	`a="hello "`
	`b="world"`
	`c=a+b`
	`print(c) ->`
	`hello world`

Return the position of a character If there is more than 1 of the same character the position of the first character is returned.	`student = "Hermione"` `student.index('i')`
Find the character at a specified position	`student = "Hermione"` `print(student[2]) -> r`

sub strings - select parts of a string

Example	`Student="Harry Potter"`	
Output the first two characters	`print(student[0:2])`	Ha
Output the first three characters	`print(student[:3])`	Har
Output characters 2-4	`print(student[2:5])`	Rry
Output the last 3 characters	`print(student[-3:])`	Ter
Output a middle set of characters	`print(student[4:-3])`	y Pot

*A negative value is taken from the end of the string.

Subroutines are a way of managing and organising programs in a structured way. This allows us to break up programs into smaller chunks.

- Can make the code more modular and more easy to read as each function performs a specific task.
- Functions can be reused within the code without having to write the code multiple times.

- **Procedures** are subroutines that do not return values
- **Functions** are subroutines that have both input and output

Procedure:
No input parameters or return
	`SUB greeting()`
	`  OUTPUT "hello"`
	`ENDSUB`
		`def greeting():`
		`  print("hello")`
		
		`call: greeting()`

Procedure: One input parameter, no return	`SUB greeting(name)`
	`  OUTPUT "Hello",name`
	`ENDSUB`
		`def greeting(name):`
		`  print("Hello",name)`
		
		`greeting("grey")`

Function:
1 input parameter, and 1 return value
	`SUB add(n)`
	`  a ← 0`
	`  FOR a ← 0 TO n`
	`  a ← a + n`
	`  ENDFOR`
	`  RETURN a`
	`ENDSUB`
		`def add(n):`
		`  a=0`
		`  for a in range(n+1):`
		`  a=a+n`
		`  return a`

Function:
Two input parameters, and 1 return value
	`SUB (num1,num2)`
	`  sum=num1+num2`
	`  return sum`
		`def add(num1,num2):`
		`  sum=num1+num2`
		`  return sum`
		
		`greeting(1,2)`

The **scope** of a variable determines which parts of a program can access and use that variable.

A **global variable** is a variable that can be used anywhere in a program. The issue with global variables is that one part of the code may inadvertently modify the value because global variables are hard to track.

A **local variable** is a variable that can only be accessed within a certain block of code typically within a function. Local variables are not recognized outside a function unless they are returned. There is no way of modifying or changing the behavior of a local variable outside its scope.

Global variables need to defined throughout the running of the whole program. This is an inefficient use of memory resources. Local variables are defined only when they are needed an so have less demand on memory. Local variables only exist within the subroutine.

Reading and writing files

Open file Whatever we are doing to a file whether we are reading, writing or adding to or modifying a file we first need to open it using:

`open(filename,access_mode)`

There are a range of access mode depending on what we want to do to the file, the principal ones are given below:

Access Mode	Description
r	Opens a file for reading only
w	Opens a file for writing only. Create a new file if one does not exist. Overwrites file if it already exists.
a	Append to the end of a file. Create a new file if one does not exist.

Reading text files

read – Reads in the whole file into a single string	`f=open("filetxt","r")`
	`print(f.read())`
	`f.close()`

readline – Reads in each line one at a time	`f=open("file.txt","r")`
	`print(f.readline())`
	`print(f.readline())`
	`print(f.readline())`
	`f.close()`

readlines – Reads in the whole file into a list	`f=open("file.txt","r")`
	`print(f.readlines())`
	`f.close()`

Writing text files

Write in single lines at a time	`file=open("days.txt','w')`
	`file.write("Monday\n")`
	`file.write("Tuesday\n")`
	`file.write("Wednesday\n")`
	`file.close()`

Write in a list	`say=["How\n","are\n","you\n"]`
	`file=open("say.txt",'w')`
	`file.writelines(say)`
	`file.close()`

Data Validation Routines

Check if an entered string has a minimum length	OUTPUT "Enter String"
	s ← USERINPUT
	IF LEN(S) > 5 THEN
	  OUTPUT "STRING OK"
	ELSE
	  OUTPUT "TOO SHORT"
	ENDIF

Check is a string is empty	OUTPUT "Enter String"
	s ← USERINPUT
	IF LEN(S) == 0 THEN
	  OUTPUT "EMPTY STRING"
	ENDIF

Check if data entered lies within a given range	OUTPUT "Enter number" s num ← USERINPUT IF num > 1 AND num < 10 OUTPUT "Within range" ENDIF

Authentication Routine

```
OUTPUT "Enter Username"
username ← USERINPUT
OUTPUT "Enter Password"
password ← USERINPUT

WHILE username != "bart" OR password !="abc"

 OUTPUT "Login failed"
 OUTPUT "Enter Username"
 username ← USERINPUT
 OUTPUT "Enter Password"
 password ← USERINPUT

ENDWHILE

OUTPUT "Login Successful"
```

Debugging

Syntax errors – Errors in the code that mean the program will not even run at all. Normally this is things like missing brackets, spelling mistakes and other typos.

Runtime errors – Errors during the running of the program. This might be because the program is writing to a memory location that does not exist for instance. eg. An array index value that does not exist.

Logical errors - The program runs to termination, but the output is not what is expected. Often these are arithmetic errors.

Test data

Code needs to be tested with a range of different input data to ensure that it works as expected under all situations. Data entered need to be checked to ensure that the input values are:

- within a certain range
- in correct format
- the correct length
- The correct data type (eg float, integer, string)

The program is tested using normal, erroneous or boundary data.

Normal data - Data that we would normally expect to be entered. For example for the age of secondary school pupils we would expect integer values ranging from 11 to 19.

Erroneous data - Data that are input that are clearly wrong. For instance, if some entered 40 for the age of a school pupil. The program should identify this as invalid data but at the same time should be able to handle this sensibly which returns a sensible message and the program does not crash.

Boundary data - Data that are on the edge of what we might expect. For instance if someone entered their age as 10, 11, 19 or 20.

GCSE Design and Technology

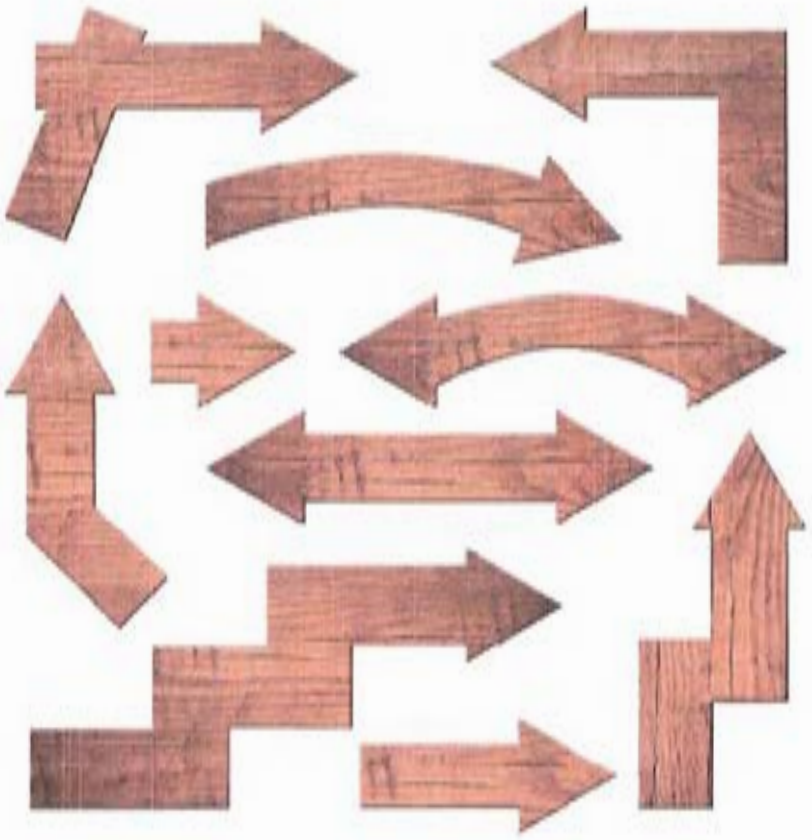
AQA
Realising potential

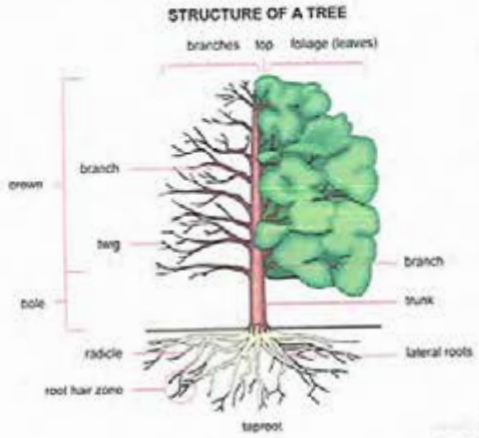
Revision

GCSE
DESIGN AND TECHNOLOGY
(8552)

Specification
For teaching from September 2017 onwards
For GCSE exams in 2019 onwards

Version 1.1 n June 2022



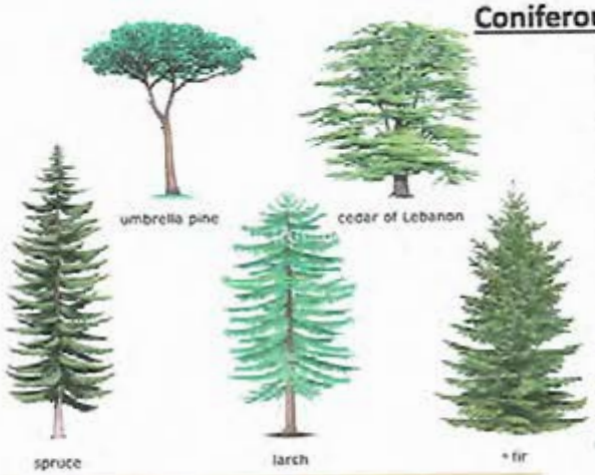


Trees come in all shapes and sizes. They produce many different types of wood that can be used for many different jobs. All trees grow relatively slowly, some take 20 – 30 years to reach full size and others 300-400 years. A few can live for thousands of years. And reach over 120 meters in height.

The bark of the tree is there to protect the living part of the tree from the weather and insects. The heart wood is the strongest part of the tree.

Mr E 2011

Coniferous trees



Coniferous trees are also know as 'Evergreens'. This group of trees keep their leaves all year . They tend to have tall, flexible trunks to allow them to bend in heavy winds and under the weight of snow. They are generally found in milder, temperate climates such as northern Europe, Russia and North American

The wood produced from Coniferous trees is known as **softwood**. This does not necessarily mean it is 'soft'. 80% of the worlds production wood is softwood.
Some coniferous trees are very fast growing reach maturity in 25 years.

Thin needle like leaves.

Mr E 2011

Farming Trees???

Due to the amount of time it takes a **deciduous tree (hardwood)** to grow there is little point in landowners planting these and hoping to make a return (profit) in a short amount of time. Because of the speed they grow, hardwood is expensive

Conifers (softwood) mature much quicker and as a result landowners plant these with the aim of cutting them down to sell. You often see these growing in neat, straight rows. Because of the speed they grow, softwood is cheap

Once the trees have been cut down, they need to be converted into planks and boards that we can use. However at this point 80% of the trees weight is water, this has to be reduced before we can use it. This process is know as seasoning. Wood that isn't dried is known as '**Green**' wood

Mr E 2011

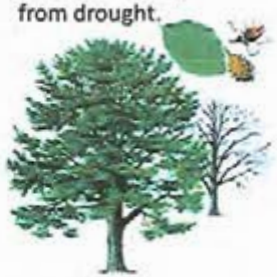
Once cut down the timber is cut into workable planks. This is either done by 'slab' sawing or quarter sawing. Both have advantages and disadvantages. Once cut the timber needs to dry out before it can be used.

Mr E 2011

Deciduous trees

Deciduous trees are the group of trees that loose their leaves during the winter seasons. They tend to have rigid trunks with visible branches. These trees loose their leaves during changes in climate to protect themselves. This is usually to protect from freezing and snow, but it can be to protect from drought.

The wood produced from Deciduous trees is known as **Hardwood**. This does not necessarily mean it is 'Hard'. 20% of the worlds production wood is hardwood.
Most deciduous trees are slow growing and take over 100 year to reach maturity.



Broad leaves

Mr E 2011

Trees can be split into two main groups – Coniferous and Deciduous

Coniferous trees; tall single trunk, generally small needle like leaves.

Deciduous trees; large trunk with large visible branches and broad leaves.

Seasoning is the name given to the methods of drying timber
There are two methods by which timber can be dried:
(i) natural drying or air drying,
(ii) artificial drying.

Air drying
Air-drying is the drying of timber by exposing it to the air. The technique of air-drying consists mainly of making a stack of sawn timber (with the layers of boards separated by sticks) on raised foundations, in a clean, cool, dry and shady place. This can take up to 18 months to dry the timber.

Artificial or Kiln drying
The process of kiln drying consists basically of introducing heat. In this process, deliberate control of temperature, relative humidity and air circulation is provided. For this purpose, the timber is stacked in chambers, called wood drying kilns, which are fitted with equipment for manipulation and control of the temperature and the relative humidity of the drying air and its circulation rate through the timber stack. This process is quick and can dry the wood in 48 hours

Mr E 2011

The Forest Stewardship Council (FSC) helps take care of forests and the people and wildlife who call them home.

FSC is an international, non-governmental organisation dedicated to promoting responsible management of the world's forests.

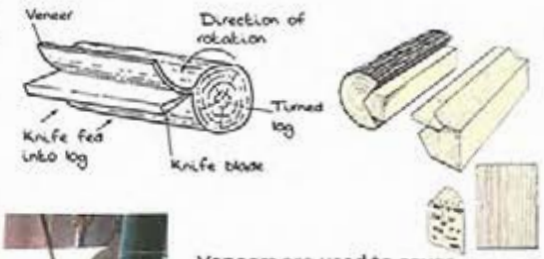
The FSC are an independent organisation that check that managed forests meet internationally and nationally agreed standards of responsible forest management.
Forest products like timber can then carry the FSC label, guaranteeing that it comes from a well-managed forest and enabling you to pass on the benefits of certification to your customers.

Manufactured Woods - veneers

Occasionally logs are used to create **veneers** (very thin sheets of wood)

This can range from 4 mm down to 0.5mm in thickness.

Veneers are cut in a number of different ways, these are the main methods; Rotational or Sliced



Veneers are used to cover cheaper woods to give a more appealing finish, to decorate ornate furnishings or to produce plywood.

Mr E 2011

MDF - Medium Density Fibreboard

Medium-density fibreboard (MDF) is an manufactured wood product formed by breaking down hardwood or softwood residuals into wood fibre, combining it with wax and a resin glue, and forming panels by applying high temperature and pressure. MDF is denser than plywood.
It is made up of separated fibres, (not wood veneers) but can be used as a building material similar in application to plywood. It is stronger and much more dense than normal particle board.

MDF like plywood is known as a sheet material. It comes in large sheets normally 2440mm x 1220mm (8ftx4ft). It is very stable and will not normally twist or bend. Dust extraction should be used when working with M.D.F.

https://www.youtube.com/watch?v=gitenYvp8x4

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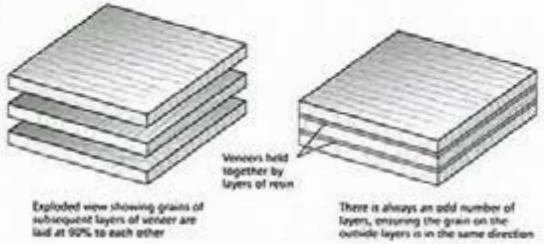
Blockboard is a manufactured board that has a central core of solid wooden strips. These strips of wood are glued together to form a single piece of wood. This collection of wooden pieces is then covered with a wood veneer to give a much more aesthetically pleasing appearance as well as providing strength and support. Without the veneer the solid wood would be weak along the grain.

Mr E 2011

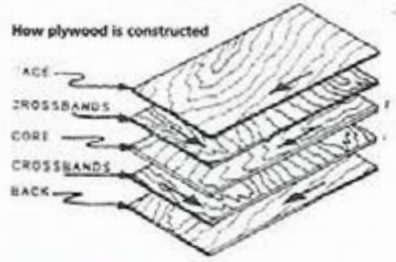
Chipboard is an engineered wood product manufactured from wood particles, such as wood chips, sawmill shavings, or even saw dust, and a synthetic resin or other suitable binder, which is pressed and extruded. Particleboard is a composite material. It is considerably weaker than both MDF and Plywood. Due to the chemicals (thermosetting glues) used to bond the particles disposing of chipboard can present problems for the environment.

Plywood is a manufactured board made of a layers of Veneers, these are LAMINATED together to form a single sheet



Advantages of Plywood

1. High uniform strength
2. Freedom from shrinking, swelling and warping
3. Non-splitting qualities
4. Availability of relatively large sizes
5. Economical and effective utilisation of figured wood:
6. Ease of fabrication of curved surfaces
7. Reduction of waste



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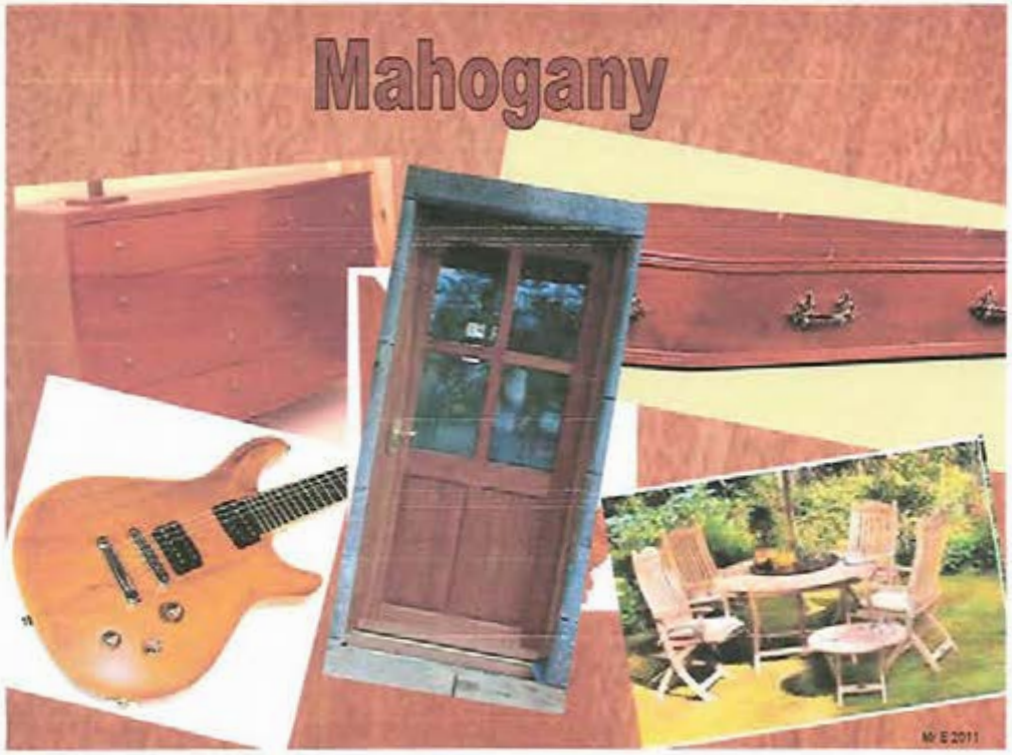
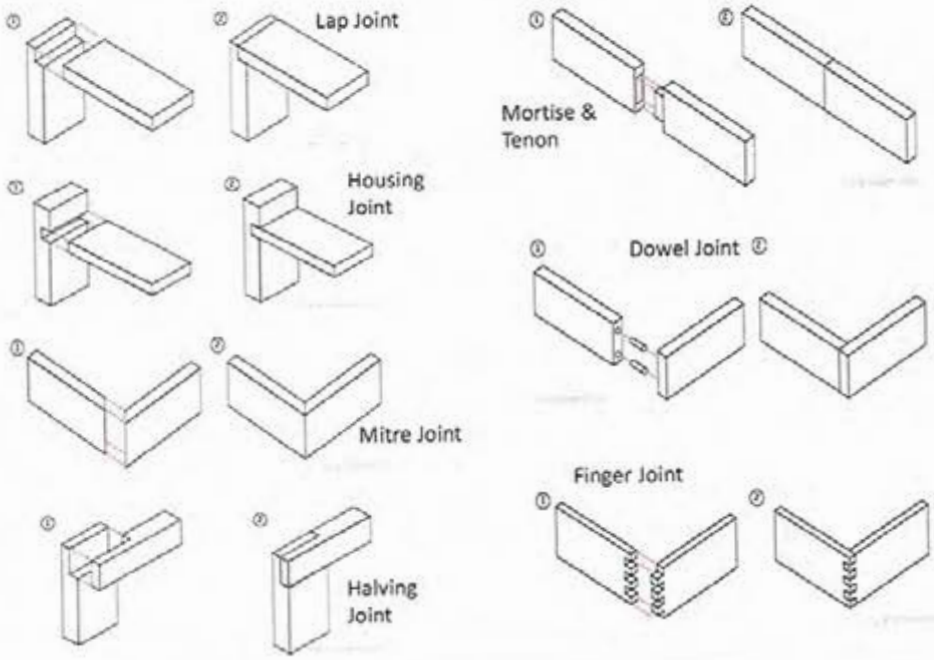




Panel pins are used for holding small pieces together, normally as glue is drying.

Nails are used as a fixing, they have a flat head to prevent it being driven below the surface.

Dowels are a fixing that takes a little more preparation. Holes need drilling in both pieces before hand and then glue applied to fix.

Hinges come in many various shapes and sizes and fulfil many different jobs. The most common type are the plain Butt Hinge (1). A variation of this is the rising hinge, which lifts the door as it opens (2). Decorative hinges are for surface mounting (3). Kitchen cupboards are often fixed using concealed hinges, these are occasionally called self closing(4)

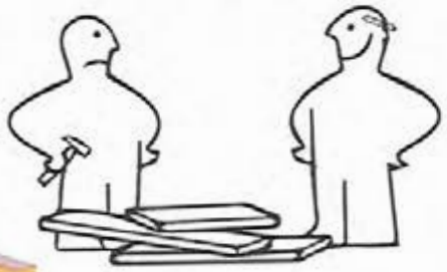
Mr E 2011

Knock Down Fittings

(KD Fittings)

If you have ever assembled a piece of flat pack furniture some of these fittings might be familiar – frustrating but familiar

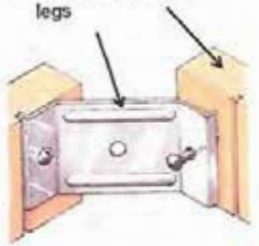
Cross Dowel – used to join pieces where an upright needs to have a piece joining it – where traditionally a mortise and tenon might work



Corner block – used to join pieces at a right angle

Cam lock – used to join pieces at a right angle. The cam pulls the pieces tightly together.

Corner plate – often used on tables to attach the frame to the legs



The most common method of fixing pieces of wood together is usually to screw them together. Screws offer a strong semi permanent fixing. Due to modern screws being coated in moisture resistant material the screws will now last a very long time without decaying.

There are many varied designs of screw the most common are the countersink variety. These are normally either slotted or Phillips (crosshead).

Coach bolts are a type of screw used for heavy duty fixing in wood.

It is normal when putting screws into wood to drill a pilot hole, this will stop the wood splitting as the screw pulls through the wood.

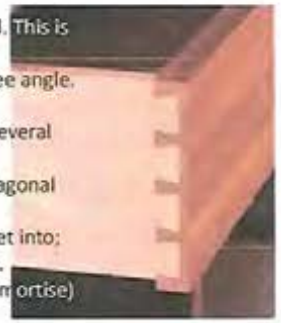
Mr E 2011

Joinery is a part of woodworking that involves joining together pieces of wood, to create furniture, structures, toys, and other items. Some wood joints employ fasteners, bindings, or adhesives, while others use only wood itself.

Joints can be designed to hold without the use of glue or fasteners; a pinned mortise and tenon is an example of this. Glue is highly effective for joining wood when both surfaces of the joint are edge grain. A properly glued joint may be as strong or stronger than a single piece of wood.

<u>Traditional woodworking joints</u>

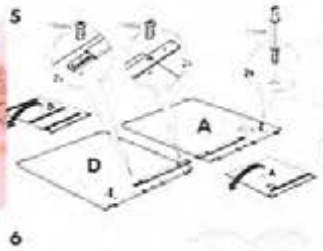
Butt joint; the end of a piece of wood is butted against another piece of wood. This is the simplest and weakest joint.
Miter joint; similar to a butt joint, but both pieces have been cut at a 45 degree angle.
Lap joints; one piece of wood will overlap another.
Box joint, also called a **finger joint**, used for the corners of boxes. It involves several lap joints at the ends of two boards.
Dovetail joint; a form of box joint where the fingers are locked together by diagonal cuts.
Housing joint; a slot is cut across the grain in one piece for another piece to set into; shelves on a bookshelf having slots cut into the sides of the shelf, for example.
Mortise and tenon; a stub (the tenon) will fit tightly into a hole cut for it (the mortise)



6R's and party bags

PRACTICAL ACTION

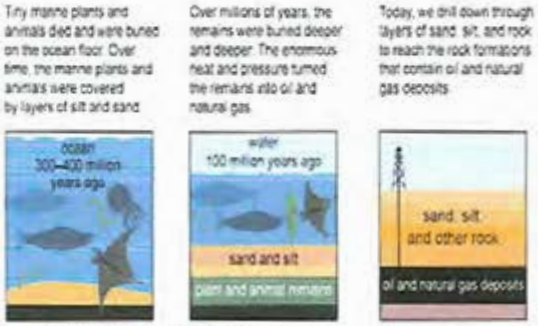
- Rethink: What could you do differently? Do we need party bags at all?
- Refuse: Are there materials you would choose not to use?
- Reduce: Can you reduce the packaging?
- Reuse: Can the bag or its contents be used again for another purpose?
- Recycle: Have you used materials that area easy to recycle when its finished with?
- Repair: It is possible to mend any of it or will it go to landfill if broken?



Flat packed furniture and <u>knock down fittings</u>

•They're much cheaper than ready-to-use furniture. Their price is so low it compensates for the lower durability.
•They're easy to dismantle and transport. This means companies can reduce the amount of trucks/lorries they use to transport goods and customers can take them apart when they need to, e.g. if they are moving house.
•They are easier to carry into your house as they are in boxes and flat packed instead of being an awkward, fixed shape.
•Manufacturers can carry more products in a single truck, which reduces the cost, journeys, amount of trucks used and fuel consumption.
•The retailer can store the products on flat shelves, maximizing the storage space.
•The products can be produced using a CNC milling machine. This means they are not made by craftsmen which reduces the labour costs as the company doesn't have to pay for skilled labour.

Petroleum and natural gas formation



Source: Adapted from National Energy Education Development Project (public domain)

Oil is thought to have formed over **millions of years** from the break down of tiny **dead creatures.** Natural gas is formed alongside oil. The dead organisms sank to the bottom of lakes or seas and became **trapped** in muddy sediments. As the sediments built up, the lower layers were under pressure. They eventually turned to rock. If there was no oxygen in the sediments, **heat and pressure** turned the remains of the organisms into oil and natural gas.

The large majority of plastics we use today are formed from oil. Crude oil is separated into separate batches of different compounds by heating it in a process called fractional distillation

Oil and pollution

There are many risks involved with the extraction and processing of oil. Oil spills from oil rigs, pumping stations and oil tankers can cause huge environmental problems for both marine and land habitats.

Airborne pollution from oil refineries contributes towards both acid rain and increasing carbon dioxide in the atmosphere. This can impact on peoples health, have a negative effect on the environment, damage habitats and contribute towards climate change.

Thermoplastics are a group of plastics (polymers) that as they are heated become soft and CAN be moulded over and over again. These plastics then harden as they cool. The Polymers in Thermoplastics do not form strong bonds so they can move over each other and be reshaped when subjected to heat.

Advantages
- Highly recyclable
- Aesthetically-superior finishes
- High-impact resistance
- Remolding/reshaping capabilities
- Chemical resistant
- Eco-friendly manufacturing

Disadvatages
- Generally more expensive than thermoset
- Can melt if heated

Thermoset plastics are a group of plastics that once they have been moulded and set CANNOT be remoulded. Once moulded, they do not soften when heated and they cannot be reshaped. Its polymer chains are joined together by cross-links, so they cannot slide past each other easily.

As a result of this resistance to heat **Thermosetting plastics** are suitable where a degree of heat resistance is required, such as engines, electrical components and fittings, saucepan handles etc.

Advantages
- More resistant to high temperatures than thermoplastics
- Highly flexible design
- Excellent aesthetic appearance
- Cost-effective

Disadvantages
Cannot be recycled
More difficult to surface finish
Cannot be remolded or reshaped

Tips for exams

- If it's a **drinks bottle its PET.**
- If it's a **chemical** container its probably **HDPE.**
- If it's a **thin film** its probably **PVC** or **LDPE** – both would be accepted.
- If its **safety** equipment its **PC.**
- If its **anything else** it could be **ABS** because they cant prove otherwise.
- If its **packaging** it is **expanded polystyrene.**
- If its around **food** it will be **PET, HDPE, LDPE**

There are many types of plastics that are used for a huge variety of different tasks. These plastics can be divided into two main groups; Thermosetting plastics and Thermoplastics. Plastics are made up of long strings of monomers that bind together to form **polymers.**

Thermoplastics are a group of plastics (polymers) that as they are heated become soft and CAN be moulded over and over again. These plastics then harden as they cool. The Polymers in Thermoplastics do not form strong bonds so they can move over each other and be reshaped when subjected to heat.

Thermoplastic

Common Thermoplastic Polymers

Some of the most commonly found thermoplastic polymers include polyethylene, polypropylene (PP), polyvinyl chloride (PVC), polystyrene, polytetrafluoroethylene (PTFE, commonly known as Teflon), Acrylonitrile butadiene styrene (ABS plastic), and polyamide (commonly known as nylon).

Thermoset plastics are a group of plastics that once they have been moulded and set CANNOT be remoulded. Once moulded, they do not soften when heated and they cannot be reshaped. Its polymer chains are joined together by cross-links, so they cannot slide past each other easily.

Thermoset

As a result of this resistance to heat Thermosetting plastics are suitable where a degree of heat resistance is required, such as engines, electrical components and fittings, saucepan handles etc.

Common Thermoset Polymers

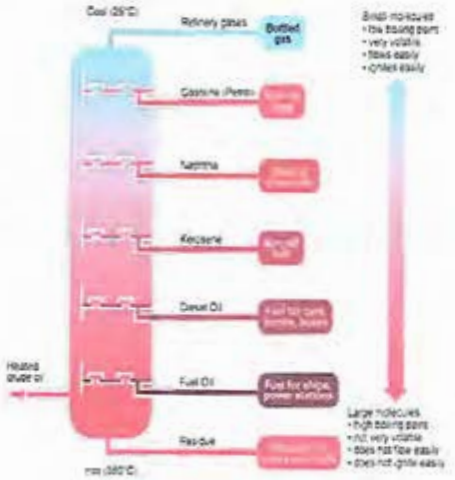
Some of the most commonly found Thermosetting polymers include Epoxy Resin, Melamine Formaldehyde, Polyester Resin and Urea Formaldehyde

Fractional distillation of crude oil

Crude oil is a **mixture** of many thousands of different compounds with different properties. They are called **hydrocarbons** because they only contain the elements hydrogen and carbon.

To make crude oil useful, batches of similar compounds with similar properties need to be sorted. These batches are called **fractions** and they are separated by **fractional distillation.**

The theory behind this technique is that some of the compounds in crude oil are easily vaporised, for example, they are volatile due to their low boiling points. Others are less volatile and have higher boiling points.



Tips for exams

- **If its electrical - it Urea Formaldehyde**
- **If its worktop or flooring – it Melamine Formaldehyde**
- **If its GRP or carbon fibre – Its Polyester Resin**

Thermoplastics

The majority of plastics that are used each day are Thermoplastics. Due to the fact they are easy to mould, can be recycled and have a wide variety of uses.
A large proportion of plastics can be identified by their **Resin Identification Code.** This is normally stamped on the product so we can identify the type of plastic it is made from.

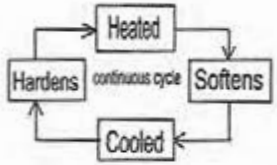
Look on the bottom of your bottle of water, you will see this symbol. It is made up of the recycling symbol we are all familiar with, a number and sometimes letters.
The number and letters identify plastic in the picture as 1 (PET) **Polyethylene terephthalate.** PET is fine in all exam situations!!!!

Resin identification codes

These were introduced in 1988 to help identify the main groups of plastics to help with recycling. They identify 6 named types of plastic and all others are grouped as number 7

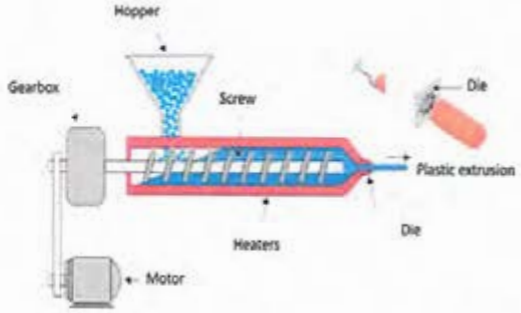
7 – OTHER

These days we use such a wide variety of different plastics that a large proportion of products will fall into the 'OTHER' category. For example Other **acrylic, nylon, polycarbonate (PC), and Acrylonitrile Butadiene Styrene (ABS)**



Extrusion

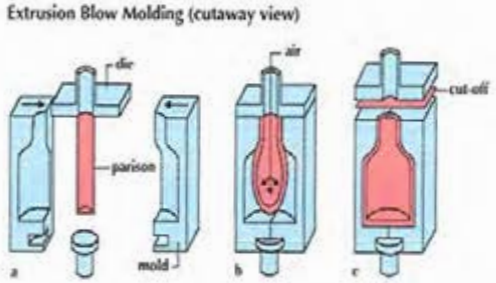
Extrusion is the starting point for other forms of plastic moulding as will be seen later. Extrusion is generally used to form of plastic moulding. It is used to form pipes, moulded sections and trunking. Plastic granules are fed into the screw barrel by a hopper, as they pass along they are heated and for a semi liquid homogenous mass. This is then forced out under pressure through the DIE, what ever the shape of the die the plastic adopts. It is then cooled rapidly in water baths to stop it deforming and cut to the required length.

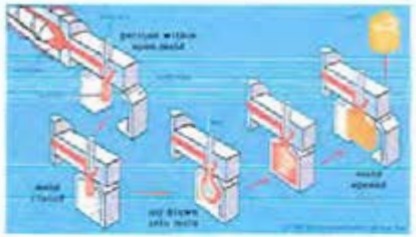


Thermoplastic Moulding Processes

Blow Moulding

Blow moulding is a plastic moulding process that is often used to form hollow products such as bottles. A plastic tube is extruded following the extrusion process discussed earlier. This tube is known as a **parison**. The parison is clamped between two halves of a mould and air is blown in through one end. The hot, flexible plastic is blown out and takes on the shape of the mould. The steel mould helps the plastic cool rapidly. When cooled the mould opens and the bottle falls out.





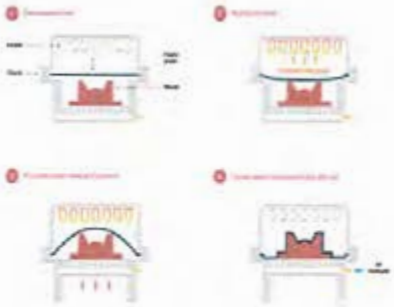
Products that are blow moulded often have a visible line down them on opposite sides, this is where the mould opens, it is known as a split line.

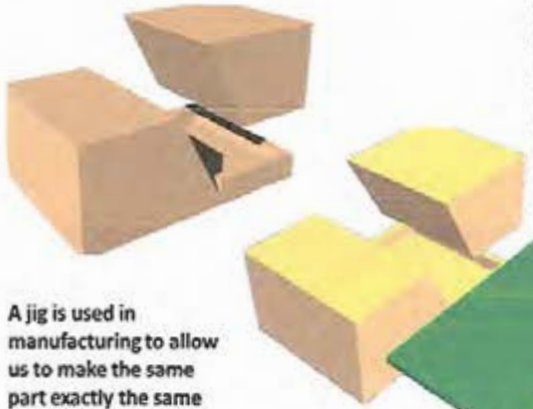
Thermoplastic Moulding Processes

Vacuum Forming

The vacuum forming process involves heating a plastic sheet until soft and then dropping it over a mould. A vacuum is applied sucking the sheet into the mould. The finished sheet is then taken from the mould.
The table that moves the mould up in to the soft plastic sheet is called the plattern. As the plattern is pushed up and the plastic starts to form the shape of the mould the vacuum is turned on actually sucking the plastic tight over the mould.

All moulds must have a **DRAFT** angle to allow them to be removed from the formed plastic. The sides must have an angle of around 5° to allow the parts to separate.





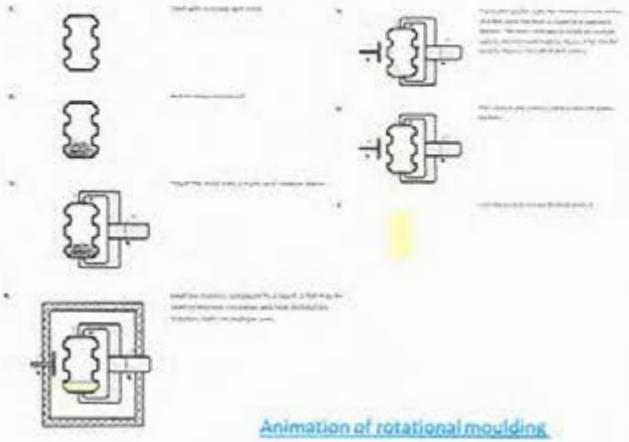
A jig is used in manufacturing to allow us to make the same part exactly the same over and over again. In this case to put the first bend in a piece of plastic. This is a two part jig.

Once the plastic has been heated on the line bender it is placed into the jig and gently bent in to shape. The second past of the jig will help ensure the angle is a good sharp bend

After a short time the plastic will have cooled. The top part of the jig can be removed to allow the plastic to be removed.

Rotational Moulding

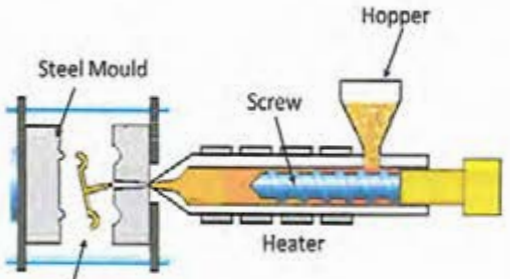
Rotational moulding is a plastic moulding process commonly used to make large, hollow products.
Plastic powder or granules are loaded into an open mould. The mould is then sealed and heated. The mould then spins around 3 axis so the plastic sticks to the cooling metal mould. Layers are built up by adding more plastic following each cooling process.

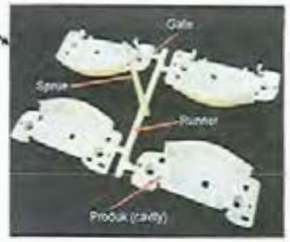


Animation of rotational moulding

Injection Moulding

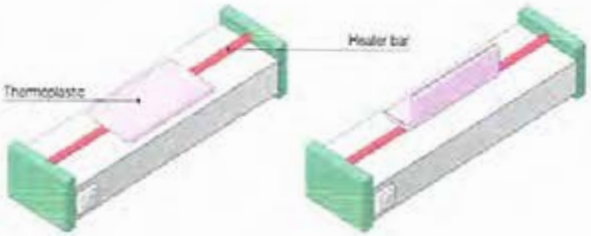
Injection Moulding along with extrusion ranks as one of the main processes for producing plastics articles. It is a fast process and is used to produce large numbers of identical items from high precision engineering components to disposable consumer goods.
The process is similar to the extrusion process in terms of the hopper and screw, how ever rather than the plastic being pushed through a die it is injected under pressure into a steel mould.





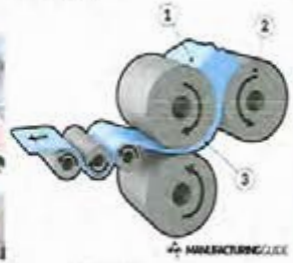
Line Bending/Strip heating

Line bending/strip heating is a simple process often used with ACRYLIC to bend a straight line in the plastic.
The acrylic is heated slowly over a heated bar or wire. This softens the plastic which then allows it to be reformed (bent) along the heated line.
Simple angles can be completed easily and with some planning some more complex shapes can be achieved. To ensure accurate bends a jig should be used to hold the soft plastic at the desired angle until it has hardened.



Calendaring

Calendaring is the process of squeezing a soft (melted) plastic between several rollers. The careful control and space between thee rollers will determine the eventual thickness of the plastic film.
The original plastic is extruded from the same as we looked at in the extrusion process. This melted extrusion is then dropped onto the first few sets of rollers to position and start the cooling process. The other rollers in the process stretch and adjust the thickness of the desired film.



Laser cutter

Although technically not a moulding process the laser cutter is often used in schools and industry to shape plastic.
The laser cutter is a 2 Dimensional cutting machine that can also engrave on to a range of materials.
In schools laser cutters are used to cut a variety of materials, but acrylic is widely used. This **CAM (Computer Aided Manufacture)** process is quick, easy and produces a finished edge when cutting acrylic.

A design is produced in a **CAD (Computer Aided Design)** package and sent to the laser cutter. A popular CAD program would be **2D Design.** This CAD design would identify which parts of the plastic are to be cut and which engraved. If multiple products are needed the designs should be collected together in a tessellation (sometimes called NESTING) to save material.

As discussed previously the majority of plastics are made from oil. This causes problems fom the environment through the process of extracting oil from the ground or under the sea. There are also problems with the processing of oil into compounds we can use as plastics and the pollution these produce.

Plastic also creates problems following our use and its **final disposal.** Plastic is generally not biodegradable, meaning it is not easily broken down naturally by animals and enzymes digesting it. Plastics have only been around for about 70 years. So microorganisms simply haven't had much time to evolve the necessary biochemical tool kit to latch onto the plastic fibres, break them up into the constituent parts and then utilise the resulting chemicals as a source of energy and carbon that they need to grow.

Disposing of plastic

According to National Geographic only 9% of plastic is recycled.
The vast majority—79%—is accumulating in landfills or discarded in the natural environment as litter. Meaning: at some point, much of it ends up in the oceans, the final sink.

Environmental impact of disposal.

- Most plastic ends up in landfill, land that cannot be used again as plastic does not natural degrade.
- A large proportion is simply litter damaging habitats.
- Much will finally end up in the ocean as small pieces where it is ingested and will enter the food chain.

Can plastics be environmentally friendly?

If we recycled 100% of all plastic produced then there is every chance the use of plastics would become sustainable, but we don't. Alternatives are needed to allow us to continue to use this versatile material.

I order to make plastic more environmentally friendly we need to look at:

- **Bioplastics** made from natural materials such as corn starch
- **Biodegradable** plastics made from traditional petrochemicals, which are engineered to break down more quickly
- **Eco/recycled plastics**, which are simply plastics made from recycled plastic materials rather than raw petrochemicals.

Bioplastics

The theory behind bioplastics is simple: if we could make plastics from kinder chemicals to start with, they'd break down more quickly and easily when we got rid of them.

The most familiar bioplastics are made from natural materials such as **corn starch** and sold under such names as *EverCorn™* and *NatureWorks*. Some bioplastics look virtually indistinguishable from traditional petrochemical plastics. **Polylactide acid** (PLA) looks and behaves like polyethylene and polypropylene and is now widely used for food containers.

Biodegradable plastic is **plastic** that decomposes naturally in the environment. This is achieved when microorganisms in the environment metabolize and break down the structure of **biodegradable plastic**. The end result is one which is less harmful to the environment than traditional **plastics**

Some supermarkets now use what are described as **photodegradable, oxydegradable**, or just **biodegradable bags** (in practice, whatever they're called, it often means the same thing). As the name suggests, these biodegradable plastics contain additives that cause them to decay more rapidly in the presence of light and oxygen (moisture and heat help too). Unlike bioplastics, biodegradable plastics are made of normal (petrochemical) plastics and don't always break down into harmless substances: sometimes they leave behind a toxic residue and that makes them generally (but not always) unsuitable for composting

Eco/recycled plastics

One easy solution to the problem of plastic disposal is to recycle old plastic materials (like used milk bottles) into new ones (such as items of clothing). A product called ecoplastic is sold as a replacement for wood for use in outdoor garden furniture and fence posts. Made from high-molecular polyethylene, the manufacturers boast that it's long-lasting, attractive, relatively cheap, and nice to look at.

Metals are found in the Earth's crust and have been mined extensively for many years. Of the 70 different types of metal a select few are used for the majority of applications. Metals very rarely occur in their pure metallic state in the ground (the only exceptions are gold, silver and copper)

Metals account for about two thirds of all the elements and about 24% of the mass of the planet. Metals have useful properties including strength, ductility, high melting points, thermal and electrical conductivity, and toughness. From the periodic table, it can be seen that a large number of the elements are classified as being a metal. A selection of various metals can be seen below

From ore to metal

What are "ores"?

An **ore** is a type of rock that contains minerals with important elements including metals. The ores are extracted through mining; these are then refined to extract the valuable element Aluminium, for example, is the most common metal in the Earth's crust, occurring in all sorts of minerals. However, it isn't economically worthwhile to extract it from most of these minerals. Instead, the usual ore of aluminium is bauxite - which contains from 50 - 70% of

Bauxite – the ore from which Aluminium is extracted

Iron ore – the ore from which Iron is extracted.

An open cast gold mine. Huge areas of land are removed to get access to the valuable metals.

Metals like all materials come in a large variety of standard shapes and sizes. We will look at the standard **stock forms.**

Sheet metal is commonly sold in flat sheets, however large industrial users will by roles of steel sheet if it is thin enough to be placed on a role.

Bar is shaped lengths of metal in a variety of shapes in the cross section.

It is solid in its cross section and is often comes as round bar, flat section and hex bar (hexagonal)

It would be available in many different sizes and is often sold in both metric and imperial sizes

Turning Metal

A lathe is used to change the sizes and shape of metal. It is a versatile tool that has many applications. The work piece is held in the chuck that the spins. The cutting tool is then carefully moved against the tool as the work spins cutting the metal away slowly to shape the metal.

Facing Off

This operation involves moving the cutting tool along the end of the spinning work piece. This cleans the metal, removing cutting marks and ensuring the end of the material is cut 'square'

Turning down

This operation involves moving the cutting tool down the length of the metal, this has the effect of reducing the diameter.

By turning the tool holder on its mount and repeating the turning down process you can cut a taper on the metal.

Milling

Milling is a process of removing metal using a spinning cutting tool. The machine looks similar to a drill but the work can be moved using the 'Cross' travel and 'Long' travel. This allows the metal to be shaped, cut or a surface finished.

Cutting on a flat sheet using the miller. The tool stays in position, it is the work that moves under control of the operator.

Milling machine Motions

CNC (computer numerical controlled) millers can produce some extremely detailed pieces of work.

https://www.youtube.com/watch?v=GRL9Pf7STSM

Blanking

Blanking is an industrial process of stamping shapes from metal sheet. Flat shapes are punched from metal sheet. The moulds and shapes of the punch determine the shape of the final product.

Polishing

Polishing involves fast spinning cloth wheels being applied to the surface of metal along with a hard wax polish this can produce a highly polished surface.

You should always use separate mops (the cloth wheels) for ferrous and non ferrous metals as well as different polishes.

There are many different types of polishing wheel/mop for different finishes or materials.

Casting – simple pewter casting

The easiest form of pewter casting is often done between pieces of MDF/plywood laminated together. The middle piece has a shape cut out to form the void into which the pewter is poured. More complicated moulds would have details engraved onto the other surfaces.
This process was demonstrated in the workshops.

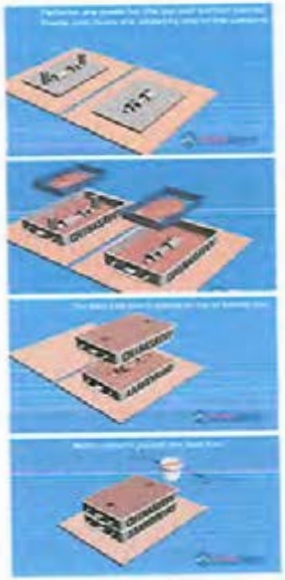
Pewter is a malleable metal alloy that is made from tin and copper. Pewter has a low melting point, around 170–230 ° and therefore is much easier to cast in a school than other metals. The pewter is heated in a low temperature system or by torch (not recommended) and poured into a mould. The pewter sets rapidly to form the desired shape.

Casting – sand casting

Casting is the process of pouring liquid metal into a mould and allowing it to set. These moulds are often made in sand and use either a removable, reusable mould or a sacrificial mould like one made from wax, that will be destroyed during the process.

The process of making a mould and preparing for pouring the metal is quite long. Below is the basic step by step guide.

The mould (pattern) is placed on a flat board. The **drag and cope** (metal of wooden frames) are placed around them and these are then filled with a type of sand known as **Green Sand.** This sand is packed tightly around the moulds and is compacted to form a prefect copy of the mould.
The drag and the cope are then turned over so they now meet and the two haves of the mould line up.
After any excess sand is cleaned away from the mating surfaces the molten metal is poured in through the feed hole. Air and gases escape through the riser hole to allow the metal to reach all parts of the void. When it is cool the sand is removed leaving a metal duplicate



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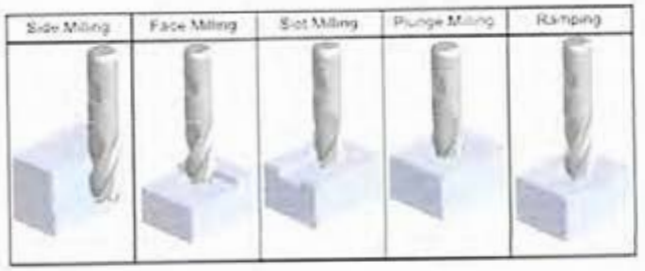
Milling tools

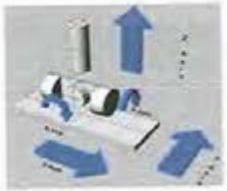
At first glance a milling tool looks similar to a drill but there are different types for different jobs.

An end mill normally has 4 cutting edges and is used for cleaning or cutting the edge of a piece of work or the surface of a piece of work

A slot cutter is used to cut slots in the metal and cut holes.



5 axis CNC milling machines are very versatile and can produce extremely complicated products by moving beyond the X,Y,Z axis and using A and B as well giving access to the underside of work and even the interior



https://www.youtube.com/watch?v=jbIU7I_8pR8

Welding – Gas and Electric

Oxy acetylene welding is using two gases (oxygen and acetylene) mixed together to produce a very hot, but controlled flame. As the metal is melted a handheld filler metal rod is fed into the pool of molten metal.

Correct and safe oxygas welding station

MIG (Metal Inert Gas) welding melts the metal by using an electric arc. The work being welded is connected to the welder by a clamp that is the negative side of the circuit. The metal that passes through the middle of the welding un has a positive charge, when they touch the arc is produced which intern melts the metal. The joint is protected from the air by the gas that is fed through the torch (stops rusting and air getting into the weld).

Correct and safe electric welding station

Technology 'push and pull'

Technology push

Technology push is when products are re-designed because of changes in materials or manufacturing methods. This might mean that new materials have become available, with improved properties; or that improvements in manufacturing processes mean a manufacturer can make the product cheaper or more efficiently, which reduces manufacturing costs

Market pull

Market pull is when product ideas are produced in response to market forces. Examples of market influences include:
A demand from consumers for new or improved products.
A competing product is launched by another manufacturer.
A manufacturer wants to increase their share of the market

Technology push

Market / demand pull

Benefits of automation

- Robots and automated systems often replace manual jobs, and can therefore save labour costs
- What other benefits are there of automation to:
  - Product manufacturers or service suppliers?
  - Consumers?
- What products are still handmade?
  - Why would manufacturers prefer to make things by hand?

Making a sphere out of resin by hand

4

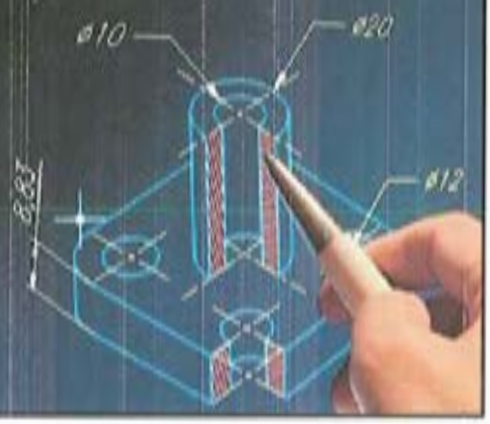
Automated guidance systems

- Some companies including Google are developing autonomous self-driving vehicles
  - How might this improve the lives of the elderly or impaired?
  - What ethical considerations might developers need to make?

5

Computer Aided Design (CAD)

- CAD software is used to create precision 2D or 3D drawings, models or technical illustrations
- It is commonly used by designers, architects, engineers and artists
  - What are the advantages of CAD over hand drawn designs?
  - Many designers still prefer to start sketching by hand
  - Why?



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Advantages and disadvantages

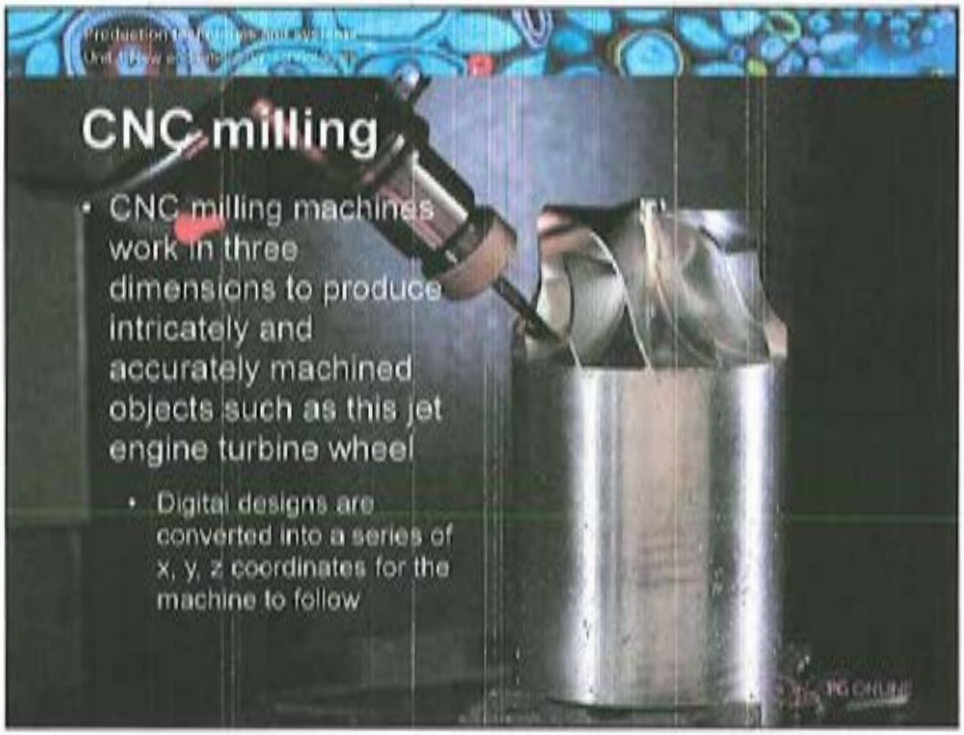
Advantages of CAD	Disadvantages of CAD
Designs can be created, saved and edited easily, saving time	CAD software is complex to learn
Designs or parts of designs can be easily copied or repeated	Software can be very expensive
Designs can be worked on by remote teams simultaneously	Compatibility issues with software
Designs can be rendered to look photo-realistic to gather public opinion in a range of finishes	Security issues - Risk of data being corrupted or hacked
CAD is very accurate	
CAD software can process complex stress testing	

9

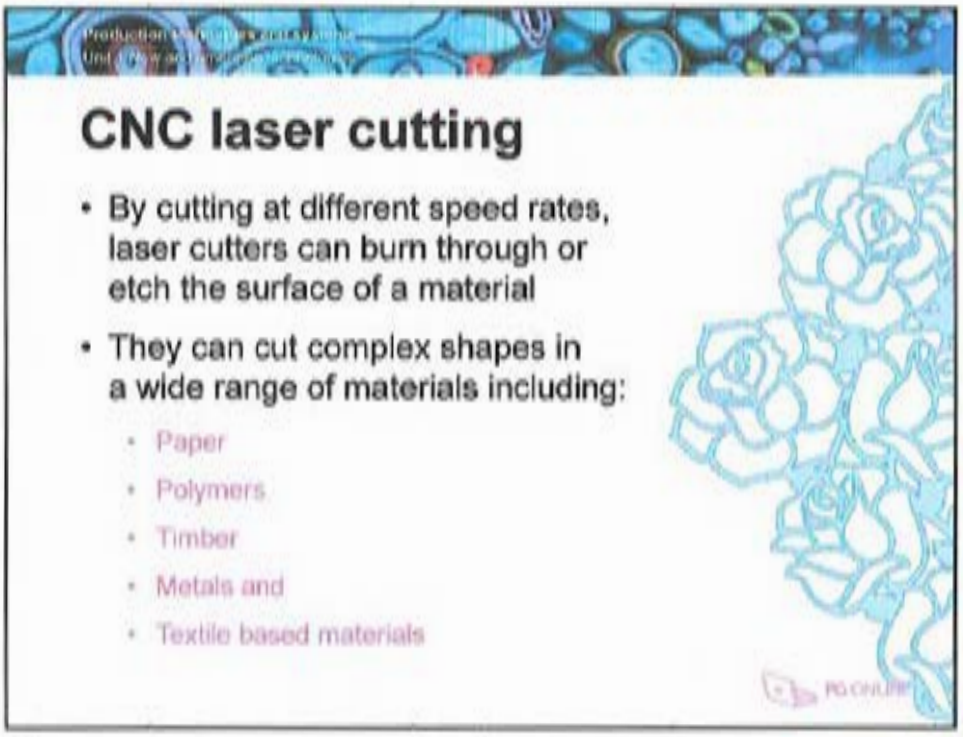
Computer Aided Manufacture

- Automated machinery is controlled by software to manufacture physical parts
- CAM uses Computer Numerical Control (CNC) and CAD files to generate 3D tool paths for the machinery to follow
  - CAM machinery includes laser cutters, embroidery machines, CNC milling machines, routers and lathes
  - Where is CAM currently used?

10


CNC milling
• CNC milling machines work in three dimensions to produce intricately and accurately machined objects such as this jet engine turbine wheel
• Digital designs are converted into a series of x, y, z coordinates for the machine to follow

11


CNC laser cutting
• By cutting at different speed rates, laser cutters can burn through or etch the surface of a material
• They can cut complex shapes in a wide range of materials including:
• Paper
• Polymers
• Timber
• Metals and
• Textile based materials

12

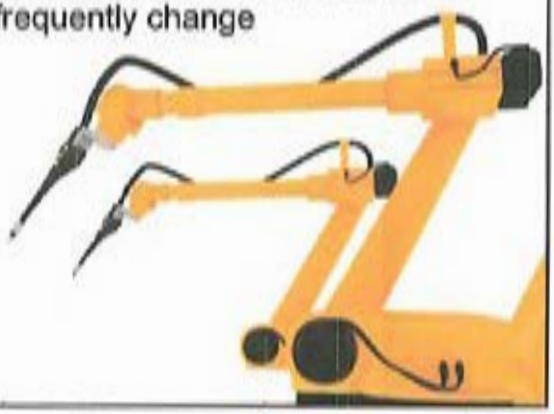
Why use CAM?

- Why are CAM systems becoming increasingly used in industry?
- What are the drawbacks of using CAM to:
  - The organisation?
  - Staff within the organisation?

13

Flexible Manufacturing Systems (FMS)

- FMS involve an assembly of automated machines commonly used on short-run batch production lines where the products frequently change
- They can be easily:
  - recalibrated
  - reprogrammed
  - retooled



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Lean Manufacturing

- 'Lean' is a Japanese philosophy created by Toyota
- It aims to manufacture products just before they are required to eliminate areas of waste including:
  - Overproduction
  - Waiting
  - Transportation
  - Inappropriate processing
  - Excessive inventory (Storage)
  - Unnecessary motion
  - Defects

15

Just In Time (JIT) production

- Items are created as they are demanded
- No surplus stock of raw material, component or finished parts are kept
  - What are the benefits of holding no stock?

16

Advantages and disadvantages

Advantages of JIT	Explanation
No warehousing needed	Reduced costs for construction, maintenance and running costs.
Orders secured before outlay on parts is required	Making it more economical. No storage or waste of unused parts
Stock does not become obsolete, damaged or deteriorated	Cuts down on wastage

17

Manufacturing techniques

- Complete **Task 3** of **Worksheet 4**

18

Ethics and the environment

- Companies are increasingly aware of the need for social responsibility
  - This includes sustainably sourcing components and materials, ethical production methods, reducing waste, recycling and considerate end-of-life disposal
  - What are the benefits of social responsibility to companies?
- How might ethical factors inform design decisions?

Evaluating the use of new technologies

- The success of new technologies and products are frequently evaluated according to the following points:
  - Cost
  - Reliability
  - Longevity
  - Sustainability
  - Recyclability
- What other factors might you consider?

3

Informing design decisions

- If you are designing a new product, you will need to gather opinion and facts in relation to:
  - Successes and shortfalls of similar available products
  - Available technology
  - The size of the market
  - The market need

4

Planned obsolescence

- Should all products last for your lifetime?
- How long would you expect the following to last?
  - School chair
  - iPod
  - Shoes
  - Newspaper
  - Plastic fork

5

Determining product lifespan

- Why should designers of a new product consider:
  - Fashion and trends?
  - The requirements to maintain market share?
  - New technologies?
  - Upgradeability and function?
- Once the expected lifespan is determined, manufactures need to appropriately engineer the product in order to last as long as expected
  - What are the consequences of over- or under-engineering product parts?

6

Disposability

- Some products are planned with deliberately short lifespans
- What are the advantages and disadvantages of short product lifetimes to:
  - Manufacturers?
  - Consumers?
  - The environment?

7

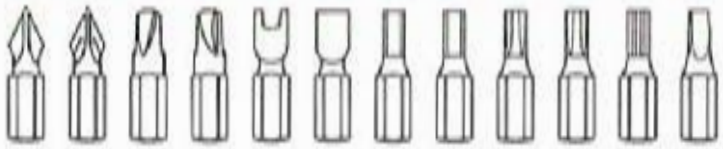
Design for maintenance

- Should all products be repairable?
  - What scope for maintenance and repair should designers allow?
  - Are repairs expected to be carried out at home or sent to professionals?
  - How easily are modern products repaired?

8

Specialist repairs

- Some products are manufactured to be too complex to be repaired at home
  - Knowledge is required to fix electronics or mechanical parts
  - Specialist tools are required
  - Specialist replacement parts may be required



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Case study: Swedish repairs

- The Swedish government is offering to halve VAT on repairs to encourage owners to make do and mend
- They will also offset half the labour cost through income tax benefits
  - This will significantly reduce the cost of repairs to clothes, shoes, bikes and large kitchen appliances such as washing machines and dishwashers
  - Products will last longer and the consumption of materials will be reduced

10

Recycling

- What products are designed to be recycled or reused?
  - What makes them suitable for recycling?
  - What products are easily upcycled?
- What are the benefits of recycling to:
  - The company?
  - The customer?
  - The planet?
- How much recycling does your household produce each week?

PG ONLINE

11

End of life

- Responsible end of life design should include:
  - as few materials as possible
  - recycled and recyclable materials where possible
  - easy-to-separate materials avoiding permanent bonding methods
  - built-in reusability where possible

PG ONLINE

12

Low oil supplies

- The depletion of oil reserves is hastening change and development of replacement technologies to fuel our industries, homes and transport
- New technologies include:
  - Harnessing natural resources
  - Hydrogen power
  - Battery technology

8

Electric vehicles

- The EV market is expanding rapidly
- Success is dependent on:
  - national and international charging networks
  - battery technology
  - a change in driver mindset

9

MATERIALS AND THEIR MECHANICAL PROPERTIES.

Conductivity: The ability of a material to conduct heat and electricity.

Strength: The ability of a material to withstand a force without breaking or bending.

Elasticity: The ability of a material to bend or distort and return to its original form.

Plasticity: The ability of a material to permanently change its shape or form.

Malleability: The ability of a material to permanently deform in any direction without cracking or splitting.

Ductility: The ability of a material to be drawn out along its length, twisted or stretched without splitting or breaking

Hardness: The ability of a material to withstand wear, scratching and indentation.

Toughness: Is the ability to withstand sudden shocks, blows, impacts etc without breaking

Durability: The ability of a material to withstand wear and tear especially from weathering.

Fusibility: Is the ability of a material to change into a liquid or molten state when heated.

Stability:
The ability of a material to resist changes in size and shape due to environmental factors.
Many timbers are not very stable because they shrink and swell along their width due to temperature and humidity changes.

10

MATERIALS AND THEIR MECHANICAL PROPERTIES.

Compressive strength: Is the ability of a material to withstand crushing or pushing forces which attempt to crush or shorten the material.

Tensile strength: Is the ability of a material to resist stretching or pulling forces.

Bending strength: Is the ability of a material to withstand forces which attempt to bend the material.

Shear strength: Is the ability of a material to resist sliding forces acting against each other like a scissor action.

Torsional strength: Is the ability of a material to withstand twisting forces when torque and torsion are applied.

11

Environmental Issues

Making a product uses resources, such as raw materials and energy. This has an impact on the environment.

There are a number of things that a designer might think about to reduce environmental impact:

- **The material used to make the product.**
- **The life of the product.**
- **What happens to the product at the end of its life.**

Wood

Timber is a renewable resource, which means that if forests and woodlands are carefully managed, we will never run out of it. Timber is easy to reuse and can be burnt to produce heat when at the end of its natural life. It is also biodegradable.

Metals

Most metals are relatively easy to recycle and reuse, and there are advantages for manufacturers. It is 20 times more efficient to recycle aluminium cans than to make new ones.

Plastics

Although most plastics are not biodegradable, they can be recycled and reused. Polystyrene vending cups can be recycled to make items such as pencils and rulers, and plastic carrier bags can be reused

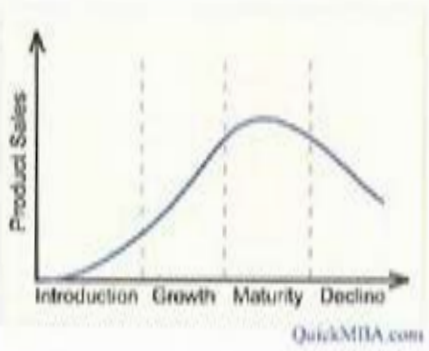
1

Product life

Most products have a limited life. This means that eventually they stop working, are worn out or are thrown away. Designers have to consider how long a product will last and what will happen when it is no longer needed.

A product with a long life uses less material than several short-lived replacements. This is good for the environment. However, a longer life also means that the manufacturer will sell less replacement products.

One way of extending product life is using better materials – like stronger materials or materials that resist corrosion. Another way is through design to allow their life to be extended by maintenance.



2

Design for maintenance

Maintenance means any activity which allows the product to have a longer life. It can include anything from repairing worn out parts to replacing batteries.

Designing a product to allow maintenance may mean including features such as access panels and standard screws. These help to allow parts to be replaced.

Alternatively, products might be made from a series of standard modules. This would mean that if it went wrong, only the faulty module would need to be repaired or replaced.

Using modular design also makes it easier to upgrade and improve products as there are new developments and improvements in technology.

3

Disposal

At the end of their useful life, most products are disposed of in some way. How this is carried out can have a significant effect on their impact on the environment.
A large proportion of products that we use currently end up in landfill – this means that they are buried in underground rubbish dumps. This is one of the least environmentally friendly methods of disposal.

Recycling

Recycling means reprocessing a material so that it can be used again. This helps to reduce damage to the environment by reducing the need for new materials. For example, this might mean melting plastic parts so that they can be shaped into new products. Symbols are used on plastic products to show the type of plastic used, so that it can be sorted into different types and recycled.

Biodegradability

If it is essential to dispose of a product in landfill, ideally the material should be biodegradable. This means that it will decompose (naturally break down) relatively quickly into naturally-occurring substances - as opposed to non-biodegradable ones that take many years to decompose.

4

As discussed previously the majority of plastics are made from oil. This causes problems fom the environment through the process of extracting oil from the ground or under the sea. There are also problems with the processing of oil into compounds we can use as plastics and the pollution these produce.

Plastic also creates problems following our use and its **final disposal**. Plastic is generally not biodegradable, meaning it is not easily broken down naturally by animals and enzymes digesting it. Plastics have only been around for about 70 years. So microorganisms simply haven't had much time to evolve the necessary biochemical tool kit to latch onto the plastic fibres, break them up into the constituent parts and then utilise the resulting chemicals as a source of energy and carbon that they need to grow.

Disposing of plastic

According to National Geographic only 9% of plastic is recycled.
The vast majority—79%—is accumulating in landfills or discarded in the natural environment as litter. Meaning: at some point, much of it ends up in the oceans, the final sink.

Environmental impact of disposal.

- Most plastic ends up in landfill, land that cannot be used again as plastic does not naturally degrade.
- A large proportion is simply litter damaging habitats.
- Much will finally end up in the ocean as small pieces where it is ingested and will enter the food chain.

Can plastics be environmentally friendly?

If we recycled 100% of all plastic produced then there is every chance the use of plastics would become sustainable, but we don't. Alternatives are needed to allow us to continue to use this versatile material.

In order to make plastic more environmentally friendly we need to look at:

- **Bioplastics** made from natural materials such as corn starch
- **Biodegradable** plastics made from traditional petrochemicals, which are engineered to break down more quickly
- **Eco/recycled plastics**, which are simply plastics made from recycled plastic materials rather than raw petrochemicals.

Bioplastics

The theory behind bioplastics is simple: if we could make plastics from kinder chemicals to start with, they'd break down more quickly and easily when we got rid of them.

The most familiar bioplastics are made from natural materials such as **corn starch** and sold under such names as *EverCorn™* and *NatureWorks*. Some bioplastics look virtually indistinguishable from traditional petrochemical plastics. **Polylactide acid** (PLA) looks and behaves like polyethylene and polypropylene and is now widely used for food containers.

Bioplastics

Biodegradable plastic is **plastic** that decomposes naturally in the environment. This is achieved when microorganisms in the environment metabolize and break down the structure of **biodegradable plastic.** The end result is one which is less harmful to the environment than traditional **plastics**

Some supermarkets now use what are described as **photodegradable, oxydegradable**, or just **biodegradable bags** (in practice, whatever they're called, it often means the same thing). As the name suggests, these biodegradable plastics contain additives that cause them to decay more rapidly in the presence of light and oxygen (moisture and heat help too). Unlike bioplastics, biodegradable plastics are made of normal (petrochemical) plastics and don't always break down into harmless substances: sometimes they leave behind a toxic residue and that makes them generally (but not always) unsuitable for composting

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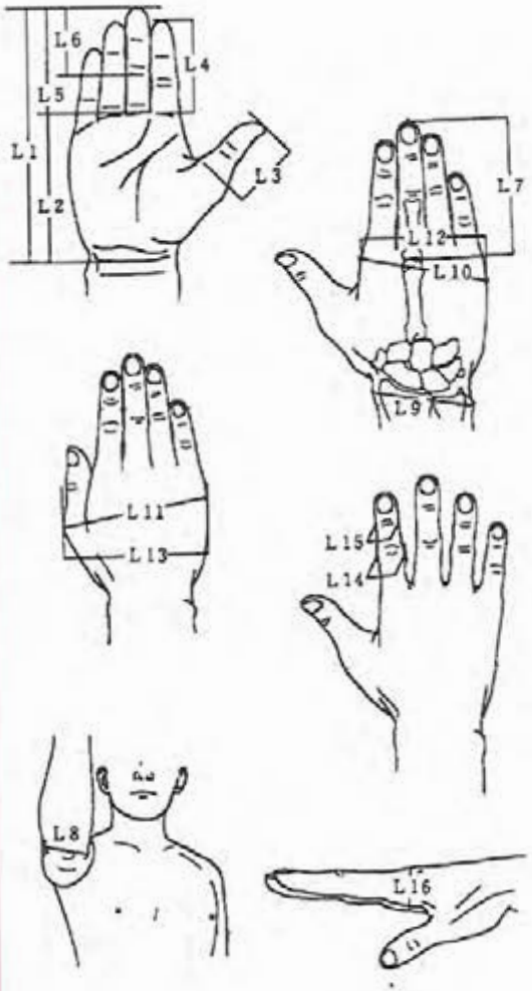
Anthropometrics

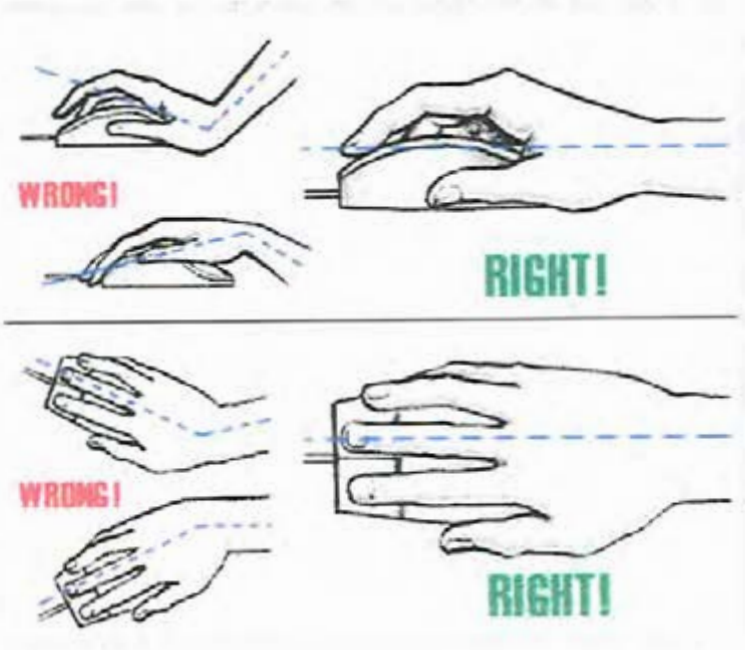
- Anthropometrics is the study of measurements of the human body.
- It is used in product design, architectural design and clothing design.
- Nothing that is designed for humans to use can be designed before considering the anthropometric data.

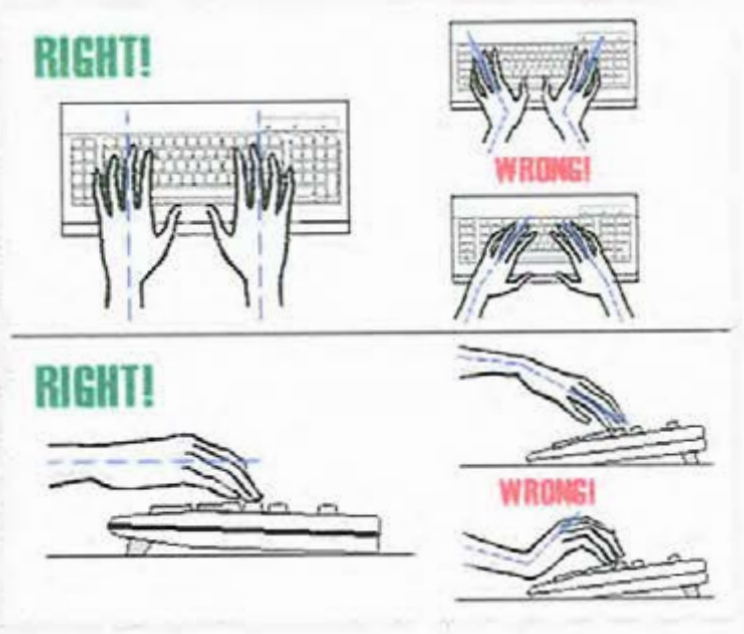


Ergonomics is the study of designing equipment and devices that fit the human body, its movements, and its abilities making them comfortable.

Many products are designed to be used by people for long periods of time, such as computer keyboards and mice, ergonomics are used to make sure they can be used safely and efficiently.

Repetitive strain injury (rsi) can be caused by badly designed products or by incorrect use of them for long periods of time.





Enterprise

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What is Market Segmentation?

Market Segmentation is the process of grouping potential customers together based on different factors. It is basically the method used by businesses to identify their target customer/market. Markets can be segmented in different ways and some businesses choose to use more than one characteristic to specifically segment their market.

How can markets be segmented?

✪ **Age** – This is basically how old the customer is. Businesses tend to segment their market into age brackets. Toys, for example, are aimed at younger audiences, potentially between ages 3 and 13.

✪ **Gender** – This is whether the target customers are typically going to be male or female. Make-up, for example, is targeted at females – this doesn't mean that males cannot buy it, it is just who the business is targeting!

✪ **Occupation** – Occupation means the job or career that the people within the target market may have. This could be a specific job, for example Gym equipment being targeted at Personal Trainers, or a more general group of jobs, Office Workers for example.

✪ **Income** – Some businesses segment their market based on how much money their potential customers make. Luxury branded items, for example, will be targeted at customers with more disposable (spare) income.

✪ **Geographic** – This is when businesses segment their market by their location. A local newspaper, for example, will segment their market to include only those in the area in which the newspaper reports.

✪ **Lifestyle** – Businesses could segment their market based on what their customers' lifestyle is like; this is basically their hobbies, their routines and their habits. Some people enjoy going on holiday abroad each year, this is their lifestyle.

What are the benefits of Market Segmentation?

By segmenting their market, businesses are:

- Able to focus on the wants/needs of specific customers and more likely to meet these wants/needs.
- More likely to make sales because they've focused on specific groups of people (if they segment successfully).
- More able to focus their advertising and other marketing at the right groups of customers – if their market is segmented to include female customers, then the business could choose to advertise in magazines aimed at females, for example.
- More able to produce a specific customer profile, which is a portrait of the business's main target customer.

How do customers vary (how are they different)?

Customers are different/vary because of:

- The amount of money they are **able** to spend
- The amount of money they are **willing** to spend (some customers have more money, but may not be willing to spend this money)
- The **quantity** of products/services they require
- The **quality** of products/services they require
- The **location** in which they want/can purchase items
- The time in which they want to/can purchase items.

What Customer Feedback Techniques are available for business start-ups?

Customer Feedback Techniques are the methods a business uses to allow customers to tell them what they think about their products or services and can include:

- Social Media / Online Communities
- Websites with reviews
- Online surveys
- Customer comment cards
- Comments made to staff members
- Telephone/email surveys
- Email contact forms

Why are Customer Feedback Techniques useful for new business start-ups?

If things aren't going well for a business, customer feedback will give them the reasons why. Taking action could improve sales and help businesses meet customer wants/needs better. Customer feedback also makes people/customers feel they are being listened to.

What is Market Research?

Market Research is the process of finding out what customers want and what they need. Businesses typically carry out Market Research before developing a new product as well as during the testing of the product to get the opinions of their potential customers.

What is the purpose of Market Research?

The purpose of Market Research is to find out what customers want and need – this helps businesses develop products that are more likely to be successful. Research also helps understand customers' tastes and opinions and can change the design or specification of products. Finally, Market Research can also be used to gauge what products are already on the market and what competitors are doing.

What is Primary (field) Market Research?

Primary Research, or Field Research, is when businesses gather their own data and information. This can be done through surveys, questionnaires, focus groups, observations, consumer trials and 'taste tests'. The data gathered is unique to the business and does not already exist.

What are the benefits of Primary (field) Research?

Carrying out Primary Research means that the results are exactly what the business wants to find out, because this research has been tailor made for their own specific needs. Researchers can include everything the business wants to find out from their potential customers.

What are the drawbacks of Primary (field) Research?

Primary Research is usually more expensive to carry out than Secondary Research because the business is creating and analysing everything from scratch. This also means that Primary Research is more time consuming to carry out.

What is Secondary (desk) Market Research?

Secondary Research, sometimes called Desk Research, is when the business uses data or information that already exists. This is not tailor made for the business. Methods of Secondary Research include Internet research, books, newspapers and data already collected by competitors, the Government or other sources of statistics.

What are the benefits of Secondary (desk) Market Research?

Secondary Research is quicker to complete, because the data has already been collected and, in some cases, analysed.
Secondary Research is also cheaper to carry out – looking in newspapers for competitor research is clearly cheaper than preparing, carrying out and analysing a questionnaire, for example.

What are the drawbacks of Secondary (desk) Market Research?

The data that is used when completing Secondary Research is not unique and not specific to the business's needs, unlike when Primary Research is carried out. Secondary Research doesn't allow businesses to ask further questions to those that took part in the research either.

Forms of Ownership for Business Start-ups…

Sole Trader

- **Number of Owners:** 1 (one owner, but can have employees working there)
- **Legal Requirements to Start:** Register as self-employed with HMRC; (HMRC is the Government department in charge of collecting tax).
- **Liability:** Unlimited Liability – the debts are the responsibility of the owner (disadvantage).
- **Decision Making:** The owner is responsible for all the business's decisions (advantage).
- **Distribution of Profits:** The owner chooses what to do with any profits made (advantage).

Partnership

- **Number of Owners:** 2 minimum
- **Legal Requirements to Start:** Register with HMRC. A Deed of Partnership is also usually drawn up to state how the business will operate.
- **Liability:** All partners will have Unlimited Liability. They will all be responsible for any debt the business may have (disadvantage).
- **Decision Making:** Decision making is shared between partners; this is usually included in the Deed of Partnership. This can be a disadvantage if owners fall out over decisions.
- **Distribution of Profits:** % share will be agreed within the Deed of Partnership (shared profit is a disadvantage of this type of ownership).

Limited Liability Partnership (LLP)

- **Number of Owners:** 2 minimum
- **Legal Requirements to Start:** Register with HMRC and complete an LLP Agreement that outlines how the LLP will be run.
- **Liability:** Partners have Limited Liability. They only stand to lose what they have invested if the business gets into financial difficulty (an advantage of this type of ownership).
- **Decision Making:** This will be decided when the business is formed and written in the LLP Agreement.
- **Distribution of Profits:** Again, this will be in the LLP Agreement.

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What is liability (in terms of Business Ownership)?

Liability means responsibility and it refers to whether owners will be responsible for the debt of a business, should it get into financial difficulty.

Limited Liability…

If an owner has Limited Liability, they will only lose what they have invested in a business. Shareholders in companies have limited liability – if they invested £500, and the business failed and owed money, they would only lose their £500 – they wouldn't have to cover any more of the debt, even if the business owned millions.

Unlimited Liability…

This is a risk for a business owner as, if they have Unlimited Liability, they are responsible for all the debts of a business. This means that if their business fails and owes people money, they will have to cover this debt, even if it means losing their personal possessions.

What is a franchise?

A franchise is when someone buys the rights to an existing business's name to run as their own business. Basically, they're setting up their own business but using the name and ideas of an existing business.

Benefits of owning a franchise…

The franchisee (who buys the franchise) will benefit from guidance and help from the franchisor (who sells the rights to their business name). The business idea is already a success, so they could be more likely to succeed than if setting up on their own. They will also benefit from any advertising the franchisor does.

Drawbacks of owning a franchise…

Franchisees have to pay the franchisor for the rights to their name – this is more expensive than setting up a new business. Franchisees must also pay royalties to the franchisor on a regular basis. It is also unlikely the franchisee can make changes to the business format.

What is Capital?

Capital is the name given to the money that is used to start-up a new business or to launch a new product.

Sources of Capital…

- **Own Savings** – This is the owners' own money. This method doesn't involve interest but are limited by how much savings they have.
- **Friends & Family** – Borrowing from friends or family may not include interest or paperwork but can lead to friction if not paid back.
- **Loans** – Loans from banks or other organisations can help raise capital quickly but will have interest added to the amount paid back.
- **Crowdfunding** – This is where lots of a people (sponsors) pledge small amounts of money, usually online. This can be slow to raise the amount of capital needed but doesn't involve interest payments.
- **Small Business Grant** – Sometimes Governments give grants to encourage businesses to set up. Grants often involve no interest payments but strict criteria needs to be met and funds are limited.
- **Business Angels** – Investors on the TV show 'Dragons Den' would be considered Business Angels. They invest in a business idea in exchange for a share of profits and/or part ownership of the business.

What is a Business Plan?

A Business Plan is a document that is drawn up before a business is launched to describe the new business idea.

What should a Business Plan contain?

- Business Aims and Objectives (what it wants to achieve/when)
- Business Strategies
- Business Operations (how will the business be run on a daily basis. Who owns the business? Who will make decisions?)
- Sales Plan
- Marketing Plan (marketing, promotions and advertising?)
- Financial Forecasts (cash flow forecasts – how much money is predicted to come in and go out each month? How much profit does the business predict it will make in the first year/over a longer period?)

Why is it important for new start-ups to have a Business Plan?

New businesses can be difficult to set up and, unfortunately, most will fail. Having a Business Plan *should* reduce the risk of failure, especially if the plan is detailed and realistic, as all eventualities will be planned for. A Business Plan is also used to share the business's ideas with third parties – it is unlikely, for example, that a bank will lend money to a new start-up without a detailed plan that includes financial forecasts.

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What are Costs?
Costs are the things businesses have to pay for in order to produce a product or provide a service.

What are Fixed Costs?
Fixed costs are things a business pays for that do not change depending on the amount of a product a business makes – so these costs stay the same no matter how many products a business produces.

Examples of Fixed Costs for a Cake Shop…
Rent for the shop would be a fixed cost because the cost will stay the same no matter how many cupcakes are produced and sold. The shop's insurance, staff wages and phone bill will also be examples of fixed costs.

What are Variable Costs?
Variable costs are the costs a business pays that change depending on how many products a business produces – these costs increase when more products are made.

Examples of Variable Costs for a Cake Shop…
The ingredients used in the cakes would be an example of a Variable Cost because this cost will increase if more cakes are made. The packaging for the cakes will also be a variable cost, if more cakes are made and sold then more packaging will be required.

How are Total Costs calculated?
Total cost is just the fixed costs plus the variable costs. You will, however, need to account for the number of products made when including variable costs.

For example, if the shop's fixed costs are £1000 and their variable costs are £0.20 per cupcake, their total costs when they produce 500 cupcakes will be:

Fixed Costs + (Variable Cost Per Unit x Units Produced)

£1000 + (£0.20 x 500)

£1000 + £100 = **£1100 Total Costs**

How to calculate Total Costs for 400 cupcakes when Fixed Costs are £2000 and Variable Costs are £0.45 per unit…

£2000 + (£0.45 x 400)
£2000 + £180 = **£2180 Total Costs**

What is Revenue?
Revenue is the money generated from selling products or services. **It is not profit**, but the money coming into a business from sales.

How is Total Revenue calculated?
Total Revenue is calculated by:

Selling Price x Number of Sales

What is Profit?
Profit is the money left over from revenue once costs have been paid – it's the money a business makes once all costs have been covered.

How is Total Profit calculated?
Total Profit is calculated by:

Total Revenue – Total Costs

What is Profit per Unit? How is it calculated?
Profit per Unit is the amount of profit a business makes on just one item sold.

Profit per Unit is calculated by:

Selling Price per Unit – Total Costs per Unit

Example calculations…

Selling Price = £1.20 per cake
Fixed Costs = £350
Variable Costs = £0.20 per cake

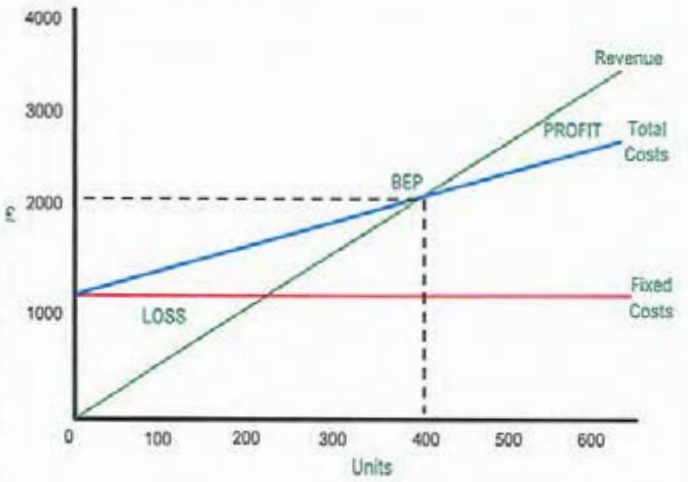
- Total Costs for 500 cakes = 350 + (0.20 x 500) = £450
- Revenue for 500 cakes = 500 x 1.20 = £600
- Profit per Unit = £1.20 – (450 ÷ 500) = £0.30

What is Break-even?
Break-even is the point at which a business does not make a profit or a loss – its revenue from sales and its total costs are equal. The number of products that must be produced/sold to reach this point is called the Break-even Point.

How is Break-even calculated?
The formula for Break-even is:

$$\frac{\text{Fixed Costs}}{\text{Selling Price per Unit} - \text{Variable Cost per Unit}}$$

A labelled Break-even graph…



This business's Break-even Point is 400 Units.

Why is Break-even information useful for a business?
Businesses who calculate their Break-even point know what output they need in order to be profitable; so, they know how many products to produce or can generate a sales target in order for them to make a profit.

What does increasing selling prices do to the Break-even Point?
Increasing selling prices will lower a business's Break-even Point, they will need to produce/sell less in order to Break-even.

What impact does increased costs have on the Break-even Point?
An increase in either Fixed or Variable Costs (or both) will result in a higher Break-even Point for a business; they will need to produce/sell more in order to Break-even.

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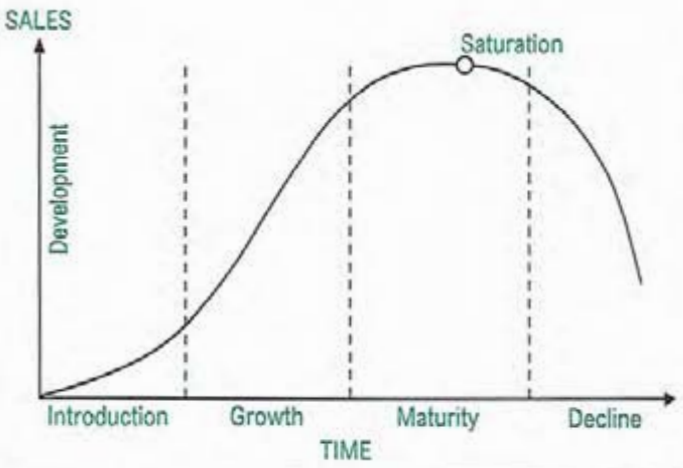
What is the Product Lifecycle?
All products have a life span – this is short for some products or, in the cases of popular products, can be quite long. The Product Lifecycle is a set of stages that a product will go through in its lifetime. It is important to note that not all products go through all stages of the lifecycle.

The Product Lifecycle…



The stages of the Product Lifecycle…

- **Development** – This is the stage before the product is released. At this stage, the business will be designing and testing the product as well as completing their market research.
- **Introduction** – At this stage, the product is launched onto the market. Businesses might be advertising the new product a lot at this stage to increase awareness and might include introductory offers. Sales will increase steadily in the introduction stage (if successful).
- **Growth** – If the launch of the product is a success, it will enter the growth stage (remember not all products go through all stages of the lifecycle, some may decline and never grow). At the growth stage, sales of the product will increase rapidly.
- **Maturity** – At this stage, most customers have tried or bought the product. New competitors might be on the scene. Sales are at their highest, but the rate of sales growth will slow down.
- **Decline** – In this final stage, sales decline. If sales decline continues then the product will be withdrawn from the market. If businesses are aware of the Product Lifecycle though, they will be able to extend the life of a product before it enters the decline stage.

What is an Extension Strategy?
An Extension Strategy is the name given to the action a business takes when it identifies a product is close to entering the decline stage of the Product Lifecycle. These actions aim to extend the life of a product, by keeping the product within the maturity stage, and should improve sales.

What Extension Strategies can businesses use?
Businesses could **advertise** their product to remind customers that it exists and to encourage them to purchase it. The **price** of the product could be **reduced**, or the product could be **updated** to encourage new sales. Businesses might choose to explore **other markets** – like targeting a **different audience** or selling in another country. this would expose the product to new customers. The **packaging** of the product could be updated to get customers' attention.

What is Product Differentiation?
As the name suggests, Product Differentiation refers to what is DIFFERENT or what STANDS OUT about the product or service a business is launching. Businesses usually identify what is different about their product in the development stage of the product lifecycle.

How can Product Differentiation be achieved?
- Businesses should try to build a strong brand image for their goods or services.
- Businesses should focus on the **function**, **cost** and **appearance** of their products (these are variables of the Design Mix Model).

To stand out, business could offer improved/better:
- Design mix (see above)
- Location
- Product Features
- Product Functions
- Better services (delivery etc.)
- After sales services (extended guarantees etc.)
- Design/Appearance of their products

Differentiation is about the **product** itself, not the price etc.

…or they could identify a product's **USP**

What is a USP?
USP stands for **Unique Selling Point.**

This is a specific thing that a business identifies about their product or service that is different (unique). Businesses identify a USP for their products or services to help them DIFFERENTIATE from others on the market.

How can identifying a USP for a product help sales?
If a business identifies a USP for a product or service, they can use this within their advertising. If the market already has existing products or services being sold, having a USP will help a new product stand out and will give customers a reason to change their habits and purchase the new product.

What are the three categories of External Factors that could affect Product Development?

☆ **Technological Developments** – technology is changing and updating at a fast pace. Businesses must keep up to date with these developments or they'll be left behind by competitors. Technology could speed up the manufacturing of products, speed up the design process for new products or impact on customers' preferences.

☆ **Economic issues** – the state of the country's economy can have an impact on whether businesses are likely to develop new products or not. In a **recession**, for example, people are generally struggling to make ends meet and businesses will struggle with sales/survival – they're unlikely to invest in new product development.

If there is an economic **boom** then more people are employed and have money to spend; businesses will make more sales but may struggle to keep up with production of existing products to meet increased demand, so they may not be able to focus as much on developing new products.

☆ **Legal Issues** – businesses need to make sure they understand different laws when developing new products and ensure they do not break any of these laws. Laws could have an impact on the way a product is manufactured or could change the designs of some products to ensure they meet **safety standards** within a particular country. Businesses must ensure they do not break **Copyright** law; so they can't copy other people's work that already exists. They must also ensure they do not copy anyone else's product ideas that are covered by a **Patent** (the business might choose to patent their new ideas to stop others copying them too). Meeting legal obligations could cost the business more to produce a product but will ensure the business is less likely to break laws and therefore should avoid having legal cases brought against them.

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What factors do businesses consider when setting a price for a new product?

- Income levels of target customers (how much they're able to pay)
- How much target customers are willing to pay for products
- The prices competitors are charging for similar products
- The amount products cost to produce

Why is it important for businesses to consider these factors before setting a price?

If businesses didn't consider what customers are able/willing to spend, then the price set could be too high – this would mean the business loses out on sales. If the product was priced a lot higher than that of the business's competitors, then it would struggle to compete. If the cost of production is not considered, businesses could end up selling a product at a loss.

Methods of Advertising to attract and retain customers...

- **Leaflets** – these are small handouts given to customers in the street or posted to people (not specifically addressed to anyone). Businesses use these because they're cheap to make and can be kept by customers if needed (so they can be referred to for the business's phone number, for example). They are, however, often thrown away before being looked at.
- **Social Media** – websites/apps such as Facebook, Twitter and Instagram. These are used because they're cheap to advertise and accounts are usually free to create. It is possible to target adverts and specific people. Social Media is not, however, guaranteed to be used by all target customers, particularly older age groups.
- **Websites** – multiple pages hosted on the Internet. Websites can be accessed by customers around the world at any time of day. They are, however, less effective if not promoted or not kept up to date.
- **Newspapers** – these can be either local (in one area) or national (all around the country). Advertising in newspapers can be expensive but can get a large audience. Newspapers are less effective when targeting younger customers though and adverts are easily lost with the amount of information on any single page.
- **Magazines** – magazine advertising can also be expensive but often magazines are based on specific topics or aimed at a specific age group/ gender, so this means it's easy for a business to target their advertising.
- **Radio** – Radio is likely the most expensive method of advertising out of the six methods. Adverts can grab people's attention with sound/ music, but customers can't keep any information or might miss parts.

What is a Pricing Strategy?

A pricing strategy is a specific system used to set prices. There are lots of different pricing strategies that businesses can use, and some businesses use more than one on the same product. There are four you need to know for your exam (below). REVISE THEM!

Pricing Strategies...

Competitive Pricing is...

When a business looks at what competitors are charging when considering what price they are going to charge for their products or services. It doesn't necessarily mean they charge a lower price (though they could in order to be competitive).

Psychological Pricing is...

When businesses avoid using round numbers for their prices, instead choosing to end prices with figures like 99p. This gives the psychological impression that the products are not as expensive - £2999 instead of £3000, for example, is only £1 off, but appears cheaper!

Price Skimming is...

When businesses charge a HIGH price for a new product or service because people will be willing to pay for it as it's new and sought after. This price is then lowered over time as other products are released or the product itself becomes more common.

Price Penetration is...

When businesses charge a LOW price when a product or service is first launched and then increase the price over time. This encourages people to give the product or service a chance, with the hope that they'll buy it again. This is a way of changing customers' established buying habits and is used in crowded markets.

Methods of Promotion...

- **Discounts** – these are appropriate for all products or services. They help businesses attract customers, who will buy because of a discounted price, and can encourage repeat custom if the price is discounted again at a later date.
- **Competitions** – competitions are often used by businesses that advertise on social media. They encourage people to interact with the brand, which can attract new customers.
- **Buy one get one free (BOGOF)** – these are suited more to businesses that sell products, rather than services, and to businesses that sell products that people consume (use a lot of) – like groceries. These offers can be expensive for a business as they have to give away an additional product with each sale of a specific product.
- **Free gifts/product trials** – where a free gift is given with every purchase or a small 'test' product is offered to encourage customers to try a new product out.
- **Point of Sale Advertising** – point of sale refers to the place a product is sold; these are usually adverts within stores or at checkouts.
- **Loyalty Schemes** – this promotion method is used for products that people consume a lot of or buy regularly, like coffee. These schemes are mainly used to retain customers, as their loyalty will be rewarded with discounts/freebies.

What is customer service?

Customer service is when a business provides assistance, support or advice to the people that are buying their products or services. Good customer service will mean people are happy to return and can also lead to a good reputation, which can help to attract new customers.

Customer Service Techniques...

- **Good Product Knowledge** – customers expect businesses to have staff that know the products they're selling inside out! As more and more people buy online, businesses that offer expert knowledge can compete more with online retailers. This can attract customers.
- **Customer Engagement** – this means that the business's employees interact with customers in a polite way and make them feel special. This can help retain customers – if they're happy with the service, they'll likely return.
- **After Sales Service** – businesses can offer guarantees on products, maintenance and servicing. All of these additional services will help attract customers but will also mean that customers return to the business.

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What is a Functional Area?

A Functional Area is a 'department' within a business. Each department has its own specialisms and responsibilities, known as their functional activities. Functional Areas will often work together, communicating to ensure the business runs smoothly.

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Functional Areas / Activities

Human Resources

Description...

The Human Resources Functional Area deals with the business's employees.

If you think that this function deals with the PEOPLE, then it should be easy to remember by relating the word HUMAN to PEOPLE within the business.

Main Activities/Responsibilities...

- Recruiting employees
- Ensuring the right number of people are working within the business (no shortages, not too many employees)
- Training employees
- Performance management (giving employees targets and checking on how well they're working)
- Health and Safety within the workplace
- Ensuring the business keeps to all laws relating to employment and employees

Marketing

Description...

The Marketing Functional Area is responsible for identifying what customers wants and needs are.

This Functional Area is then responsible for developing products that meet these wants and needs.

Main Activities/Responsibilities...

- Carrying out Market Research
- Finding out customers' opinions
- Gathering feedback from customers
- Developing a marketing mix for the products the business offers.
- The Marketing Mix involves the 4 P's... PRODUCT, PRICE, PLACE and PROMOTION. The marketing function focus on getting this mix right so the product has more chance of success.

Operations

Description...

Sometimes referred to as the 'Production Department', this Functional Area is responsible for the process that turns inputs (raw materials) into outputs (finish goods) that can be sold to customers.

Main Activities/Responsibilities...

- Planning how products will be manufactured
- Producing the product or service
- Quality control
- Stock control
- Ordering stock
- Logistics (delivery of stock / finish products)

Finance

Description...

This Functional Area is responsible for everything to do with money in the business. They also organise the financial performance reports on an annual basis.

Main Activities/Responsibilities...

- Budgets
- Organising resources
- Ordering
- Preparing financial statements which will be submitted to HMRC (HMRC is the Government department that deals with tax).
- Reporting on financial performance; if it's a company, these reports will be available for all to see.

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What is the difference between function activities in a small start-up business and a large company?

In a small business start-up, all of the above functional activities are likely to be carried out by the same person (if it's a sole trader business) or a handful of people (in a partnership). There won't be dedicated teams of people to do all of the different activities required.

In larger firms, Functional Areas will have big teams of people all working together on specific tasks within the same department. The departments will still communicate with one another, but there is less likely to be shared responsibilities.

Summary of some main activities...

Checking Quality of Products	Operations	Manufacturing Products	Operations
Organising delivery of parts	Operations	Advertising Products	Marketing
Carrying out Market Research	Marketing	Paying employees' wages	Finance
Health and Safety	Human Resources	Posting adverts for a job	Human Resources

Food Preparation and Nutrition

Year 11 Food Preparation and Nutrition knowledge organiser Summer Term

What's assessed: Theoretical knowledge of food preparation and nutrition including:

- ✓ the functional properties and chemical processes as well as the nutritional content of food and drinks
- ✓ the relationship between diet, nutrition and health, including the physiological and psychological effects of poor diet and health
- ✓ the economic, environmental, ethical, and socio-cultural influences on food availability, production processes, and diet and health choices
- ✓ the functional and nutritional properties, sensory qualities and microbiological food safety considerations when preparing, processing, storing, cooking and serving food
- ✓ a range of ingredients and processes from different culinary traditions (traditional British and international), to inspire new ideas or modify existing recipes.

How it's assessed: Written exam paper including made up of:

- ✓ Multiple choice questions (20 marks)
- ✓ Five questions each with a number of sub questions (80 marks)

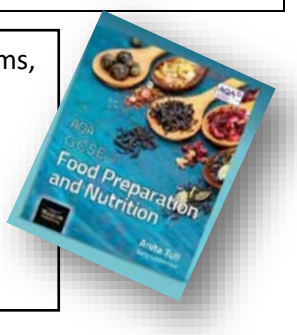
Success criteria:	
Grade	Description
To achieve grade 8 candidates will be able to:	• demonstrate relevant and comprehensive knowledge and understanding of the concepts, principles and properties of food science, cooking and nutrition • critically analyse and evaluate, to draw well-evidenced conclusions: o issues relating to food choices, provenance and production o food made by themselves and others
To achieve grade 5 candidates will be able to:	• demonstrate mostly accurate and appropriate knowledge and understanding of the concepts, principles and properties of food science, cooking and nutrition • analyse and evaluate, to draw coherent conclusions : o issues relating to food choices, provenance and production o food made by themselves and others
To achieve grade 2 candidates will be able to:	• demonstrate some relevant knowledge and understanding of the concepts, principles and properties of food science, cooking and nutrition • make straightforward and obvious comments on: o issues relating to food choices, provenance and production o food made by themselves and others

Use the online text book to help you prepare for the examination. It is full of information, key terms, films and animations, quizzes, weblinks, practice questions, study tips and more!

https://www.illuminate.digital/aqafood/

Username: stelfordlangley3

Password: student3



French

French Year 11 Summer Term – The Environment

The weather

il y aura – there will be
de la pluie – rain
de la neige – snow
du vent – wind
du tonnere – thunder
des averses – showers
des éclairs – lightning
des éclaricies – sunny spells
il fera… - it will be
beau – good
mauvais – bad
chaud – hot
froid – cold
frais – chilly
le temps sera – te weather will be…
ensoleillé – sunny
nuageux – cloudy
orageux - stormy

What concerns me in the world

le racisme – racism
l'état de la planète – the state of the planet
l'environnement – the environment
la cruauté envers les animaux – cruelty towards animals
la faim – hunger
la guerre – war
l'injustice – injustice
la pauvreté – poverty
la violence - violence

Oak National Academy –

Lesson on the units we cover in the Summer Term can be found on The Oak National Academy website.

Natural disasters

le manque d'eau portable – lack of drinking water
la disparition des espèces – extinction of species
la destruction des forêts tropicales – destruction of tropical rainforests
la surpopulation – overpopulation
la pollution de l'air – air pollution
la sécheresse – drought
les inondations – floods
les incendies - fires

Protecting the environment

on peut… - you can…
faire du bénévolat – do charity work
parrainer un enfant – sponsor a child
donner de l'argent à une association caritative
recycler – recycler
il faut – you/we have to…
lutter contre la faim – fight against hunger
signer les pétitions – sign petitions
participer à des manifestations – take part in demonstrations
éduquer les gens – educate people
agir - act

Essential Vocabulary

selon – according to
grave – serious
actuellement – currently
à l'avenir – in the future
ceci dit – having said that
cependant – however
en ce qui concerne – as far as …is concerned
d'ailleur – besides / what's more
parout – everywhere / all over
d'un côté – on one hand
d'un autre côté – on the other hand
le pour – the pros
le contre – the cons

The Perfect Tense with avoir

To form the perfect you need to use the verb *avoir* in the present tense:

j'ai – i have
tu as – you have
il / elle a – he / she has
on a / nous avons – we have
vous avez – you have
ils /elles ont –they have

You then add the past participle:

-er verbs = é (j'ai joué)
-re verbs = u (j'ai perdu)
-re verbs = i (j'ai fini)

The Perfect Tense with être

There are 14 verbs which use être to form the perfect tense:

The most important verb which uses être is "aller"

Je suis allé – I went

Simple Future Tense – Regular Verbs

To form the simple future tense, you take the future stem and and then add the correct verb endings.

Je manger**ai** – I will eat
Tu manger**as** – You will eat
Il/elle/on manger**a** – He/she/we will eat
Nous manger**ons** – We will eat
Vous manger**ez** – You will eat
Ils/ells manger**ont** – They will eat

For –**re** verbs, drop the "e" from the infinitive to make the stem.

Je boirai – I will drink

Geography

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T1

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Landscapes and physical processes

Geography Knowledge Organiser

1.1.1 - Distinctive landscapes

Upland Areas +600m

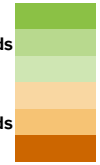
Peaks and ridges. Cold, misty and snow common. i.e. Scotland

Lowland areas -200m

Flat or rolling hills. Warmer weather. i.e. Fens

Relief of the UK

Relief of the UK can be divided into uplands and lowlands. Each have their own characteristics.



Glaciation in the UK

Over many thousands of years, glaciation has made an impression on the UK's landscape. Today, much of upland Britain is covered in u-shaped valleys and eroded steep mountain peaks.

During the ice age

Ice covered areas eroded and weathered landscapes to create dramatic mountain scenery.

After the ice age

Deep valleys and deposition of sediment revealed

What is a landscape?

A landscape has visible features that make up the surface of the land. Landscapes can be broken down into four 'elements'.

Landscape Elements

Physical	Biological
-Mountains	-Vegetation
-Coastlines	-Habitats
-Rivers	-Wildlife
Human	**Variable**
-Buildings	-Weather
-Infrastructure	-Senses

1.1.2/3 - Human activity

Honeypot site - A location which attracts a large number of tourists who, due to their numbers, place pressure on the environment and local people.
Carrying capacity - The number of people which a region can support without damaging the location and environment.
Visitor pressure - tourists who, due to their numbers, place stress on the environment and local people.

Positives of visitor pressure	Negatives of visitor pressure
Employment opportunities are created to meet the demands of the tourists	Jobs are often seasonal or part time. This makes it harder to support family.
Tourism brings in money and will boost the local economy	There is overcrowding in the peak seasons
There will be upkeep of the area, making it a clean place to live	Businesses are designed for the tourists
Crime can be reduced due to higher levels of employment	There can be congestion on the roads
	Scenic walks and hikes are damaged by footpath erosion

(1.1.3) Management: repairing footpaths

Stone pitching - This technique involves digging stone into the ground to form good solid footfalls. This ancient technique is used extensively in the central fells using stone which is naturally occurring.

Soil Inversion - A digger is used to construct a ditch drain. The soil removed from the drain is placed alongside to create a hard wearing walking surface. Grass seed mix is then sown to encourage vegetation to bind all the works together.

Sheep wool - The fleece is placed between the soil and the stones to prevents the stone from sinking into the soil. This creates a 'floating' path and also absorbs some water to slow surface runoff.

1.2.1 - Processes & landforms (Rivers)

Erosion

Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolved rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

Transportation

Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

Deposition

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition.

Freeze-thaw weathering

Stage One
Water seeps into cracks and fractures in the rock.

Stage Two
When the water freezes, it expands about 9%. This wedges apart the rock.

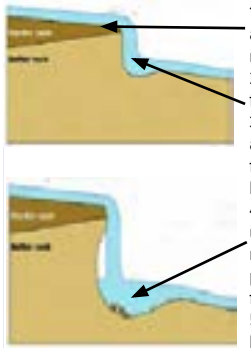
Stage Three
With repeated freeze-thaw cycles, the rock breaks off.

Weathering

Chemical
Action of chemicals within water dissolving the rock.

Biological
Rocks that have been broken down by living organisms or plant roots.

Formation of a waterfall



1) River flows over alternative types of rocks.
2) River erodes soft rock faster creating a step.
3) Further hydraulic action and abrasion form a plunge pool beneath.
4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
5) Waterfall retreats leaving steep sided gorge.

Formation of floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials builds up to form natural levees.

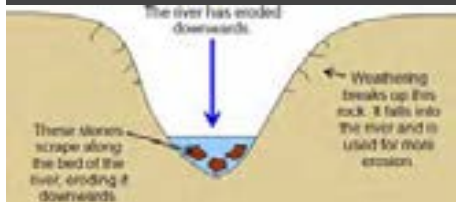
Formation of a meander

A meander is a curve in a river's course formed when erosion and deposition take place on opposite river banks. The two sides of the meander eventually meet and create a straight channel.

Inside bend:
Slowest speed
Deposition
Slip-off slope/point bar

Outside bend:
Fastest speed
Erosion
River cliff/undercut

Formation of a V-shaped valley



River long profile

Upper course

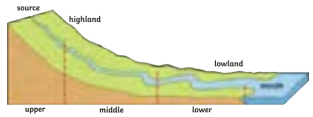
Near the source, the river is flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Middle course

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

Lower course

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.



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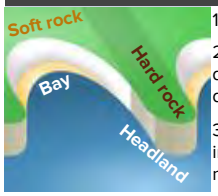
1.2.1 - Processes & landforms (Coasts)

Formation of bays and headlands

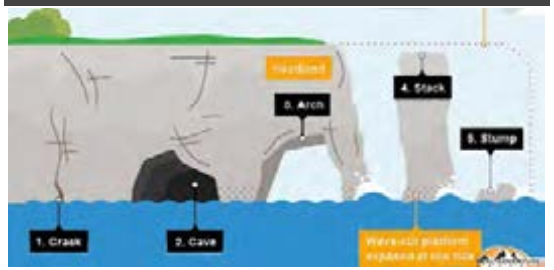


1) Waves attack the coastline.

2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.

3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Formation of coastal landforms



1. Hydraulic action widens cracks in the cliff face over time. Abrasion forms a wave cut notch between HT and LT.
2. Further abrasion widens the wave cut notch to from a cave.
3. Caves at both sides of the headland break through to form arch
4 .Weather above/erosion below –arch collapses leaving stack.
5. Further weathering and erosion eaves a stump.

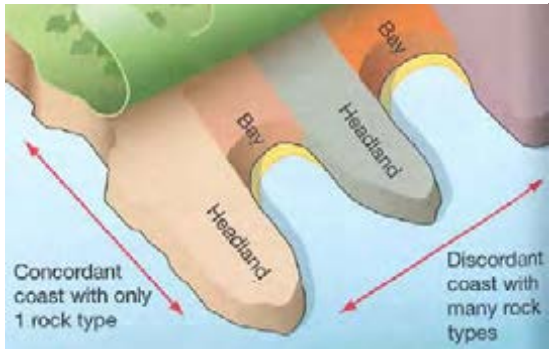
Types of coastline

Concordant

A concordant coastline occurs where the bands of differing rock types run parallel to the coast. The outer hard provides a protective barrier to erosion of the softer rocks further inland. Sometimes the outer hard rock is punctured allowing the sea to erode the softer rocks behind. This creates a cove which is a circular area of water with a relatively narrow entrance way from the sea.

Discordant

Discordant coastline occurs where bands of differing rock type run at right angles to the coast. The different resistance to erosion leads to the formation of headlands and bays.



Formation of coastal spits (longshore drift)

1) Swash moves up the beach at the angle of the prevailing wind.
2) Backwash moves down the beach at 90° to coastline, due to gravity.
3) Zigzag movement (Longshore Drift) transports material along beach.
4) Deposition causes beach to extend, until reaching a river estuary.
5) Change in prevailing wind direction forms a hook.
6) Sheltered area behind spit encourages deposition, salt marsh forms.

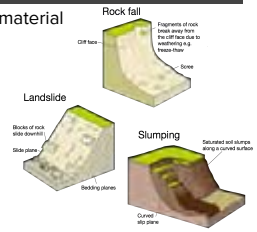
Mass movement

Mass Movement is the downhill movement of cliff material

Rockfall As the weathering processes weaken the structure of the cliff rock fragments fall away.

Landslide Large blocks of the cliff slide down to the base of the cliff due to erosion weakening the base of the cliff

Slumping When soft rocks like clay become too wet from rainfall and weakened by erosion, the entire cliff face slips down in a curve, making steps in the cliff



Wave-cut landforms

1. The sea attacks the base of the cliff between the high and low water mark.

2. A wave-cut notch is formed by erosional processes such as abrasion and hydraulic action - this is a dent in the cliff usually at the level of high tide.

3. As the notch increases in size, the cliff becomes unstable and collapses, leading to the retreat of the cliff face.

4. The backwash carries away the eroded material, leaving a wave-cut platform.

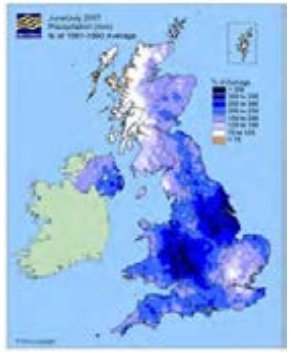
5. The process repeats. The cliff continues to retreat.

1.2.2 - Rates of change

Climate

The rainfall map of the UK shows variations in rain.
Less precipitation occurs in low land areas. East England
Most precipitation occurs in upland areas. Scotland.

These differences mean...
Uplands experience more weathering, erosion and mass movement.



Geology

Some rock types erode faster than others (sedimentary limestone or clays erodes quicker than metamorphic granite). The direction rocks are layered in can also affect this eg. concordant or discordant coastlines

Human activity

Humans can increase rates of change such as footpath erosion on cliffs or building on floodplains but humans can also put management in place is slow erosion or transport processes, like dams, groynes, river dredging & afforestation.

1.3.1 - Drainage basins

Hydrological cycle

Condensation- when water vapour cools to form clouds
Evaporation- where water is turned into water vapour (gas)
Precipitation- any water that falls from the sky (rain, snow etc)
Interception- vegetation traps water before it reaches the ground
Transpiration- water is evaporated from the leaves of vegetation
Surface runoff- water runs across the ground to a river
Infiltration- water seeps into the soil in the ground
Percolation- water seeps into rock deeper in the ground
Groundwater flow- water flows through the soil and rock in the ground

Drainage basin

Drainage Basin- is the area of land drained by a river and its tributaries
Watershed- the area of high land forming the edge of a river basin
Source- where a river begins
Mouth- where a river meets the sea
Tributary- a small river or stream that joins a larger river
Confluence- the point at which two rivers meet
Main river channel- main river flow in the drainage basin
Floodplain- flat land on the sides of the river that takes the overflow water

1.3.2 - River flooding

Factors influencing how rivers flood:

Steep Slopes - If the land surrounding a river is steep, rainfall will run quickly across the ground as surface runoff, increasing the river's discharge

Urbanisation - Roads and pavements are built using a tarmac, an impermeable material. Rainfall flows quickly over tarmaced surfaces as it cannot infiltrate into the ground, leading to rapidly increasing discharge

Geology - If a drainage basin has impermeable rock, water is unable to percolate into the rock. As a result, the rainfall flows into the river via throughflow and surface run off

Heavy or prolonged rainfall - A high volume of rainfall will cause a river's discharge to increase rapidly, increasing the chances of the river bursting its banks

Vegetation - Trees intercept rainfall as it falls from the sky. If there is a lack of vegetation, more rainfall reaches the ground and eventually the river, seeing a large increase in discharge

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1.3.3 - Flood management

Hard Engineering - Hard engineering management involves using artificial structures, such as dams and embankments which try to control rivers. They tend to be expensive.

Soft Engineering - Soft engineering management is a more natural approach to manage flooding, it does not involve building artificial structures, but takes a more sustainable approach to managing the potential for river flooding.

River defences	
Hard Engineering	
Channel straightening	Removing meanders, increases velocity to remove flood water.
Artificial Levees	Man-made banks heighten river so flood water is contained.
Channel widening	Makes river wider to increase capacity for a flood.
Soft Engineering	
Afforestation	Planted trees soak up rainwater, reduces flood risk.
Managed Flooding	Naturally let some areas flood to protect settlements.

Home study questions

DEVELOPING

Describe how tourists can have benefits and negatives to honeypot sites **[3 marks]**

Explain why a waterfall migrates backwards the source **[4 marks]**

SECURING

Analyse the pattern of average precipitation (rainfall) in the UK (1.2.2) **[6 marks]**

Explain the difference between discordant and concordant coastlines **[4 marks]**

MASTERING

'Urbanisation is the most significant factor in flooding' **To what extent** do you agree with this statement? **[8 marks]**

Sketch and annotate the formation of a spit **[6 marks]**

CHALLENGE

Create a spider diagram to show how all the erosional processes and landforms of rivers and coasts are linked

Draw out a river long profile and **label** where the different landforms and processes would usually occur

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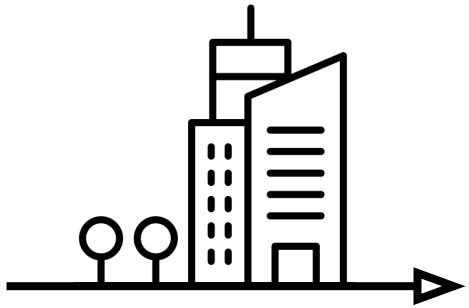
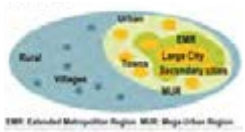
Rural-urban links



Geography Knowledge Organiser

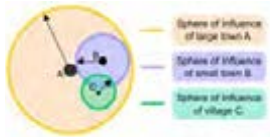
2.1.1 - Rural-urban continuum



A **rural-urban continuum** is the gradual change from a very built up urban area (like a large city) through to rolling countryside and sparsely populated villages. There is no clear line between urban and rural, as represented by the diagram

Service provision

As we move along the continuum from the most rural to the most urban locations, the number of services provided by each settlement increases. For example, in a small village there is likely to be a post office and a. However, in a large city there are a large number of shops, supermarkets, banks, hospitals and entertainment providers.



A **sphere of influence** is the area around the settlement from which people are attracted to visit or work due to the services the settlement provided. Large cities have more services so have a larger sphere of influence in the area

Counter-urbanisation

The movement of people from urban to rural areas to live.

Reasons for counter-urbanisation:

Housing - cheaper & bigger

Transport - improved roads and increased car ownership

Employment - more workplaces now located on urban-rural fringe

Environmental factors - less noise and air pollution

Impact of counter-urbanisation:

Higher house prices - increased demand

Decrease in traditional services - (village shops) residents now shop in urban areas

Increase need for local schools

Traffic congestion

Commuting - People often choose to live in cheaper rural areas and commute to work rather than paying higher urban prices, or just work from home

2.1.2 - Changing rural areas

Rural change

Counter-urbanisation, sphere of influences and technological change has lead to:

- Reduction or change in employment opportunities in rural area
- Closure of rural services like banks and post offices
- Increase in house prices rural areas, especially in accessible "commuter belt"
- Increased "second" home ownership
- Some locals can no longer afford local houses
- Reduction in bus services

Some of the more remote rural areas have experienced lots of negative changes. These include depopulation and deprivation. Deprivation is often characterised by a lack of public transport, healthcare and education.

Spiral of deprivation

Sustainable rural community

Things that need to be considered when creating a sustainable community;

Availability of jobs – encourage jobs based in rural areas by encouraging more companies to locate there

Education – ensuring local schools remain open

Healthcare – ensure all locals can access healthcare (transport links to cities)

Village services – encouraging shops, pubs and post offices to remain open

Transport – ensuring public transport runs regularly and can be accessed by all

Internet – ensure fast and reliable broadband

2.2.1 - Changing population

UK population change factors

Social

Healthcare - free and accessible for all, so people are living longer

Marriage/culture - People are marrying later and having a family later, reducing the number of children they can have

Economic

Careers - many women now chose to have a career, than start a family

Maternity pay - Getting paid while looking after a newborn child encourages more people to have children

Political

Contraception - is widely available

Mat-/Pat-ernity rights - Mothers and Fathers now have the rights to paid leave to care for a newborn, so encouraging more people to have children

UK migration

Migration to the UK

Stable government
More available jobs
Good healthcare system
Already have family in the UK
Good education system
Better rates of pay

Migration within the UK

Cost of housing cheaper somewhere else
Change in lifestyle - retiring to a rural area
Searching for work - more jobs in a cities
Moving to reduce the commuting time - live closer to work
Moving closer to family for care needs

UK's ageing population

Causes

Low birth rate and low death rate means we have more people living for longer (high life expectancy). The UK now have more people aged 60+ than ever before

Social/Health effects

- OAPs have more health issues, straining NHS
- Increased demand for care homes and carer services
- More people living longer increases demand for homes

Economic effects

- Not enough working aged population to pay taxes
- Healthcare, free public transport etc costs the state more money
- Pension costs for government increases

2.2.2 - UK towns and cities

Egan's wheel

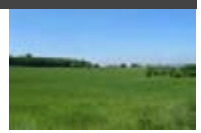
Egan's wheel outlines the criteria that needs to be met for a community to be sustainable. There is a social, economic and environmental focus. All of these categories must be met in order to have a sustainable community in urban and rural places.

Greenfield development

Greenfield sites are those that have not been built on before.

They are easier and cheaper to build on as there's nothing to knock down and there's more land available.

But this isn't sustainable as it is destroying the natural environment and animal habitats.



Brownfield development

Brownfield sites are those that have been built on before and is often derelict.

Planning permission is often easy to obtain and there are already existing services.

This is a more sustainable method of development however space is often limited and it can be expensive.

2.2.3 - Changing retail

Retail change in the UK

Economic factors

More home delivery firms making deliveries cheaper, congestion in cities, free parking in out of town centres, high city centre parking costs

Cultural factors

Car dependant society, habit of bulk buying weekly or monthly shops

Technological factors

Development of high speed broadband, improved websites that can be used to compare prices, internet banking

Out of town centres

Benefits	Costs
Large free parking areas	Can cause decline in city centre
Less congestion at out of town location	Can increase congestion out of town
Quick and easy access (near motorway network)	Often has the same chain stores at out of town centres – so does not support smaller independent shops.
Often room for expansion	Land use conflicts in out of town areas – areas in high demand from business parks and golf courses
Near suburban housing	

Internet shopping

Benefits	Costs
Convenient and often cheaper	Not everyone, (the elderly) have internet
Can buy products not available locally	Goods might be difficult to return
Can buy at any time or any location	City centre shops might close, leads to jobs losses and decline
Less time consuming	More delivery vans = more congestion
Traffic congestion is reduced	Using bank details can lead to fraud
Jobs created for those delivering products	

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2.3.1 - Global urbanisation

Distribution of global cities

As a result of globalisation, places around the world are now more connected than ever before. **Global cities** have become key globally connected places.

Although global cities are distributed widely across the world it is not an even distribution. For example;

- North America, Western Europe and South Asia have clusters of global cities
- Africa has very few
- India has 8
- China has 14

Changes over time

The rate of urbanisation varies across the world. In many HICs the period of rapid urbanisation occurred back in the 1800s, whereas many LICs are experiencing it at the moment.

2.3.2 - Urbanisation in global cities

London (HIC global city)

Reasons for growth

Natural population change – from the migrants and young workers who were attracted to the city for work

Migration – the UK attracted many from ex-colonies as well as people from other EU countries

Connections – London is the financial capital of UK and for most of the global finances too. It has the stock exchange. It is also home to large MNCs. London is also a major trading and transport hub.

Way of Life

The UK has huge numbers of cultures and races, as well as white British people there are huge numbers of migrants from India, Pakistan, Bangladesh, Canada, USA, Kenya, Zimbabwe and other ex-British colonies

London houses a major world financial centre and a range of business specialisms which attract a highly skilled workforce.

However London's unemployment rate was one of the highest in the UK

Challenges

Poverty

Often people who live in inner-city areas experience a poor quality of life. This is because the inner-city is typically a zone with older housing and declining industry. There is a lack of housing provision; access to services; access to open land;safety and security.

Traffic Issues

London has massive problems with congestion. From the 1950s, car ownership has grown at a very quick rate. The increasing population of the city has meant roads are crowded and transport services such as the underground and buses struggle to cope

Urban decline

Some areas of a London suffers from out-migration of people and businesses, derelict buildings, high unemployment. This was common in the inner cities of the UK in the 1980s, leading to further poverty in these areas.

Mumbai (NIC global city)

Reasons for growth

Natural population change – in 1974 the fertility rate was 4, although this has now reduced to 1.8. Natural change was therefore a big factor in the 1970's and 1980s but less so now.

Migration – the pull factors for Mumbai are cheap rail travel, jobs and better education. The push factors from the surrounding countryside are poor standards of housing, healthcare and sanitation.

Connections – Mumbai is the financial capital of India and home to the stock exchange. It is also home to large MNCs.

Way of Life

Mumbai is a city of contrasts. One obvious one is the difference between rich and poor. Many well education people live in expensive properties while the majority of the city live in slums and work in the informal economy (in roles such as street vendors and rubbish collectors)

In the slims there is a lack of sanitation, adequate housing and open sewers are just some of the issues that face people living in these areas. Disease often spreads quickly due to the conditions and lack of health care facilities.

Informal sector

Wages are low = families unable to save and cannot afford to send children to school = children fail to get an education and forced to work in informal sector

Informal workers don't pay tax = government does not raise income and cannot afford to invest in schools or hospitals = **children fail to gain a good education** and forced to work in the informal sector.

Challenges

Reducing poverty and deprivation – with such a large proportion of people living in slums. Education opportunities for these people are being increased, in addition to improved healthcare and sanitation.

Housing – the majority of people live in slums, are pavement dwellers or live in crawls (four or five story tenement buildings with shared facilities). These areas suffer from overcrowding and the risk of fire, flooding or collapse.

1.3.3 - Connected global cities

Global Cities are connected to each other and other places around the world by:

Finance and Trade - global cities are the world's financial centres as banks locate their head offices in these cities and decisions regarding world trade are made here. This makes them very important places for the economy.

Migration and Culture - global cities attract economic migrants from all over the world. This pattern of migration results in cultural diversity which means that new languages, traditions, foods, celebrations and religions are brought to the country. For example in London over 250 languages are spoken.

Governance and Decision-Making - global cities are home to some of the most influential businesses and companies in the world where decisions made can influence the rest of the globe. For example the UN has headquarters in New York and yet employs 41,000 people worldwide.

Ideas and Information - global cities are home to many of the world's largest television and film industries, broadcasting all across the globe.

Transport Hubs - global cities are home to some of the world's largest airports which allow for the movement of people, goods and tourists across the globe. For example about 158 flights arrive at Dubai International Airport.

Home study questions

DEVELOPING

Define what an rural-urban continuum is **[2 marks]**

Explain how the spiral of deprivation leads to depopulation **[4 marks]**

SECURING

Analyse the distribution in global cities around the world (2.3.1) **[6 marks]**

Explain why building on brownfield sites is more sustainable than on greenfield sites **[4 marks]**

MASTERING

'The challenges associated with an NIC global city are more difficult to solve than those of HIC global cities' **To what extent** do you agree with this statement? **[8 marks]**

Decide why Europe and North America has the most significant concentration of global cities **[6 marks]**

CHALLENGE

Link greenfield and brownfield developments to as many different elements of this module as possible

Create a spider diagram to show how Newcastle is linked to the rest of the world (a connected global city)

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Tectonic hazards

Geography Knowledge Organiser

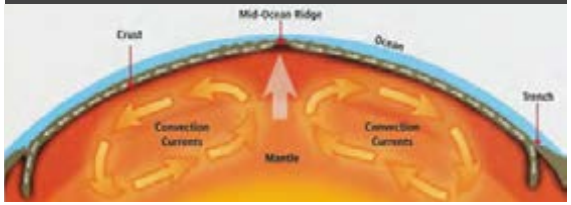
3.1.1 - Tectonic processes and landforms

Tectonic plates

The earth is made up of a series of layers. The outer layer is called the crust. This is made of 2 different types:

Continental Crust (which is on average 35km thick)
Oceanic Crust (which is much thinner, between 6-8km)

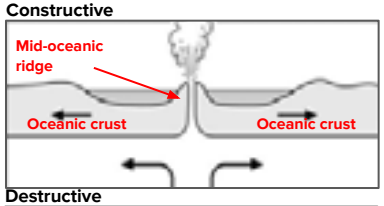
Convection currents



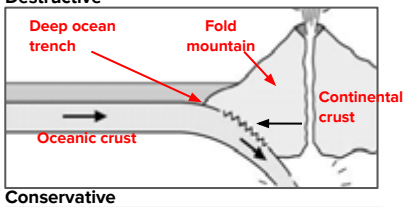
Heat from the core causes **convection currents** in the mantle and these currents slowly move the plates

Tectonic boundaries

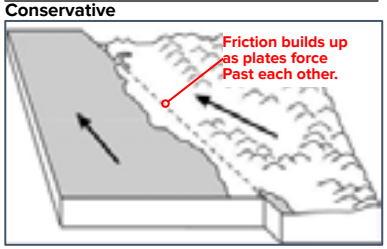
Constructive



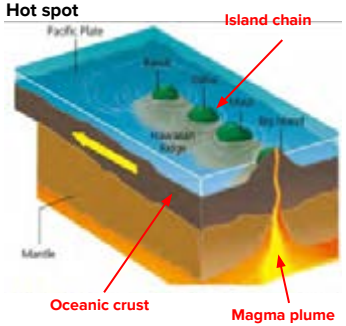
Destructive



Conservative



Hot spot



1. Intense radioactivity in the Earth's interior creates a large column of magma (known as a magma plume)

2. The plume rises, melting and pushing through the crust above

3. The plume lies in a fixed position under the plate – as the plate move over it, a series of new volcanoes are created along the plate

3.1.1 - Tectonic processes and landforms

Volcanic landforms

Shield volcano characteristic
Low profile
Wide base
Thin runny lava
Made up of layers of lava
Frequent and gentle eruptions

Stratovolcano characteristic
High profile
Narrow base
Thick, slow lava
Made up of layers of mainly ash
Infrequent and violent eruptions

Feature	How it is formed	Found at
Ocean trench	Where subduction takes place	Destructive
Fold mountain	Continental crust is crushed and folded upwards	Destructive
Ocean ridge	As lava cools a ridge is formed under the sea	Constructive
Rift valley	Where 2 continental plates pull apart	Constructive
Caldera	A large depression or crater formed by large stratovolcanoes or supervolcanoes	Destructive & hotspot
Cinder cone	Bowl shaped crater of a shield volcano	Constructive
Lava tube	Under the ground, basic lava develops a hard crust through which lava flows	Constructive
Geysers	Water in the ground heated by the magma explodes onto the surface	Destructive & hotspot

3.2.1 - Tectonic impacts

Volcano effects

MONTSERRAT 1995-7

Health
- Ash clouds caused breathing problems
- 19 deaths
- 100s injured

Infrastructure
- The capital, Plymouth, has been covered in layers of ash and mud
- Lahars have destroyed large areas urban areas
- The only airport was destroyed

Economy
- Farmland abandoned (significant unemployment)
- Prevented tourism so tourism economy suffered
- Capital city is abandoned and rebuilt in the north

Earthquake effects

HAITI 2010

Health
- 250,000 people died.
- 300,000 people were injured.
- Cholera spread through temporary camps

Infrastructure
- Airport and port damaged
- 30,000 buildings collapsed
- Hospitals and medical centres were destroyed

Economy
- Damage to the main clothing industry
- Tourist industry will take years to recover
- Infrastructure damaged reduced trade, imports and exports

Tsunami effects

SOUTHEAST ASIA 2004

Health
- Over 220 000 deaths
- 650 000 injured
- 5-6 million needing emergency aid

Infrastructure
- 1,000s of railway lines, roads, bridges and airports were destroyed
- Hospitals within 30mi of the coastline were destroyed
- Water supplies contaminated

Economy
- Fishing industry devastated
- Tourism, dropped 80%
- Reconstruction cost billions of pounds

Vulnerability to tectonic hazards

Physical factors

Duration - the longer a hazard lasts the more severe the impact
Predictability -hazards that hit with no warning have a larger impact

Volcanoes

Lava flows - Molten rock flows down the side of a volcano (Local)
Lahars - Volcanic mudflows consisting of a mixture of ash and water (Local)
Pyroclastic flow - Burning clouds of gas and ash (Local)
Ash clouds - Ash thrown into the atmosphere (Regional/National/Global)

Earthquakes

Magnitude - the stronger the hazard the more severe the impacts

Human factors

Wealth - poor people are less able to withstand disasters and recover from it
Education - where populations are able to read and write, written messages can be used to spread warning or give advice about how to cope
Governments - can support education and and can pass building regulations
Age - children and the elderly are more vulnerable
Health - healthy people are more able to cope
Population density - the more people living in the area the more that will be affected
Time of the day - e.g. earthquakes in rush hours have a more devastating effect
Emergency services - richer countries have well trained and well resourced response

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3 . 2 . 2 - Tectonic management

Earthquakes are difficult to predict but there are some monitoring techniques:
- Laser beams can detect plate movement
- A seismometer is used to pick up vibrations in the earth's crust. These can lead up to an earthquake

Monitoring Techniques used to predict volcanic eruptions include:
- Remote sensing. Satellites monitor gas emissions and thermal imaging can work out the temperature within the volcano.
- Seismometers can pick up movements in the earth which sometimes occur before an eruption.

Tsunami warning system:
- Following the 1960 Chilean earthquake the Pacific countries decided to set up the Pacific Tsunami Warning System (PTWS).
- This is a network of seismometers and ocean buoys that detect earthquakes and ocean movements.
- Warnings are then given to local centres, which warn local people using the TV, radio, text messages and sirens.

Hazard planning strategies

Hazard Mapping highlights areas affected by or vulnerable to earthquakes, volcanoes and tsunamis so planning and money can be targeted at these areas
New building technology can also reduce the impact of earthquakes. Often they are built to absorb the energy and withstand the earth's movement
Emergency planning:

- An exclusion zone can be set up around a volcano
- Lava flows can be diverted
- Emergency services can be trained and given the equipment needed
- People put together emergency kits which include first aid items, blankets etc.

Home study questions

DEVELOPING

Describe how a hot spot creates island arcs **[2 marks]**

Compare the differences between shield volcanoes and stratovolcanoes **[4 marks]**

SECURING

Analyse the distribution of the 3 different plate boundaries around the world (3 . 1 . 1) **[6 marks]**

Explain how tsunamis impact the health and infrastructure of a country **[6 marks]**

MASTERING

'Human vulnerabilities are responsible for more deaths than the physical risks associated with tectonic hazards' **To what extent** do you agree with this statement? **[8 marks]**

Explain how tectonic hazards are managed **[4 marks]**

CHALLENGE

Research the responses to the 3 hazard case studies (Montserrat, Haiti and SE Asia) and add these to the space below

Explain how tsunamis are a secondary effect of earthquakes

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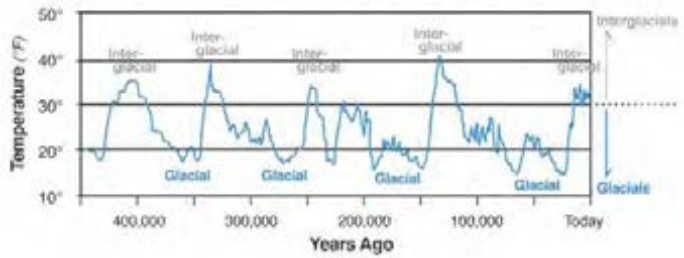
Weather, climate and ecosystems

Geography Knowledge Organiser

5.1.1 - Climate change evidence

Climate Change during the Quaternary Period



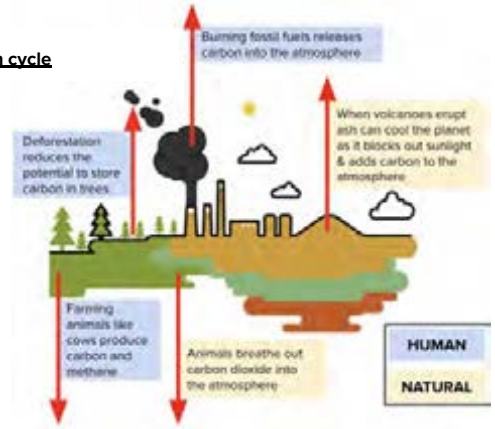
Over a long period of time (the last 400,000 years) there have been natural cycles of cooling and warming. The periods of time the average global temperature was below 15°C are known as **glacials**, and periods of warmth are known as **interglacials**.

Evidence for climate change

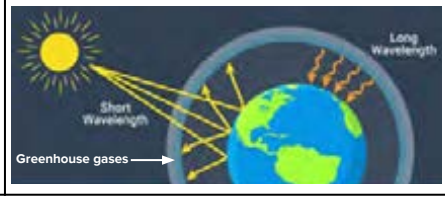
- Ice cores from the Antarctic show the amount of CO_2 and methane in the atmosphere have changed over the last 420,000 years
- Historical records, such as diary extracts
- CO_2 levels in the atmosphere
- Measurements by the met office show temperature has increased by 0.6°C over the past 100 years.

5.1.2 - Climate change causes

Carbon cycle



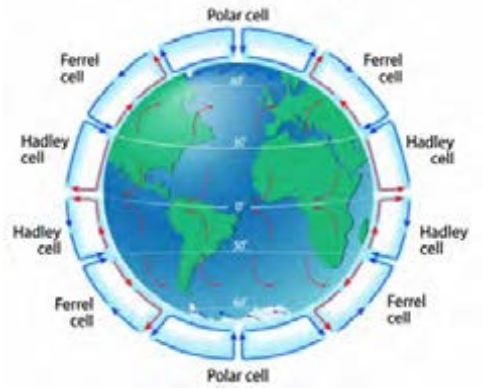
Greenhouse effect



The greenhouse effect is natural but humans have worsened the impacts. Carbon Dioxide and Methane are greenhouse gases which trap heat in the atmosphere. As more gases build up more heat is stored, warming the planet.

5.2.1 - Weather hazards

Global circulation

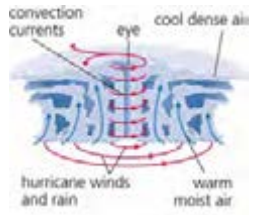


1. At the equator insolation heats the Earth which heats the air above
2. Hot air rises creating low pressure – as it rises it travels north and south
3. This air eventually cools and sinks at about 30° north/south of the equator – this creates high pressure
4. This air then returns to the equator (known as the intertropical convergence zone ITCZ)

Low pressure & tropical storms

Warm air rises because it is less dense. When it reaches the edge of the atmosphere it cannot rise any further and moves north and south. The edge of the atmosphere is cold and so the air cools too. Low pressure can create a hazard called a tropical storm, which is also known as a hurricane, cyclone or typhoon

Tropical storm cross section



Tropical storm causes (CYCLONE PAM 2015)
Occurred near the island chain of Vanuatu in the South Pacific
Tropical storms can only form over large/deep oceans
Ocean temperatures of at least 27°c
Water depth of at least 50 meters
Gentle winds in the atmosphere to draw air up from water surface

Tropical storm effects (CYCLONE PAM 2015)
11 people died
90000 homeless
Hospitals and schools destroyed
Widespread destruction of fruits, vegetables, root crops and livestock
Stormsurge flooded coastal areas and contaminated freshwater supplies

Tropical storm responses (CYCLONE PAM 2015)
Emergency aid sent by Australia, Fiji, New Zealand and UK
153 temporary school built
Repairs to infrastructure to provide safe drinking water
Blankets & tents given to those made homeless
28 schools used as evacuation centres

High pressure & droughts

As the air cools in the outer atmosphere it becomes heavier and starts to sink. This air moves back to the ground. This is called high pressure. As the air reaches the surface it starts to warm again and the cycle continues. High pressure can produce a hazard called a drought - a long period of no available water due to intense heat.

Drought causes (CALIFORNIA 2012)
The jet stream was further north that normal, pushing low pressure systems north and allowing high pressure systems to sit over the state creating a heat wave.

Drought effects (CALIFORNIA 2012)
A hosepipe ban was introduced
Homes were destroyed by wildfires
Hydroelectric power dams stopped producing electricity
Crops could not be grown and 17,000 agriculture jobs were lost
Fish died as high temps caused an oxygen decrease

Drought responses (California 2012)
12,500 water metres installed in homes
400,000 water saving toilets installed
3.2 million square feet of turf removed.
50% of Orange County's water supply is now imported from other areas.

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5.2.2 - UK weather variations

Weather - the conditions of the atmosphere over a short period of time, often a day
Climate - the weather of a place averaged over a period of time, often 30 years

Factors affecting Climate in the UK

Latitude –the north of the UK has cooler temperatures than the south
Altitude – mountain areas have cooler temperatures. Temperatures decrease by 1°C for every 200m of elevation.
Ocean currents – the North Atlantic drift brings warmer water to the UK, keeping the climate milder in winter and cooler in summer.
Different winds directions also bring different **air masses**:

- **Pm** North westerly brings polar maritime air (cool and showery)
- **Tm** South westerly brings tropical maritime (mild and wet)
- **Pc** Easterly brings polar continental (cold and dry)
- **Tc** South easterly brings tropical continental (warm and dry)
- **Am** Northerly brings arctic air (cold and snow in winter)

Low Pressure (depressions)
Begin in the Atlantic and move east

Brings rain, cloud and wind

Air rises, cools and condenses forming clouds

High Pressure (anticyclone)
Low wind speed, stable conditions with no clouds

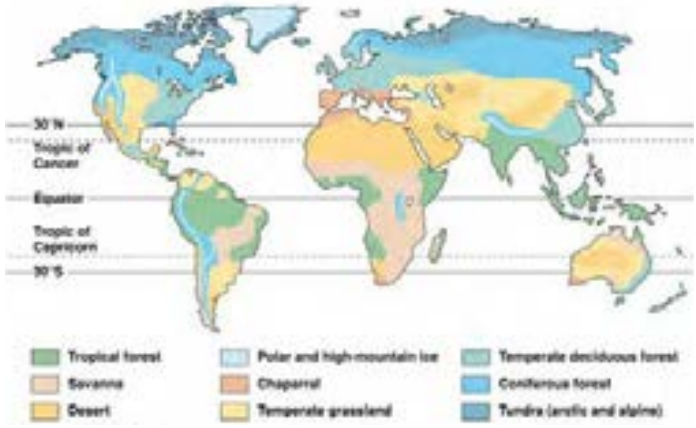
In summer they bring hot weather, which may lead to drought

In winter they bring cold (frosty) nights

Microclimate

Physical features - hills, trees can block the wind and sun. Water cools the air
Shelter - Buildings, trees and hills can shelter from the wind
Surface (albedo) - dark surfaces heat up quicker than light surfaces
Buildings - Buildings store up heat and redirect wind direction
Aspect - locations facing south have sun all day, the north doesn't receive sunlight

5.3.1 - Ecosystems



Large scale **ecosystems** are known as **biomes**.

Climate – the most important factor in determining their distribution
Rainfall – the amount and patterns determine the distribution of biomes
Temperature – when rainfall is reliable and distributed evenly temperature becomes the most important factor

Other factors can also have an influence e.g.
Tropical rainforests are located either side of the equator where hot and wet conditions allow continuous growth of plants

5.3.2 - Ecosystem processes

Tropical rainforest characteristics

Shrub layer. It is dark and gloomy with very little vegetation.
Under canopy. It is the second level up. There is limited sunlight. Saplings wait here for larger plants and trees to die
Canopy. This is where the upper parts of most of the trees are found. The canopy is typically about 65 to 130 feet (20 to 40 metres) tall.
Emergents. These are the tops of the tallest trees in the rainforest. These are much higher, and so are able to get more light than the average trees in the forest canopy.

Nutrient cycle

The rainforest nutrient cycling is rapid. The hot, damp conditions on the forest floor allow for the rapid decomposition of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots.

Water cycle

The roots of plants take up water from the ground and the rain is intercepted as it falls - much of it at the canopy level. As the rainforest heats up, the water evaporates into the atmosphere and forms clouds to make the next day's rain.

Carbon cycle

Rainforests contain about 40 to 50% of the carbon in the biomass, and very little in the soil due to the rapid nutrient cycling

Key services

Regulating climate and air quality
Preventing Soil Erosion
Carbon Storage
Provisioning Goods (food, fuel)
Flood prevention

Biodiversity

Biodiversity is the variety of plant and animal life in a particular habitat, a high level of which is considered to be important and desirable. The tropical rainforest has a higher level of biodiversity than savannah

5.3.2 - Ecosystem processes

Savanna characteristics

Grasses and trees - The savanna is a grassland with scattered trees and shrubs.
Rainy and dry seasons - Savannas have two distinct seasons in regards to precipitation. There is a rainy season in the summer with around 15 to 25 inches of rain and a dry season in the winter when only a couple of inches of rain may fall.
Large herds of animals - There are often large herds of grazing animals on the savanna that thrive on the abundance of grass and trees.
Warm - The savanna stays pretty warm all year.

Nutrient cycle

Nutrients are cycled quicky during the dry season in the tropical heat. Wildfires are common and nutrients are returned to the soil when vegetation burns.

Water cycle

All most all rain falls during the rainy season. Vegetation quickly absorbs and stores this water for the dry season. Little water is lost by transpiration due to waxy leaves and low surface area of the plants.

Carbon cycle

Majority of carbon is stored in vegetation with a lesser amount in soil. During dry seasons, wildfires can burn vegetation, releasing CO_2 into the atmosphere.

Key services

Preventing Soil Erosion
Carbon Storage
Provisioning Goods (food, fuel)

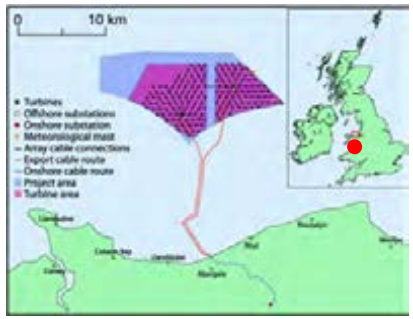
Small scale ecosystem: sand dunes

Sand Dunes are a build up of sand around vegetation. This requires loose sand and prevailing winds which blow on-shore. They are formed through a processes known as succession. As plants die and decompose it nourishes the soil making it better quality and now more fragile plants will start to grow.

5.4.1 - Human uses

Gwynt y Môr offshore wind farm
Offshore wind farms are located in the sea close to the shoreline as winds are stronger, unobstructed and do not impose on cities/population as much. Gwynt y Môr is located 15km off the north coast of Wales

The demand for renewable energy is increasing as non-renewables such as coal and gas are depleting



Advantages	Disadvantages
Produces power for 400,000 homes	RSPB says it affects bird migrations and their normal routines
Creates 100+ jobs	National Trust has concerns over affecting heritage and tourism
Helps with global climate change efforts	Locals are opposed as it spoils the natural beauty

5.4.2 - Human impacts

Tropical rainforest uses

Advantages:
Infrastructure, hospitals and education can be improved
Raw materials, eg tropical hardwoods such as ebony and mahogany, can be sold for a good price abroad.
Large-scale farming brings money into the country and provides food and jobs.
Small-scale farming provides food for rainforest communities.

Disadvantages:
Land clearance for farming, transportation and mining can lead to **deforestation.**
Loss of fertile soils that make farming possible are quickly washed away when the forest is cleared.
Loss of animal habitat occurs when trees are cut down. Hence, deforestation can result in endangering animals and plant life, or even causing them to become extinct.

Savanna uses

Advantages:
Small-scale farming provides food for rainforest communities.
Raw materials, eg fuel (firewood)

Disadvantages:
Large areas of grassland have been turned into **farmlands** for growing crops and for rearing cattle.
Animals have been **hunted** for their valuable body parts or for sport.
Loss of fertile soils that make farming possible are quickly washed away when the forest is cleared.

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5.4.3 - Ecosystem management

Tropical rainforest management

Selective logging – only cutting down older trees and not rare species. The International Forest Stewardship Council makes people aware of products made from sustainable timber.

Agro-forestry – growing new trees alongside crops

Wildlife corridors – connecting separated areas of forest with strips of vegetation so animals can move between areas

Eco-tourism – encouraging small groups of sustainable tourism. Money made is used to protect the ecosystem and uses local tour guides and companies.

Debt-swaps – HICs cancel debts which LICs have, if they protect their rainforests from over-exploitation

Savanna management

Crop rotation – growing different crops and giving the land time to rest between planting to allow soil to recover nutrients

Afforestation – planting more trees to protect the soil

Drought-resistant crops – Planting genetically modified crops which can withstand long periods of water shortage

Population control – Encouraging people to have fewer children so less crops and water are needed in the area

Home study questions

DEVELOPING

Describe the economic effects of a low pressure hazard **[3 marks]**

Give three ways that humans have influenced the carbon cycle **[3 marks]**

SECURING

Analyse the pattern of temperature change over the last 450 million years (5.1.1) **[6 marks]**

Explain how low pressure systems forms **[3 marks]**

MASTERING

Discuss how sustainable the use of one ecosystem is **[8 marks]**

Explain the factors that influence changes in weather for the UK **[6 marks]**

CHALLENGE

Decide how deforestation would affect the nutrient, water and carbon cycles in the tropical rainforest - present your decision as a paragraph or concept map

Evaluate how successful you think management strategies for the savanna ecosystems are

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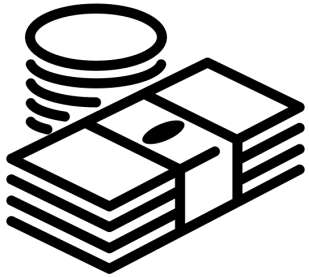
Development and resource issues



Geography Knowledge Organiser

6.1.1 - Measuring development

Measures of development

Gross domestic product (GDP) - the total value of all goods and services produced within a country
Gross National Income (GNI) - (per capita) average wage per person
Employment structure - the type of work people do (for example, primary, secondary, tertiary)
Poverty - the % of the population that earn less than $1.90 a day

Limitations of these measures
They only measure wealth and not social factors (like life expectancy)
They do not show inequality in country (gap between rich and poor)
They do not show the cost of living (ie. the amount that can be bought with the average wage)

Development continuum

A development gap exists between richer and poorer countries. The "Brandt" line splits the world into more developed "global north" countries and less developed "global south" countries.

Less developed — More developed

LIC — Lower middle — Upper middle — HIC

However, the Brandt line is a bit too simplistic. In reality there is a "**development continuum**". This is a sliding scale from super rich countries to the very poor. The World Bank splits countries into 4 categories based on their Gross National Income (GNI):
HICs with GNI of $12,736 or above
Upper Middle Countries with GNI between $4126 and $12735
Lower middle countries with GNI of $1046 to $4125
LICs with GNI of $1045 or less

6.2.1 - Uneven development

Causes of uneven development

Trade involves buying goods from other countries (imports) and selling them (exports)
HICs generally export valuable goods such as electronics, cars and financial products. They import cheaper primary products like tea, sugar and coffee.
LICS do the opposite. This means they earn little and remain in poverty

The prices of these products go up and down but HICs tend to have the biggest influence over them. LICs lose out when the price drops, but have little control over it. Increasing this trade and changing the balance of imports/exports is essential for LICs to develop. Some HICs impose tariffs (import costs) and quotas (a limit to the amount of imports) which also affects LICs.

Multinational corporations (MNCs)

MNCs have grown as a result of globalisation. Often they are free to decide where they locate many aspects of their company. The headquarters if usually found in a global city such as London. However, other parts of the company can be located around the world. Factors like, government incentives, location of raw materials, labour costs and reduced costs for buildings and land make a difference.

Advantages of MNCs in LICs	Disadvantages of MNCs in LICs
Created jobs and improved local skills	Investment could be transferred to other countries quickly
Pays higher wages than most local Companies	They has large demand for energy/water
Helped attract more MNCs	They have reputation for workers abuse
Contributes to tax which helped pay for schools, hospitals etc.	They might undermine national culture

6.2.1 - Uneven development

Tourism

As a result of globalisation the tourist industry has grown rapidly. It now accounts for 1-in-11 jobs worldwide. It is increasingly becoming important for low and middle income countries. Rapid growth is due to:
Early retirement & higher life expectancy mean people can spend time travelling
People earn more so have more disposable income
Modern aircraft make is cheaper and quicker
The internet allows people to research destinations

Mass tourism
Where tens of thousands of people going to the same resort often at the same time of year

Enclave tourism
Where tourists pay one price and get all travel, accommodation, food and drink in one place

Cruise holidays
Cruise ships sell all inclusive packages

Advantages of tourism in LICs	Disadvantages of tourism in LICs
Employs thousands directly and hundreds of thousands indirectly, bringing billions to the economy	Many tourist development are partly owned by foreign companies. Some profits leak (send) overseas
Tourism is encouraging new skills and improving language skills of locals	Jobs are seasonal, many people lose their jobs in the wet or winter season
New services such as transport can be used by tourists and locals	The growth of sex tourism can become an issue in some countries
New national parks are being created to protect wildlife and encourage tourism	The arrival of tourists can cause a decline in local cultures, for example loss of language or religious traditions

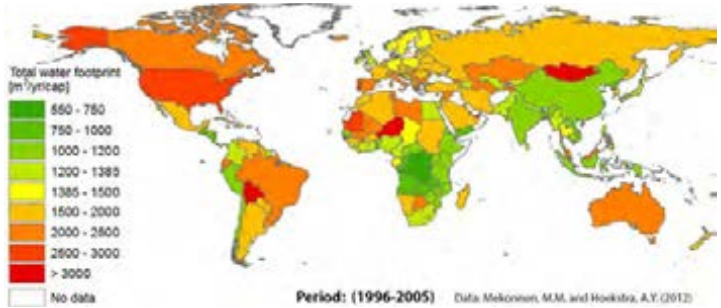
6.2.2 - Managing development

Aid

Aid is the transfer of resources from a richer country to a poorer country. Different types of aid include:
Bilateral aid – between two countries
Multilateral aid – money donated by richer countries via organisations such as the UN
Short term emergency aid – immediate relief following a natural disaster
Long term development aid – a sustained programme of aid which aims to improve the standard of living
Debt abolition – when richer countries cancel debt owed by poorer countries
Aid from non-governmental organisations (NGO's) – given through charities such as Oxfam.

Advantages of aid for LICs	Disadvantages of aid for LICs
Emergency aid saves lives and reduces misery	Aid can increase dependency on the donor country
Development aid can lead to long term improvements and increase standards of living	Profits from the large projects can go to multinationals and donor countries
Assistance in developing natural resources benefits global economy	Aid doesn't always reach the people who need it and can be kept by corrupt officials
Aid for industrial development creates jobs and aid for agriculture increases food supply	Aid can be spent on prestige projects in urban areas rather than in the areas of real need
Provision of medical training and supplies improves health	Aid can be used as a weapon to exert political pressure on the receiving country

6.3.1 - Water demand



The global consumption of water is rising. This is because:
Population is rising
Economic development - The more developed a nation the more water used
Increased need by agriculture - irrigating crops
Industrial growth - As more MNCs invest in NICs and LICs the more water needed
Consumerism - HICs use appliances like dishwashers and washing machines

Water footprint - a measure of humanity's use of fresh water and/or polluted
We don't just use water to drink and for hygiene reasons. 70% of our water is used to produce food (crops & animals). Industries use water in 'cooling processes'. Water is need in thing like clothing - fabrics have to be grown.

Water security - the capacity to safeguard the sustainable availability and access to drinking water
The UK generally have excellent access to water all year round. Some places don't, where water isn't clean or alway available. Sometimes it's too expensive to transport or access (economic scarcity) or it's not available due to droughts (physical scarcity).

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6.3.2 - Water sustainability

Dams: Dams block the flow of a river, creating a large reservoir to the rear which can be used all year round. Dams can be expensive to build, and the reservoir may flood local settlements and ecosystems.

Water transfers: When water is transferred to from an area that has a surplus of water to an area that is experiencing a shortage. This may be conducted within a country, but it can also be conducted from one country to another. For example, Lesotho transfers water to areas of South Africa experiencing physical water scarcity.

Desalination plants: Desalination is the process by which salt is extracted from water. At these plants, salt is removed from seawater to make it safe to drink. Such plants are extremely expensive to run.

Water conservation: This is when an attempt is made to actually use less water in the first instance. For example, many toilets have dual-flush systems to reduce the amount of water used. In addition, meters may be installed within households so residents can check their water usage

Over-abstraction of groundwater

India is a country that is over extracting its groundwater (the water table is 4m lower than in 2000)

Reasons for this
Some states like Gujarat have a long dry season
Surface stores (like reservoirs) are often polluted
Cheap electricity has encouraged farmers to dig deeper wells
Solutions
The government can build more dams (this is an example of top down development)
Farmers could be encouraged to conserve water e.g. rainwater harvesting (this is bottom up development)

6.4.1 - NIC regional development

India's regional patterns

Northeast has higher levels of poverty (over 30% of people)

South has the least levels of poverty (less than 10%)

The east generally has lower levels of poverty (around 15%)

GDP per region in India

Physical reasons

Northern India is more mountainous and dry, so it has poor soil and climate to grow crops. **The south** has a more humid climate with rains.

Political reasons

Kerala (in the south) funds education and encourages families to have fewer children = better quality of life (less pressure on resources)
Kashmir (in the north) has seen conflicts/wars and is in a mountainous area = not very populated, poor access, dry climate.
Maharashtra (in the east) has the capital city and attracts lots of industries like manufacturing and has ports for trade

Cultural reasons

India had a **caste system** (some people had more rights than others). Although it's illegal now it still has an impact on people today with types of jobs people can do.

Girls and women are discriminated against particularly in rural areas

6.4.2 - UK regional development

UK's regional patterns

There is a north-south divide in the UK for development. The divide recognises the social and economic differences between Southern parts of the UK (more developed) and the rest of the UK (less developed).

Economic reasons

With the l**argest markets located in the south-east,** which also includes **good access to European markets**, companies have greatest potential to **maximise profits by locating in the south**.

Social reasons

With over 20 million people of the UK's population living within a one hour commute of London, many **businesses prefer to locate themselves close to their customers**, and within **commuting distance of their staff.**
Many universities are in the south of the UK, including Oxford and Cambridge, which provide many workers - who **employers may perceive as being most skilled** and desirable.

Political reasons

Many large companies have headquarters (HQ) in the south-east, making it easier to make crucial decisions. Even though government policy has tried to encourage investment in other parts of the UK it is **still more convenient for other smaller businesses to start up where there is already infrastructure** to support.

6.4.3 - Managing UK development

Positive multiplier effect

Regional inequality can be reduced by investment in deprived areas of the UK. Various strategies have been used in the past which usually includes investing in infrastructure in an area which is deprived to try and promote a **positive multiplier effect**. However, when industries close there is also a **negative multiplier effect**.

Positive multiplier effect

National strategies

Giving power to local authorities e.g. regional mayors (Manchester/Leeds)

The **creation of the "Northern Powerhouse**" which is a proposal to boost economic growth in the North of UK, this would attract investment and create skilled jobs in the area

The **improvement of transport links** to the Northern places in the UK. This improves accessibility, attract new investment and therefore may create a positive multiplier effect (eg. HS2)

Relocation of major business and offices, sometimes head offices in other parts of the UK, such as Manchester. This encourages other businesses to invest in the areas

Local strategies (Newcastle)

Newcastle Enterprise Package - supporting new business

Newcastle Science City - a partnership between Newcastle University, Newcastle City Council and the European Regional Development Fund supporting the innovation and technology sectors

The Millennium Bridge - crossing the river Tyne

Home study questions

DEVELOPING
Outline the measures of economic development **[3 marks]**

Give three reasons why LICs receive less money from international trade **[3 marks]**

SECURING
Analyse the pattern of global water usage (water footprint) (6.3.1) **[6 marks]**

Describe what a water footprint is **[2 marks]**

MASTERING
Evaluate which factor/reason (social, economic or political) is the most significant cause of UK regional inequality **[8 marks]**

Decided whether foreign aid is overall a good or bad thing for LIC development **[8 marks]**

CHALLENGE
Create a concept map to show how MNCs and tourism are linked and how these are also linked to uneven development in LICs/NICs

Research how the High Speed railway 2 (HS2) project will have benefits for the north of England

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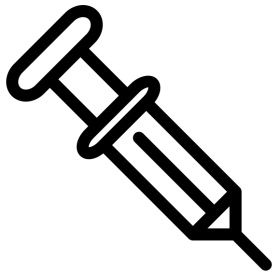
T7

Find a playlist of explainer clips by scanning or clicking the QR code

CLICK ME

SCAN ME

Social development



Geography Knowledge Organiser

7.1.1 - Measuring development

Measures of social development

Life expectancy - The average age a person is expected to live
Literacy rates - % of people in a population that can read or write
Infant mortality rate - Number of babies per 100 live births who die under the age of 1
Average number of people per doctor
Average food (calorie) consumption
Number of homeless people
Deaths from unsafe water and sanitation

Measures of gender development

Gender equality is ways in which a country can be measured through social development. So a comparison between genders is useful, such as:

- **Fertility rate** – The average number of births to a woman in her lifetime
- **Male/female literacy rates**
- **Male/Female life expectancy**
- **Male/female food consumption**
- **Male/female employment rate**
- **Gender development index (GDI)** - measures gender inequalities in three key aspects: *reproductive health, empowerment and economic status*

Human development index (HDI)

A measure of the development in a country taking into account wealth, education and average life expectancy. The human development index (HDI) is calculated from four development indicators and measures a country's progress across a range of factors:

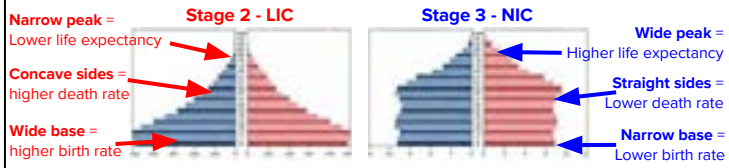
- **Average length of schooling in years**
- **Literacy rates**
- **Gross national income (GNI)** - The average income in a country per person

7.2.1 - Development issues in Africa and Asia

Changing birth rates and death rates

Higher birth rates	Lower birth rates	Higher death rates	Lower death rates
Children provide labour on farms **(E)**	People tend to marry later and therefore have reduced child -bearing years **(S)**	HIV, Ebola and other difficult to control diseases are having an impact on death rates in LICs **(S)**	Better healthcare and vaccination programmes are more available to people **(P)**
Large families are seen as a sign of virility **(S)**	Women are educated and often follow careers which delay starting families **(P)**	In HICs, the increasingly higher proportion of elderly people in ageing societies is leading to an increase in death rates **(S)**	Less physically demanding jobs put less stress on people physically **(S)**
Women may lack education and stay at home to raise a family rather than work **(S)**	The high cost of living means it is expensive to raise children **(E)**		People are educated about health and hygiene **(P)**
A high infant mortality rate encourages larger families to ensure survival of some children **(S)**	Couples prefer to spend money on holidays & cars **(E)**		Water supplies are more reliable and cleaner **(P)**

Population structure



7.2.1 - Development issues in Africa and Asia

Child labour

It is estimated that there is currently 168 million child workers and 73 million of these are children under the age of ten. Sub-Saharan Africa has the highest number of child workers mainly working on farms farming products such as cocoa and cotton.

- **Poverty** - parents need money or their parents have died
- **No (free) education** - have to pay or no formal education
- **AIDS** - Disease means a lot of middle-aged people are too ill or have died - so children are the only option

Primary education challenges

In 2010 there were 4.98 million children in child labour, whereas by 2011 there were 4.35 million child labourers. The lack of education is a key cause of child labour. Out of the 62% of India's children that do not attend school, 62% of those are girls. The reasons for this include:

- **Poor quality of school buildings**, facilities and teaching.
- **Attitude to women in society**: many families still have an oppressive attitude towards women
- **Many girls are expected to marry young** through arranged marriages.
- The **fear that sexual harassment of girls** may bring dishonour to the girl's family.

Responses to child labour

The International Labour Organisation (ILO) - It collects data from different countries and uses this data to set targets which can be used to monitor progress. The ILO then makes recommendation to individual governments as to how this can be achieved in their country which frequently include:

- **Improving access to education** for all children so that they can succeed in life
- **Creating more trade unions** to prevent and protect against child labour
- **Improving social security systems** so that the poorest in society are supported rather than them relying on their children (sick pay & unemployment benefits)

International refugee movements

Forced migrants are those we call refugees and asylum seekers. They have been pushed out of their homes but there aren't pull factors attracting them to somewhere
Refugee - Someone who has fled their home due to serious risk to life or liberty
Asylum seeker - Someone who has applied to another country for protection/support as a refugee

Causes of forced migration

Lack of food/water - often causes by droughts or blights (plant diseases)
Natural disasters -flooding, earthquakes, tsunamis etc.
War & conflict - either between countries or civil war (inside one country)
Persecution - risk to life or liberty due to politics, sexual orientation, religion, ethnicity

Responses to forced migration

National governments in Europe
- Germany and Sweden see the refugees as victims and have welcomed them to their countries and help them to integrate into their societies
- Austria is trying to limit the number of refugees to 80 a day
- The UK has agreed to accept 20,000 refugees from Syria by 2020 and it will accept more unaccompanied Syrian child refugees

International agreements
With an increasing numbers of migrants from Asia and Africa reaching Europe illegally the following changes have been made:

- In 2016 border controls were temporarily introduced to 7 Schengen countries
- An EU naval operation has been put into place to monitor the Mediterranean Sea to prevent human smuggling and trafficking
- EU member states agreed to provide task forces of national experts and support teams to work in hotspots such as Greece and Italy to expedite refugee screening

7.2.2 - Health issues in Africa

High infant mortality rate (IMR)

Neonatal infection - a high rate of infection from the process of delivering the baby
10% of early childhood deaths are caused by diarrhoea
The **lack of skilled birth attendants** leads to many children dying within 24 hours of being born
Lack of vaccinations and mosquito nets to stop diseases

Human immunodeficiency virus (HIV)

HIV is disease which attacks the body's immune system. Over 70% of people who have HIV live in Africa. Infection rates are higher in urban areas

Emotional impact on relatives and families, as well as on the individual **(S)**

Cost involved in treating the disease, eg. drugs means that most people go without treatment **(E)(S)**

Those infected will not eventually be able to work, lowering the productivity and potential wealth of a country **(E)(P)**

Leads to fewer jobs and less wealth in a country **(E)**

Children may be left without parents and brought up by their grandparents **(S)**

Malaria

Malaria is a disease passed on by parasites in mosquitoes. Infection rates are higher nearer water sources like lakes & rural areas. Children and pregnant women are most at risk

Large number of children aged under five die **(S)**

Adults are too weak to work which leads to a loss of productivity **(E)**

People remain poor and do not have a lot to eat **(S)(E)**

A country's limited resources are used up in health care rather than in education or improving services **(E)(P)**

Tourists may be less likely to visit a country so there is less revenue **(E)**

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7.2.2 - Health issues in Africa

Health issues responses
Investment in medical care and treatment in hospitals (**HIV/Mal)**
Health campaigns (adverts) about risks and prevention **(HIV/Mal)**
Free condoms **(HIV)** and mosquito nets for beds **(Mal)**
UN's AIDS Fast Track programme - leading education & funding **(HIV)**
UN's 'roll-back malaria' programme which leads a worldwide government response **(Mal)**
The '**Roll Back Malaria**' initiative had over 500 partners working together to provide a co-ordinated response to the disease. One of the UN's Millennium Development Goals is that the incidence of the disease should have reduced by 2015. Today the UN fast track strategy is aiming to end the epidemic by 2030 through contraception, education and medication.

Top-down approach	Bottom-up approach
Decisions are made at governmental level and usually involve a high cost. Communities likely to be affected by the decisions have no say as to what is done.	Decisions are made by the local communities that they will affect. They try to help communities by helping them to help themselves.
The advantages of these types of schemes are that they may be part of a strategic plan which aims to develop the infrastructure of the country. However, the frequently lead the country into debt and the jobs that are created are often not for the local community.	The advantages of these types of schemes are that they are small scale and so cost much less, are more sustainable and usually meet the needs of the local community better.

Home study questions

DEVELOPING

Describe the economic effects of a low pressure hazard **[3 marks]**

Explain why using HDI is better than GDP or GNI for measuring development **[4 marks]**

SECURING

Analyse the differences between the stage 2 and stage 3 population pyramids (7.2.1) **[6 marks]**

Explain why infant mortality rate (IMR) is an important factor to judge development **[3 marks]**

MASTERING

Evaluate how successful the responses have been in stopping international refugee movements into Europe **[8 marks]**

Discuss why poverty and poor development often leads to more child labour **[6 marks]**

CHALLENGE

Discuss how diseases like HIV and malaria can have significant impacts on a country's social and economic development. Record your discussion as a paragraph or spider diagram

Evaluate whether top-down or bottom-up approaches are better for improving the health development of LICs

Graphic Design

Year 11 Graphic design Knowledge organiser Spring Term

Topic: Unit 4 – graphic design portfolio

Knowledge: students learn what a portfolio is and show good examples, explore career paths in graphic design and present their best work in their own portfolio.

Skills: Analysis of the work of others, presentation skills, being discerning of quality design, being critical of their own work.

LO1

Grading descriptors	Example
Pass: Describes relevant opportunities in the graphic design industry and how work is presented	Learners will describe a range (more than three) of examples of working in graphic industries, different types of presentation methods and promotional formats, and ways to present and promote their work. There will be little evidence of how examples of working in the graphic design sector and presentation formats are linked.
Merit: Describes relevant opportunities in the graphic design industry and how work is presented, and makes some links between them	Learners will describe a range (more than three) of examples of working in graphic industries, different types of presentation methods and promotional formats, and ways to present and promote their work. There will be some evidence of how examples of working in the graphic design sector and presentation formats are linked.
Distinction: Describes relevant opportunities in the graphic design industry and how work is presented and explains how they are linked	Learners will describe a range (more than three) of examples of working in graphic industries, different types of presentation methods and promotional formats, and ways to present and promote their work. There will be an explanation of how examples of working in the graphic design sector and presentation formats are linked.

Different types of Presentation methods

A digital portfolio could take different forms:

a showreel,

presentation, (e.g. powerpoint)

interactive app,

website,

a cloud drive

or folders on a USB drive

Blogs and social media

Graphic designers often present their work in a Portfolio. A portfolio is a collection of your best work that is used to show to clients to demonstrate your ability and styles. For unit 4 you must compile all of the best work produced in year 10 and 11 and review your skills as a graphic designer.

LO2

Delivery and assessment
In this LO the learner must produce a graphic design portfolio and demonstrate the following skills:

Breadth of work
Learners must have a minimum of six completed pieces and/or experimental pieces to demonstrate their breadth of work and intentions as a graphic designer. Breadth would be indicated by a range of disciplines (eg typography, advertising, packaging) or by examples of ideas or interpretations of themes. Work may be selected from earlier units to be used if relevant to learner's intentions.

Editing and selection
Learners should review their work, including experimental work, edit it by making adjustments to size, shape or resolution/finish, and make selections for the portfolio. These should be made on the basis of the effective presentation of graphic design skills.

Selection of format
Learners should select and use the most appropriate format in which to display their work/intentions, eg digital/physical, interactive/static.

Presentation skills
Learners should demonstrate skill in the effective presentation of their portfolio. Learners will not be credited for quantity of work but for the careful consideration and presentation of the work they have edited and selected.

Reasons for choice
Learners will record why they have chosen specific pieces of work to include within the portfolio and what these show in relation to their graphic design practice.

LO3

The learner must evaluate:

- strengths and weaknesses
- technical skills
- creative responses
- presentation skills

Follow this link or scan the QR code to a video with great tips on how to design your portfolio.

https://youtu.be/A22TQsr7Aew

Grading descriptors	Example
Pass: Describes a range of strengths and weaknesses of their graphic design practice with supporting evidence	Learners have identified a range of strengths and weaknesses, technical skills, creative responses and presentation skills within the graphic design work, making reference to their portfolio.
Merit: Describes a range of strengths and weaknesses with supporting evidence and describes the impact on their graphic design practice	Learners have identified a range of strengths and weaknesses, technical skills, creative responses and presentation skills within the graphic design work and will describe how these affected their graphic design work.
Distinction: Describes a range of strengths and weaknesses of their graphic design practice with supporting evidence, showing evidence of recognising different levels of importance	Learners have identified a range of strengths and weaknesses, technical skills, creative responses and presentation skills within the graphic design work and will describe how these affected the design work. Learners will recognise the levels of importance when describing the impact of different factors upon their design work.

Health and Fitness

Year 11 Health & Fitness Spring Knowledge Organiser

Health Component Of Fitness

Component	Definition	Sporting Example	Test
Muscular Endurance	The ability of a muscle group to repeat a movement for a prolonged period.	Push Ups in Circuit Training	Sit Up Test
Flexibility	Range of movement around a joint.	Splits in Gymnastics	Sit and Reach
Body Composition	Describes the percentage of fat, bone, muscle and water in the body.	Endomorph- sumo wrestling Mesomorph- swimming Ectomorph- marathon running	Skinfold Caliper Test
Muscular Strength	The amount of force a muscle can exert against a resistance.	Weightlifting	Hand Grip Dynamometer
Cardiovascular Endurance	The ability to exercise the whole body for prolonged periods. This involves the cardio (heart) and vascular (blood vessels).	Running at the end of a netball match	12 minute cooper run

Sport/ Skill Component Of Fitness

Component	Definition	Sporting Example	Test
Agility	The ability to change the position of the body quickly and to control the movement of the whole body	Rugby player dodging a defender	Illinois Agility Run
Balance	The ability to retain the centre of mass over the body above the base of support	Handstand in Gymnastics	Standing Stork
Coordination	The ability to use two or more body parts together	Batsman striking the ball in cricket	Hand Wall Toss Test
Power	The ability to undertake strength performances quickly Strength x Speed =	The jump phase of the Long Jump	Standing Long Jump
Reaction Time	The time in between stimulus and the onset of movement	A sprinter responding to the start gun	Ruler Drop
Speed	The rate at which an individual is able to perform movement.	Running the 100m	30 metre sprint

F – FREQUENCY how often you train
I – INTENSITY how hard you train
T – TIME how long you train
T – TYPE type of activity you do

Health and Fitness

Definitions

Health - a state of complete physical mental and social well being, not merely the absence of disease.

Fitness - the ability to meet the demands of the environment.

You can be fit and not healthy because you might not have social and mental health.

To be healthy you have to be fit because you need to have the physical side.

S – SPECIFICITY
P – PROGRESSION
O – OVERLOAD
R – REVERSIBILITY
T – TEDIUM

- SPECIFICITY- making the training specific to the needs of the sport or individual.
- PROGRESSION- gradually increasing the training that you are doing.
- OVERLOAD- doing more training
- REVERSIBILITY- any training gains can be lost if training does not continue.
- TEDIUM- training needs to keep the athlete motivated.

Year 11 Health & Fitness Spring Knowledge Organiser

Diet and Energy Balance

Balanced diet - Eating the right foods in the right amounts. This will allow us to exercise and work properly

Varied diet - If we don't eat a variety of foods in the correct proportions, we won't get all the nutrients we need to make up a balanced diet

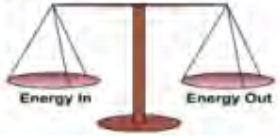
The Eatwell guide shows us what foods we should be eating and in what quantities. E.g. the largest parts of the diet should come from:

- Fruit & Vegetables
- Starchy carbohydrates

Variety is important to get all the necessary nutrients. There are seven nutrients.

- Carbohydrates
- Fats
- Proteins
- Vitamins
- Minerals
- Fibre
- Water

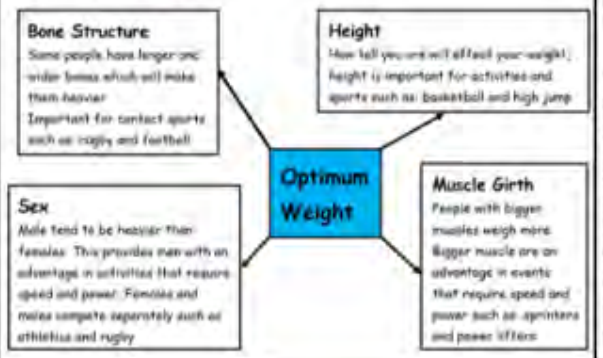
Energy Balance



The energy balance makes sure the calories we take in is equal to the number of calories we expend.

- If we take in more calories, we will gain weight
- If we take in too little calories, we will lose weight
- We need to have a balance so we have the correct nutrients for energy

Optimum Weight



Dietary Manipulation

Protein intake:
Protein should be consumed as soon as possible after exercise; this increases protein synthesis and therefore muscle growth. This is used by performers such as sprinters, shot putters and power lifters

Carbohydrate loading:
This strategy involves eating foods high in carbohydrates 1 to 4 days before an event. These increases glycogen stores in the muscle. This is used by endurance athletes such as marathon runners

Hydration:
Water prevents dehydration, dehydration causes: dizziness, fatigue, heat stroke, muscle cramps, nausea and the thickening of blood. Water should be consumed before during and after exercise

Macronutrients

Carbohydrates

Function:
- Provide us with energy in both aerobic and anaerobic activities
- Eaten in large quantities compared to other macronutrients

Found in:
- Bread, rice, pasta, potatoes

Fats

Function:
- Provide us with energy, is stored in the body and can lead to weight gain
- Should be the smallest percentage of macronutrients in the diet

Found in:
- Butter, oil, fatty meats, fried food

Proteins

Function:
- Used for growth and repair, it can provide us with energy
- May be used by athlete for growth and repair of muscles

Found in:
- Cheese, milk, eggs, lean meat, fish

Micronutrients

Vitamins & Minerals

- Vitamins and minerals keep our body healthy and can improve your immune system,
- Vitamins are found in fresh fruit and vegetables
- Minerals are found in vegetables and meat

Vitamin D: Found in dairy products and helps the body absorb calcium

Calcium: Found in milk and other dairy products and helps keep our bones strong

Water

- Water prevents dehydration and is found in most liquids and many foods

Fibre

- Fibre aids the digestive system and is found in foods such as cereals, vegetables and nuts

Year 11 Health & Fitness Spring Knowledge Organiser

Muscular Strength

Test: Hand Grip Dynamometer Test
Protocol: Grip the dynamometer in one hand. Start with your hand up and bring down to side while pulling in handle. No swinging your hand.

Advantages	Disadvantages
• Simple and easy to complete	• Only one size of dynamometer which may affect reading • Focuses solely on forearm strength.

Muscular Endurance

Test: 1 minute sit up test

Test: 1 minute press up test
Protocol: Complete as many full sit ups/press ups as possible in 1 minute.

Advantages	Disadvantages
• Simple test to complete • Minimal equipment needed.	• Difficult to assess whether each repetition is performed correctly. Difficult to accurately measure large groups.

Flexibility

Test: Sit and Reach Test
Protocol: Sit with legs straight out in front and soles of feet against box/table. Reach forward without bending knees. No jerking movements.

Advantages	Disadvantages
• Quick and easy to perform. • Data table readily available for comparison	• Can cause injury if not fully warmed up appropriately. • Only measures flexibility of lower back and hamstrings.

Cardiovascular Fitness (Aerobic Endurance)

Test: 12 min Cooper Run
Protocol: Continuously run/swim for 12 minutes. Distance recorded.

Advantages	Disadvantages
• Minimal equipment needed • Test can be self administered.	• Inaccuracy of heart rate measurements • Motivation dependant

Test: Harvard Step Test
Protocol: Step continuously for 5 minutes. Measure heart rate at 1, 2 and 3 minutes after exercise.

Advantages	Disadvantages
• Simple test to complete	• Motivation dependant

Agility

Test: Illinois Agility Test
Protocol: Start lying down at the start line. Complete course as quick as possible (10m x 5m – 4 central cones)

Advantages	Disadvantages
• Simple and easy to complete	• Motivation dependant / Timing errors.

Speed

Test: 30m Sprint Test
Protocol: Start from stationery position. Complete distance in the quickest possible time. Time is stopped when chest crosses the line.

Advantages	Disadvantages
• Quick test to complete. • Minimal equipment needed and can be performed anywhere with a flat 50m run.	• Running surfaces/weather conditions can affect the results. • Inaccuracies with stopwatch usage.

Power

Test: Vertical jump Test
Protocol: Stand next to wall and mark an initial reach while feet are flat on the ground. Standing jump to reach as high as possible. Measure distance from first mark to second.

Advantages	Disadvantages
• Quick and easy to perform. • Easy to complete with large groups.	• Technique plays are large role in successful completion.

Reliability /Validity

Validity relates to whether the test actually measures what it sets out to measure.
Reliability is a question of whether the test is accurate. It is important to ensure that the procedure is correctly maintained for ALL individuals.

<u>Results can be improved:</u>
- By using experienced testers & calibrating equipment
- Ensuring performers have the same level of motivation to complete each test
- Repeatedly test to avoid human error (x3)

Year 11 Health & Fitness Spring Knowledge Organiser

Warm up and cool down

Warming up should include:
- gradual pulse raising activity
- stretching
- skill based practices/familiarisation
- mental preparation
- Increase amount of oxygen and blood to the working muscles
- Increase in mobility through full range of movement at the joints
- Dynamic movements
- The speed of muscle contraction

Cooling down should include:
- Low intensity exercises
- maintain elevated breathing and heart rate, eg walk, jog
- gradual reduction in intensity
- stretching

The benefits of warming up:
- effect on body temperature
- range of movement increased
- psychological preparation
- practice of movement skills through the whole range of movement
- Injury prevention.
- Increased blood flow and O2 to the muscles

The benefits of cooling down:
- allowing the body to recover
- the removal of lactic acid/CO2/waste products
- Prevent delayed onset of muscle soreness (DOMS) - the pain felt in the muscles the day after exercise.
- Lowers heart rate
- Circulation of blood and O2
- Lowers body temperature
- Aids recovery by stretching muscles

Types of training

Circuit training A series of exercise stations whereby periods of work are interspersed with periods of rest. The content/demand of the circuit can be altered in order to improve different components of fitness.	**Continuous training** Sustained exercise at a constant rate (steady state) without rests, involving aerobic demand for a minimum of 20 minutes, eg running, swimming, rowing, cycling. It improves cardio- vascular fitness. Sometimes referred to as a steady state training. Appropriate to marathon runners.	**Fartlek training** Swedish for 'speed play'. Periods of fast work with intermiteent periods of slower work. Varying speed, terrain and work:rest ratios. Often used in running: sprint, jog, walk, jog, sprint, etc.	**High intensity interval training (HITT)** Alternating periods of short intense anaerobic exercise with less intense recovery periods.
Weight training The use of weights/resistance to cause adaptation of the muscles. Chose appropriate weight/exercise depending on fitness aim, eg strength/power training or muscular endurance	**Weight training** **One rep max:** The maximal amount that can be lifted in one repetition by a muscle/group of muscles (with the correct technique). **Repetitions:** The number of times an individual action is performed. A set is a group of repetitions.	**Interval training** Periods of training/work that are followed by periods of rest or low intensity exercise.	**Plyometric training** Use of plyometric exercises eg bounding, depth jumping, to increase power. It includes an eccentric contraction (lengthening of the muscle) followed by larger concentric contraction (shortening of the muscle).

PARQ

A PARQ is a Physical Activity Readiness Questionnaire:
- One of these should be completed by anyone who is wishing to undertake a new physical training programme.
- It is a self-screening/ assessment tool to indicate any potential reasons why someone may not be suited to training, or particular activities.
- It looks at medical and injury history.
- It is designed to try and help highlight any possible underlying health issues.
- May also look at emotional, mental and social factors affecting the participant, especially those which might impact on them performing regular exercise in public spaces or gyms.
- It asks the participant for general health information, usually around diet, alcohol consumption, smoking history.
- Typically used by personal trainers or sports coaches to help determine the suitability and safeness of a client or player taking part in a training programme.

Health and social care

Equality & Diversity Knowledge Organiser

LO4: How equality, diversity and rights in health, social care and child care environments are promoted.

Applying best practice in health, social care and child care environments.

Best Practice	What it means
Being non-judgemental	• Using effective communication skills and methods. i.e. active listening or appropriate vocabulary. • Assumptions are not made about people. • Using empathy to see things from their point of view. • Being open-minded and accepting (not agreeing or disagreeing). • Being respectful of their feelings, experiences and values.
Respecting the view, choices and decisions of individuals who require care and support.	• Care meets the person's needs. • Providing person-centred care. • Individuals feeing supported and valued. • Raising self-esteem.
Anti discriminatory practice.	• Treating service users, staff and relatives fairly. • Ensuring no-one is excluded from activities (making them accessible) • Being positive role models. • Applying the values of care appropriately. • Providing information regarding complaints procedures.
Valuing diversity.	• Culture and religious needs, offering choices – menus (halal, Kosher etc.) • Having a prayer room accessible. • Celebrating a range of different festivals in health, social and child care settings. • Children having access to a range of different toys, displays and resources in nurseries, playgroups and primary schools reflecting different cultures and beliefs.
Using effective communication.	• Making sure individuals have the information they need to make informed choices. • Assisting individuals to understand procedures including treatments and care plans. • Age appropriate vocabulary and not jargon or specialised medical terminology. • Using special methods of communication if needed, like; hearing loop, braille, sign language, gestures, flash cards etc. • Active listening – demonstrating interest and responsiveness to what an individual is saying.
Following agreed ways of working.	• Following an organisations policies and procedures – so care provided is appropriate, correct and safe.

Active listening: Fully concentrating on what someone is saying, rather than passively 'hearing'. It can involve non-verbal cues such as eye contact and nodding or briefly saying 'I see' or 'sure' to build trust and confidence.

Other methods for promoting best practice including:

Providing training and professional development opportunities for staff:

•Ensures staff are up to date with the latest legislation, knowledge, methods and skills that they need for their role.

•Makes sure that staff are aware of correct procedures to follow – health and safety, safeguarding, confidentiality.

•The Care Certificate –ensures new care workers know how to provide quality care and have an understanding of equality, rights and diversity.

Mentoring:

• An experienced person like a supervisor or manager sharing their knowledge and skills with another person to help them to develop their skills and improve their practice.

•The experienced person provides advice, feedback, support and encouragement.

Monitoring:

•Involves checking the progress or quality of care practice over time.

•Monitoring can involve; observations, asking opinions – service users, staff and families. Analysis of surveys, questionnaires or feedback forms, analysing the type and number of complaints etc.

Performance management:

•An ongoing process between a care worker and their manager or supervisor. It can involve one-to-one meetings, observations over time to provide feedback on performance and identify targets for improvement.

Staff meetings:

•Opportunity to share best practice and discuss what went well.

•Concerns can be shared, issues raised and problems solved.

•Reminders of policies and procedures can be given and also updates and general information.

Explaining discriminatory practice in health, social care or child care environments.

Being patronising: Talking down to someone, as though they are a child.

Discriminatory Practice	Examples
Stereotyping, labelling, prejudice	•Stereotyping: Sharon, a GP being impatient with her overweight patients, she thinks all overweight people are fat and lazy. •Labelling – jumping to conclusions about someone, e.g. An unruly child, a confused and deaf old person. •Prejudice – a care assistant refusing to bath a gay an or woman.
Inadequate care	•Not administering medication on time. •Rough handling while bathing or dressing an individual – causing bruising. •Not consulting or taking in to account an individual's care preferences.
Abuse and neglect	•Name calling, laughing at them or making derogatory comments. •Hitting, punching or scratching. •Failing to provide regular food and drinks (fluids) for a patient.
Breach of health and safety	•Forgetting to lock the drugs cabinet. •Not using sharps box to dispose of syringes. •Moving a patient from a bed to chair without assistance. •Failing to regularly check equipment for damage or wear and tear. •Lack of supervision in a child care environment. •Lack of hygiene when preparing food. •Failing to carry out risk assessments for activities.
Being patronising	•Sharon – a practice nurse always speaking very loudly and slowly to all the older adults attending the surgery just in case they are deaf or a little confused. •Tony – healthcare assistant calling all his patients 'love', 'sweetheart' or 'dear' to be friendly and put them at ease.

Choosing an appropriate action/response to promote equality, diversity and rights in health, social care and child care environments.

Equality, diversity and rights can be promoted in health, social care and child care setting in a variety of different ways. This can include; challenging discriminatory practice, providing training, applying values of care and using complaints and whistle blowing procedures.

Methods of challenging discriminatory practice.

Method of challenging	Actions to take
Challenge at the time.	•Speak to the person and explain how they are discriminating to raise their awareness. •Ask them to reflect on their actions and what they've said. •Encourage the person who has used discriminatory language to speak to the person discriminated against and apologise
Challenge afterwards through procedures.	•Show the individual the relevant policy – bullying, confidentiality, equal opportunities etc. •Discussions at senior management level – so they can address the matter with training or disciplinary action to raise awareness of the serious nature of the incident.
Challenge through long-term proactive campaigning	•Providing regular training for staff over time to raise awareness including; correct working practices – enabling them to address the issue if they observe any discriminatory practice. •Ensuring the person who has been discriminating is sent on an equality and diversity course. •Values of care training sessions or workshops.

Other methods for challenging discrimination can include:

Applying the values of care:

This ensures that individuals using health, social care and child care environments receive appropriate care, do not experience discriminatory attitudes and have their rights supported and their diversity is valued.

Providing information on complaints procedures and whistleblowing:

- Having a complaints procedure in place means that service users will know what to do and who to speak to if they feel their rights or care needs are not being met.
- Reassures service users, their families and practitioners that their concerns will be taken seriously.
- In extremely serious circumstances, whistleblowing involves raising concerns about poor practice with an outside authority such as the CQC or Ofsted – they will then launch an investigation and ensure appropriate actions are taken. Actions may include; closing a setting down or prosecuting staff

Advocacy services information provided:

An advocate is independent and represents an individual's wishes and views to make sure that their rights and needs are recognized. They act in the best interest of the individual and speak on their behalf id they cannot speak for themselves.

Implementing legislation, codes of practice and policies:

- Promoting good practice by providing guidance regarding the aspects of care in the codes of practice, policies and legislation ensuring staff are able to respond and act appropriately in any situation.
- Professional conduct and expectations are clear.
- Ensures service users, families, practitioners and staff are reassured and feel safe and secure and makes sure that there is a system of redress.

Dealing with conflict:

Needs to be handled in a manner that involves active listening, remaining calm, objective and showing empathy. Situations should be approached positively and actively seek to find solutions.

Training, mentoring and monitoring:

See examples of best practice in the table 'Other methods for promoting best practice' on the first page of this KO.

Exam Tips:

- You need to be able to explain how aspects of good practice like mentoring, monitoring and following agreed ways of working can improve standards of care.
- Be able to recognize and explain examples of discriminatory practice using the correct terminology - page 2 of this KO - Explaining discriminatory practice in health, social care or child care environments table.
- Ensure you can recognise and explain examples of discriminatory practice – test yourself with the images below!
- Use your knowledge from different arts of the specification, like applying values of care, rights, legislation and national initiatives to answer exam questions.
- Choose appropriate actions to challenge discriminatory practice and to promote equality, diversity and rights in health, social care and child care environments in exam questions.

History

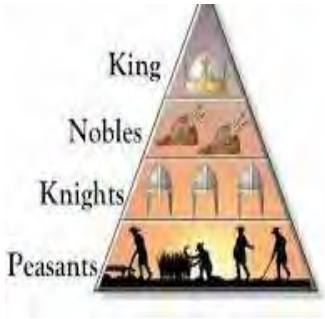
GCSE History– Knowledge Organiser – Conflict and Upheaval 1337 – 1381 – Key Question 1 – English Society

Key Terms

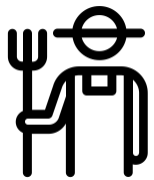
Feudal System	The system of sharing land to share control and power
Rural	Countryside and villages
Agriculture	Farming
Monarchy	The King or Queen and Royal family
Villeins	Peasants – Farm workers who did not own any land
Cottars	The poorest type of villein
Clergy	People who worked for the church e.g. priests and monks
Catholicism	The only type of Christianity in the 14th Century – Catholics were led by the Pope
Lollardy	Lollards challenged the Catholic Church by asking for an English Bible
Monopoly	Having full control over something
Flanders	A country in Europe where modern Belgium is. It was very rich and based around trade
Wool Trade	The buying and selling of sheep wool

What was England like in the 14th Century?

Society



The Feudal System was used to control England. The King owned all land and shared it with his Lords in return for loyalty. They could then share it with knights for loyalty and resources and the Villeins were given jobs on the land in return for money.



Most people lived rurally and worked in agriculture. There were only 2 towns in England: London and York.

There were roads left by the Romans which could be used to travel but this still took time as all travel was by foot or horse back.

Wool Trade

Most of England's wealth came from the Wool Trade. It had large areas of agricultural land dedicated to the raising of sheep. It also had large numbers of people working as weavers to turn the wool into wool which could be used to produce cloth and clothing.

King Edward III used the wool trade to create an alliance with Flanders. He granted Flanders a monopoly over English wool meaning they were the only people who could sell it. This was good for England as it gave them a rich ally but bad for the wool trade as it meant they could not sell their own wool!

Church

England was a Catholic country focused on Christianity. The Church controlled peoples beliefs and how they behaved (Bad behaviour made it more likely that your soul would not enter heaven).

The church was also the largest employer as it owned large areas of land for farming and the wool trade.

Priests carried out a number of duties in the community as did monks and nuns. The Pope was the head of the Church and more powerful than any monarchy as he was God's representative on Earth.

Women

Women were seen as the property of men. Your father owned you and made all decisions for you until you were married and then your ownership transferred to your husband. The only women not controlled in this way were nuns who gave their lives to work for the Church.

Poor women worked alongside the men as farm labourers as well as looking after their families and homes. Rich women were taught to read and write as a symbol of their wealth and their lives revolved around having children to produce heirs for their husbands.

Interactive Media

R093: Audience demographics and segmentation

The target audience is the set of people who media products are aimed at.

Location

If a local cake shop is only able to deliver cakes up to 10 miles away, the target audience's location would be people who live within 10 miles of the shop. Products may have a target audience that is local, national or international.

Occupation

An occupation is the type of job that an audience does. When segmenting by occupation and audience, the category may be broad, for instance, middle income earners who work in an office.

Education

Audiences are often segmented by the highest level of education they have achieved such as GCSEs, A Levels or degrees. Some publications may specifically aim at an audience with specialist knowledge in an area.

Ethnicity

Ethnic groups are defined as a group of people who have common culture, country, religion or language. Media products may focus on a particular ethnicity. It is important not to offend or alienate anyone which the content of a media product.

Interests

By understanding the hobbies and interests of an audience, media producers can identify what engages them. For instance, an outdoor adventure company has established that most of their customers enjoy horse riding, this is something they might promote on a leaflet.

Age

Age groups may be clearly defined, such as 18-24, or use descriptive terms such as 'teenagers' or 'retired people'.

Gender

Media products may be aimed more towards one gender than another. It is important that advertising and designs do not stereotype gender roles even if the target audience for a product is more likely to be one gender.

Keywords

- Target audience
- Segment
- Occupation
- Ethnicity
- Education
- Interests
- Age groups
- Gender

R094: Components of visual identity

A visual identity gives customers or users a feeling and perception of the brand, product or service. It helps to visually communicate the values and personality of the brand with audiences or customers.

Branding

The following are the components that you need to consider when creating a visual identity

- ⇒ Logo—words and/or images to represent the brand
- ⇒ Brand name
- ⇒ Slogan or strapline—a short memorable phrase

Assessment support

You will need to produce a logo to obtain marks for your visual identity in Task 1.

Keywords

- Logo
- Brand name
- Slogan/strapline
- Typography
- Graphics
- Colour palette
- Layout

Elements of visual identity

The following elements help to create a visual identity:

Typography
The style of text used

Graphics
This includes photos, images, illustrations, shapes and symbols

Colour palette
The particular group of colours or colour scheme that is to be used across all products

Layout
Layouts may be simple or complex. You will need to consider the audience and purpose of the product to decide which is appropriate

During the assessment:

When creating your visual identity, you will be asked to 'design a visual identity'.

You need to decide which parts of visual identity are required for the product you have been asked to make.

Areas you should consider include:

- ⇒ Logo
- ⇒ Name
- ⇒ Slogan
- ⇒ Graphical style
- ⇒ Typography
- ⇒ Colour palette
- ⇒ Layout

You will need to show evidence for this in your planning documents such as mood boards, concept sketches, mind maps and visualisation diagrams. Your report will also allow you to record any justifications or decisions.

R094: Concept sketch

A concept sketch is a series of simple freehand drawings or sketches that are used to develop an idea. This may also include some annotations with brief explanations of colour ot the design itself.

Concept sketches are a good way to get basic ideas down on paper. As multiple ideas are created side by side. It is also a good way to compare and consider different potential ideas and select those that can be developed further.

Features of a concept sketch

- Sketches are brief, usually just outlining the ideas.
- These give the feel of the idea rather than any detailed response to the brief.
- Commonly drawn in pencil or pen to quickly create multiple concepts.

Example of a concept sketch for a logo design

Keywords

- Concept sketch
- Drawing
- Sketch
- Idea
- Develop

Assessment support

A concept sketch is great for showing how you have developed elements of the identity or final graphic. For instance, you may create a concept sketch to show how you developed a logo. All these sketches should be photographed or scanned and added to your report or evidence folder.

You may create concept sketches to show the development of your ideas for your visualisation diagram.

R094: Concepts of graphic design

Graphic design concepts

You should consider the key concepts of graphic design before you plan your final product, including:

- Application of visual identity
- Typography
- Alignment
- Use of white space
- Use of colour and colour systems

Colour systems

Colours are represented in graphic design using a number of different systems. When setting up a graphic you should choose the most appropriate setting.

Keywords

- Graphic design
- Application of visual identity
- Typography
- Alignment
- White space
- Colour and colour systems

Colour trends

Pantone

Pantone is a system that allows colours to be precisely matched. For instance, one spot of colour on a logo may be specified with a pantone colour.

NCS (Natural colour system)

This system allows colours to be specified using the way colours are perceived.

Colour modes

RGB

Red Green Blue

This corresponds to the pixels on a screen. It is used for television and web images.

CMYK

Cyan magenta yellow key (black)

Each colour corresponds to the ink colour used in the print process. This is used in print products such as books,

Assessment support

Having consistent graphic design concepts help to make your visual identity and final product more cohesive. Ensuring you are well prepared in the pre-production stage will allow the exam board to understand your way of thinking.

R093: Health and safety

During all phases of a media production, any health and safety risks and hazards must be considered. Workers need to be mindful of hazards whether they are working at a computer, using photographic equipment or working on a film or television production.

Keywords

- Recce
- Health and safety
- Risk assessment

Location recce

A location recce is a visit to a location that might be used for photography, filming or recording. The purpose of the visit is:

- To check the safety of the site, that the site is accessible and that permission to use the site can be obtained
- Check sound issues—for example, is there any background noise such as heavy traffic
- Check lighting issues—for example, a large building may block the sun from reaching the location, additional lighting will be required
- Check facilities, such as toilets and parking areas
- Decide which shots and camera movement will work with the location

Detailed notes will be made and a series of photographs will be taken to show the potential location from all angles and times of day from reference. This provides information on the suitability of the location and helps to establish if there are any issues with safety and access that need to be incorporated into a risk assessment.

Risk assessment

Anywhere where media people work, including where crew, actors or the public will be affected, must have a risk assessment. This is a document that identifies potential risks, their likelihood, the harm associated with the risk and how each risk will be

Risk Assessment

Site Name		Risk-A number	
Project	Stay With Me – Music Video	Name	Jade Clarke
Location	Outside, school site and James' house.	Assistants	
Date Assessed			

What hazards have been identified?	What are the potential injuries or damage? Severity (1, 2 or 3)	What measures have been taken to prevent injury or damage?	Number of people at risk	What additional measures or actions are required?	Who is responsible for action?
Using a longboard	2, falling off board	Using someone with experience to use this prop	1		Daniel, the main character

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A
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QR codes

R093: Health and safety

During all phases of a media production, any health and safety risks and hazards must be considered. Workers need to be mindful of hazards whether they are working at a computer, using photographic equipment or working on a film or television production.

Examples of risks in television or film production

Moving objects

There are many ways that objects move to create hazards, for example a camera moving through the air or a car chase scene.

How to reduce risk

Get permission to close roads or walkways, make sure operators of cranes are trained and certified

Electrocution

If devices fail or are incorrectly wired, they may create a risk of electrocution.

How to reduce risk

Maintain equipment, only use qualified and trained crew, protect cables from being cut or damaged

Trip hazards

Equipment, such as lighting, will have many electric cables. A track for a dolly camera will also cause a tripping hazard.

How to reduce risk

Cable protectors, mats and ramps over cables, cables will be taped down with gaffer tape (thick strong tape)

Heavy equipment

Care needs to be taken when transporting heavy equipment such as lighting or cameras.

How to reduce risk

Equipment is transported in flight cases that may have wheels, staff are trained in how to safely move equipment

Examples of risks when using computers

Neck/back problems

Having displays at incorrect heights or sitting with bad posture may lead to serious back or neck problems.

How to reduce risk

Have display directly in front of the chair, use a fully adjustable chair, have the display at eye level.

Eye strain

Looking at a display for a long time may result in headaches and aching eyes

How to reduce risk

Look away every 20 minutes, take longer breaks every 2 hours, use the computer in a well lit room.

Keywords

- Health and Safety Act
- Hazard
- Equipment
- Halm
- Reduce
- Risk

QR codes

R093: How style, content and layout are linked to the purpose

A media product usually has a purpose or reason for its development. Some media products will have more than one purpose. The purpose is closely linked to the type of media product.

Advertise

There are a wide range of media products with this purpose including print adverts such as billboards, posters and leaflets, TV/radio advertising as well as online banner advertising on websites and social media.

Educate

Many media products aim to educate. Textbooks combine text, images and photos and are suited to independent study and revision. eLearning products are able to add interaction and video to the learning experience. Apps and games are able to teach through play.

Entertain

Most people spend a large amount of time each day being entertained by media products including TV shows, films, radio broadcasts, books, apps and computer games.

Inform

Posters are often used to display information such as your location on a map in a theme park. Information leaflets on health or financial products also help to inform.

Influence

Media products often aim to influence behaviour. This may be used as part of advertising. It may also be used by governments or schools to promote healthy or safe behaviours.

Keywords

- Purpose
- Advertise
- Entertain
- Educate
- Inform
- Influence

R094: Mood board

Mood boards

A mood board is a collection of images, text and colours that generate ideas for the look and feel of the product. They can be digital, 9created on a computer), or physical.

A mood board is unlikely to include images used in the final product, but instead is there to give an idea for the theme, based on the client brief.

A Mood board is a key part of the planning process and should be created when planning the visual identity for the graphic product.

Creating mood boards

When gathering content for the mood board, aim for a good variety of images, text that illustrates the typography and colours that will give a clear idea of the intended colour palette for the visual identity and digital graphic.

When creating your mood board, use all available space and fill the page. If creating a digital mood board, Photoshop, Affinity Photo, Word and PowerPoint are all examples of appropriate software for achieving this.

A physical mood board may also contain examples of textures and fabric. A digital mood board may contain photos of these.

If you produce a physical mood board, you will need to take a photo of it or scan it to submit it to the exam board.

Physical mood board

Keywords

- Mood board
- Colour
- Physical
- Digital

Assessment support

A mood board will probably be the first planning document you create as it helps to give a feel for the visual identity of all other planning documents you will make. A mood board will include graphics and photos that give a feel for the visual identity, not ones that you will use in the final product.

Digital mood board

R093: Properties of image files

When using image files, you must consider where it will be used as this will alter the technical requirement of the image. For instance, and image used in a printed magazine will need a very high resolution.

Resolution

Resolution is the number of pixels in a given area. It is measured as dots per inch (DPI) for print images and photographs and pixels per inch (PPI) for screen images.

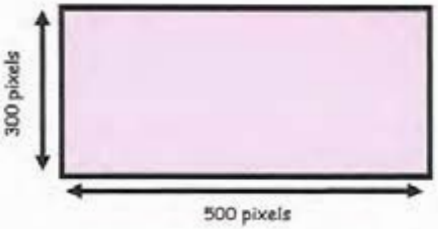
The higher the PPI/DPI the higher the quality image

Printed documents such as books and posters typically use a resolution of 300 DPI. This means that there will be 300 printed dots in 1 inch of the printed document.

Web pages typically use images with a resolution of 72 DPI.

Pixel dimensions

This is the measurement of an image in pixels. It is calculated by multiplying the pixel width by the pixel height. In this example, the image measures 500 wide and 300 pixels high so it has 15,000 pixels in total. A 10 megapixel camera will have 10 million pixels in one photo.



Vector images

Vector images are made up of shapes such as lines, curves and fills. Files are small in size and can be made bigger of smaller without affecting the quality of the image. They are commonly used for icons, logos, diagrams, animations and illustrations. SVG images are vector images.

Bitmap images

Bitmap images, also known as raster images are made of small squares called pixels. File sizes tend to be larger. Images can be made smaller on the screen but if they are enlarged, they will become pixelated or blurry. Bitmap images are widely used in photographs. JPG and TIFF all use bitmap images.

Keywords

- Resolution
- Dots per inch (DPI)
- Pixels per inch (PPI)
- Pixel dimensions
- Static file format
- JPG
- PNG
- SVG
- TIFF
- Vector
- Bitmap

QR codes

R094: Visual identity design style

A visual identity gives customers or users a feeling and perception of the brand, product or service. It helps to visually communicate the values and personality of the brand with audiences or customers.

Business type and brand values

A visual identity design style should reflect the type of business or organisation that is represents. It should help to communicate the values and core principles of the brand.

Keywords

- Values
- Position
- Economy
- Mid-range
- Luxury brand

Comparison of visual identity

Kids Zone offer holiday clubs to young children. They wanted to create a visual identity that communicated feelings of fun, activity and creativity. They made use of bright colours as these would be attractive and appealing to children. The typeface chosen uses a playful decorative font.

By contrast, Royal Swan wanted a visual identity that showed an elegant and refined hotel.

They made use of a gold colour on the swan to suggest luxury. A contrasting dark blue colour was chosen to help give reassurance and trust I the brand. The chosen logo uses simple lines to help give a feeling of a clean, elegant design that is memorable. The choice of a serif typeface for the title helps to communicate a traditional atmosphere, whilst the use of the sans-serif typeface for the strapline 'Boutique Hotel' suggests a modern twist.

Brand positioning

The brand's position in the marketplace can also be reflected in the visual identity in the visual design style. The style will change depending on whether a brand positions itself as an economy, mid-range or luxury brand .

Notice the visual identity of a brand of baked beans in a supermarket. A standard font, simple graphics and white background all help to give the feeling of an economy brand.

By contrast, a luxury brand of beans may have a stylish label that has been well designed.

During the assessment:

As you develop your product's visual identity, you will need to justify your design choices. Justifying means that you have fully explained your reasons for doing something.

You may do this by annotating designs and/or producing a report.

An advantage of creating a report is that all your evidence will be in one place.

It's a good idea to make a report at the start of the product so that you have somewhere to put everything.

R094: Purpose of a visual identity

A visual identity gives customers or users a feeling and perception of the brand, product or service. It helps to visually communicate the values and personality of the brand with audiences or customers.

Brands with a strong visual identity have an emotional connection with users and customers. The visual identity helps to establish a brand, make it stand out and develop brand loyalty over time.

A strong visual or brand identity is important to help customers recognise the brand. A brand's visual identity, including logos, colours, fonts and tone of voice, will be used throughout all of a brand's media products, from their company letterhead to their billboard poster or website. Companies usually have a set of brand guidelines to achieve this. Consistent use of this house style creates familiarity and ensures that the audience or customer recognises and remembers a brand.

Keywords

- Visual identity
- Brand
- Loyalty
- Brand guidelines
- House style

During the assessment:

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R093: Work planning and documents used to support ideas generation

A mind map or spider diagram is a way to plan out thoughts and ideas in an organised way. A mind map can be created digitally or be hand drawn.

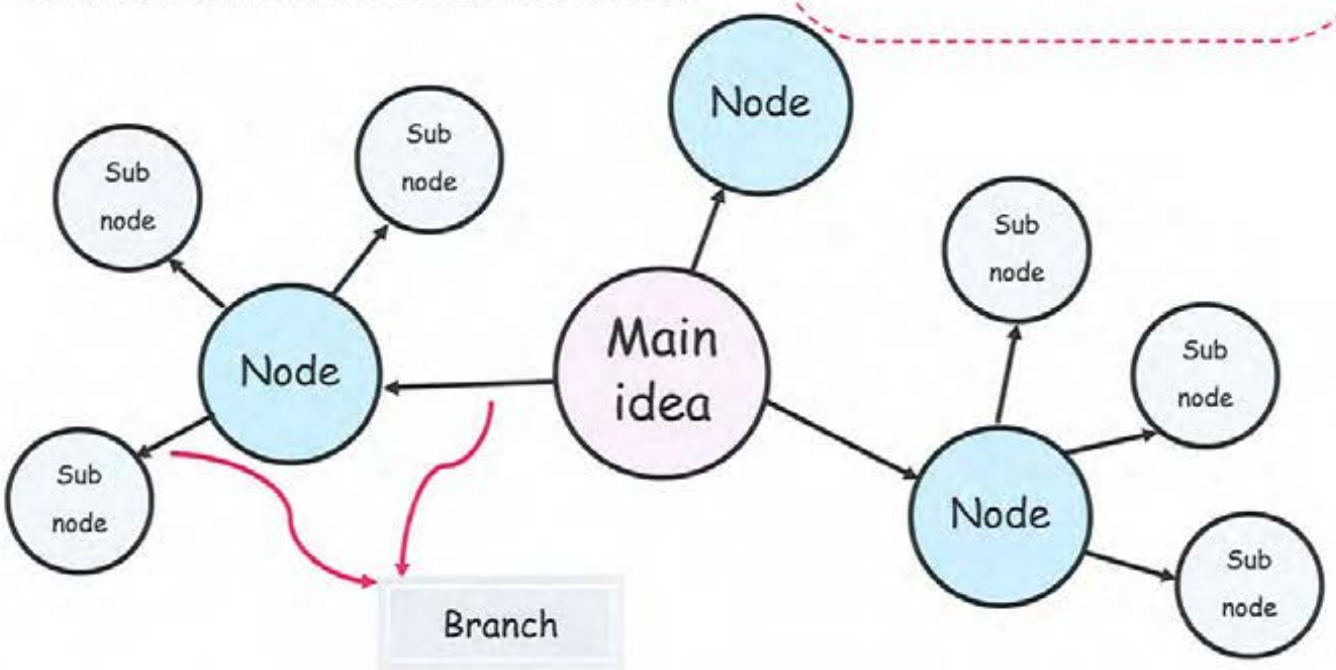
Purpose of a mind map

- The purpose of a mind map is to outline ideas quickly
- A mind map also shows the connections between different ideas

- Mind maps can be made digitally or hand drawn.
- Digital mind maps can be made on dedicated software (these can also be shared within a design team)

Content of a mind map

- A mind map consists of the main or central idea in the middle
- Nodes are connected to the main idea using lines called branches
- Sub-nodes are connected to the nodes to help organise ideas
- Each node or sub-node includes text and/or images



Keywords

- Mind map
- Digitally
- Hand drawn
- Central idea
- Node
- Branches
- Sub-nodes

QR codes

R093: Work planning and documents used to support ideas generation

A mood board is a planning document that assembles a range of materials in order to reflect the potential style of a media product.

Purpose of a mood board

- Develop feeling and style of a product before it is made.
- Giving ideas for the later planning stages
- Refer to when producing the final media product
- Gain feedback from a client or design team

Content of a mood board

Physical mood board

Produced on a large piece of paper or card and contain materials such as photographs, pages cut out from a magazine, fabrics , examples of typography and colour swatches/

Digital mood board

A digital mood board may include digital images, graphics, text, videos and audio files.

Digital mood boards are made in a wide range of software.

Keywords

- Mind map
- Digitally
- Hand drawn
- Central idea
- Node
- Branches
- Sub-nodes

Physical mood board

Digital mood board

QR codes

R093: Work planning and documents used to support ideas generation

A visualisation diagram is a rough sketch of a media product. The purpose of a visualisation diagram is to give a representation of how a film product will look including content, layout, font and colour.

Software for visualisation diagrams

- Word
- PowerPoint
- Publisher
- Photoshop/Affinity

Hardware for visualisation diagrams

- Pen
- Paper
- Coloured pens
- Scanner
- Printer

A good visualisation diagram should contain enough detail that a graphic designer could create the product using it.

Sketches of the content

Layout and positioning of assets

Where are the graphics going to go on your product?

Annotations

Labels around your diagram which provide extra information

Specific features

Typical features e.g. magazine cover visualisation diagram would show a front

Keywords

- Visualisation
- Sketches
- Layout/position
- Annotation
- Features

Visualisation diagrams are used for:

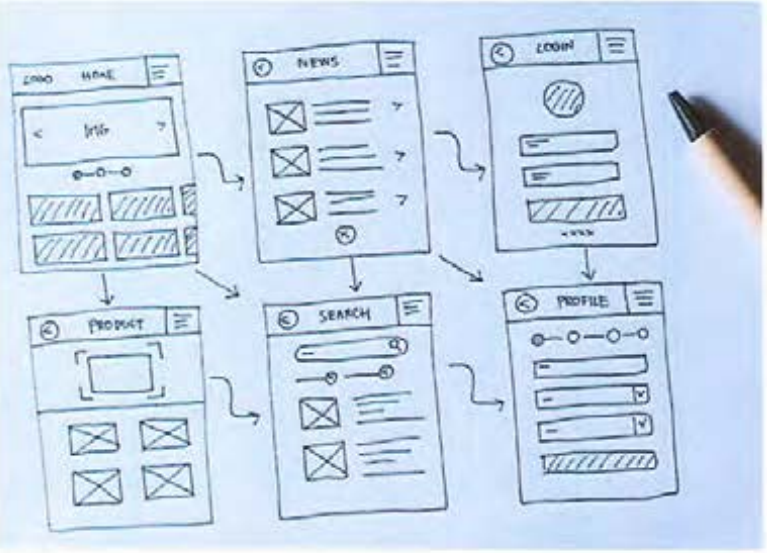
- Brochures or leaflets
- Magazines or book covers
- Posters
- DVD/Blu-ray covers
- Comic pages
- Web pages
- Game screens/characters/environments
- Print averts

QR codes

R093: Work planning and documents used to support ideas generation

A wireframe is a planning document that shows the layout and functionality of interactive products such as apps or websites. It also shows how different webpages or screens link to one another.

- The specific content used for text, images and video will likely be dynamic (it will change)
- Images are usually indicated by a box with an X inside it
- Text is usually indicated using lines or dummy text
- Buttons and text boxes are indicated with squares



Keywords

- Wireframe

Users of wireframes include:

- Website designers
- Website developers
- UX designers (User experience designers)
- App developers / designers / programmers

QR codes

R093: Work planning and documents used to support ideas generation

Work plans are used to plan out the different elements that need to be completed within a project. In media there are 3 phases: pre-production (planning), production (creating) and post-production (editing and reviewing)

Components of a workplan

Resources — Resources include the hardware, software and people required to complete the project

Timescales — The time given to each activity and task in the project

Workflow — This is the order in which activities are completed.

Contingencies — Contingencies are a back up plan when problems occur. This is spare time allocated for the unexpected.

Milestones — Milestones are the dates when key parts of the project are complete

Tasks — Tasks are the main phase of the project such as pre-production

Activities — Tasks are broken down into activities. They are smaller parts of a task.

A workplan can be created on Excel or dedicated workplan software.

Number and name of the action		2012 III	2012 IV	2013 I	2013 II	2013 III	2013 IV
A. Preparatory Actions							
A.1	Experimental data collection campaign during a winter season	■	■	■	■		
A.2	Project Requirements Analysis	■	■	■	■		
B. Implementation actions							
B.1	System design			■	■	■	■
B.2	System implementation					■	■
B.3	System integration						
B.4	Pilot realization						

Keywords

- Workplan
- Phases
- Pre-production
- Production
- Post-production
- Resources
- Timescales
- Milestones
- Tasks
- Dependencies
- Activities
- Subtasks
- contingencies

QR codes

Music

JS Bach: Badinerie

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Form and structure:

The piece is in **Binary** form (**AB**).

Section A is 16 bars long.

Section B is 24 bars long.

Each section is repeated (**AABB**).

Harmony:

Diatonic; mixture of root position and inverted chords; uses V7 chords and a Neapolitan sixth chord.

Imperfect and perfect cadences are clearly presented throughout. Both sections end with a **perfect cadence**.

Dynamics:

Mostly ***forte*** throughout, although no markings appear on the score.

On some recordings, **terraced dynamics** (sudden changes) are included.

Metre and rhythm:

Simple duple time – 2/4 – with two crotchet beats in every bar.

Uses **ostinato rhythms** which form the basis of two short musical ideas (X and Y), consisting almost totally of **quavers and semi-quavers**.

Background details:

Composed by **Johann Sebastian Bach** (1685 – 1750), one of the main composers of the **Baroque** era in music.

Badinerie is the last of seven movements from a larger piece called **Orchestral Suite No.2**.

The piece was composed between **1738-1739**.

Instrumentation:

Flute, string orchestra and harpsichord.

The score has five parts (flute, violin 1, violin 2, viola and cello). The harpsichord player reads from the cello line and plays the notes with their left hand whilst filling in the chords with their right hand.

Tonality:

Section A begins in **B minor** (tonic) and ends in **F♯ minor** (dominant minor).

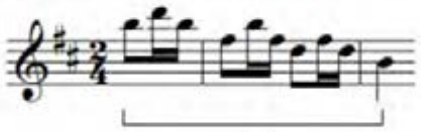
Section B begins in **F♯ minor** (dominant minor) and ends in **B minor** (tonic).

Section A modulates from B minor through **A major** before arriving at F♯ minor.

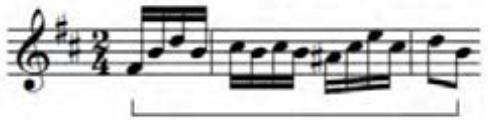
Section B modulates from F♯ minor through **E minor, D major, G major** and **D major** before arriving at B minor.

Melody:

The movement is based on **two musical motifs**.



X



Y

Both motifs begin with an **anacrusis**. Motif X is entirely **disjunct** whilst motif Y **combines disjunct and conjunct** movement.

Typical **ornaments and compositional devices** of the period are used including **trills, appoggiaturas** and **sequences**.

Texture:

Homophonic: melody and accompaniment.

The flute and cello provide the main musical material; however, the 1st violin participates occasionally.

The 2nd violin and viola provide harmony with less busy musical lines.

Tempo:

The tempo is **Allegro** (quick, lively, bright), although not marked on the score.

Toto: Africa

Soft rock

Form and structure:

The piece is in **strophic** or **verse-chorus** form.

Intro	Verse 1 / Verse 2	Chorus 1 / Chorus 2	Link 1 / Link 2	Instrumental	Chorus 3	Outro
1 – 4	5 – 39 / 14 – 39	40 – 57	58 – 65	66 – 82	40 – 92	93 – 96
4 bars	35 bars / 26 bars	18 bars	8 bars	17 bars	22 bars	4 bars

Metre and rhythm:

Simple duple time – 2/2 (split common time) – with two minim beats in every bar.

Uses distinctive **ostinato rhythms** for both riffs, consisting almost totally of **quavers**, with constant use of **syncopation**.

Vocal rhythm looks complex but follows the natural rhythm of the lyrics.

Background details:

Composed by band members **David Paich** and **Jeff Porcaro**.

Recorded by the American rock band Toto in **1981** for their fourth studio album entitled **Toto IV**.

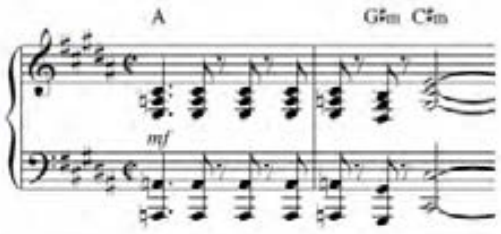
Released in **1982** and reached number one in America on 5 February **1983**.

Genre: **soft rock**.

Harmony:

Diatonic; mixture of root position and inverted chords.

Riff a can be heard during the intro, verses, link sections, instrumental and outro. This riff uses a three-chord pattern: **A – G♯m – C♯m**.



Choruses use a standard chord pattern: **vi** (F♯m) – **IV** (D) – **I** (A) – **V** (E).

The **harmonic rhythm** (the rate of chord change) is mostly once per bar.

Instrumentation:

Rock band: drum kit with additional percussion, lead and bass guitars, synthesisers, male lead vocals and male backing vocals.

Dynamics:

Most of the song is ***mezzo-forte*** (moderately loud) whilst the choruses are ***forte***.

Melody:

Mostly **conjunct** (moving in step) with a **wide vocal range**.

Riff b uses the **pentatonic scale** (interpreted through E major):

Vocal improvisations occur towards the end of the song.

Texture:

Homophonic: melody and accompaniment.

Tonality:

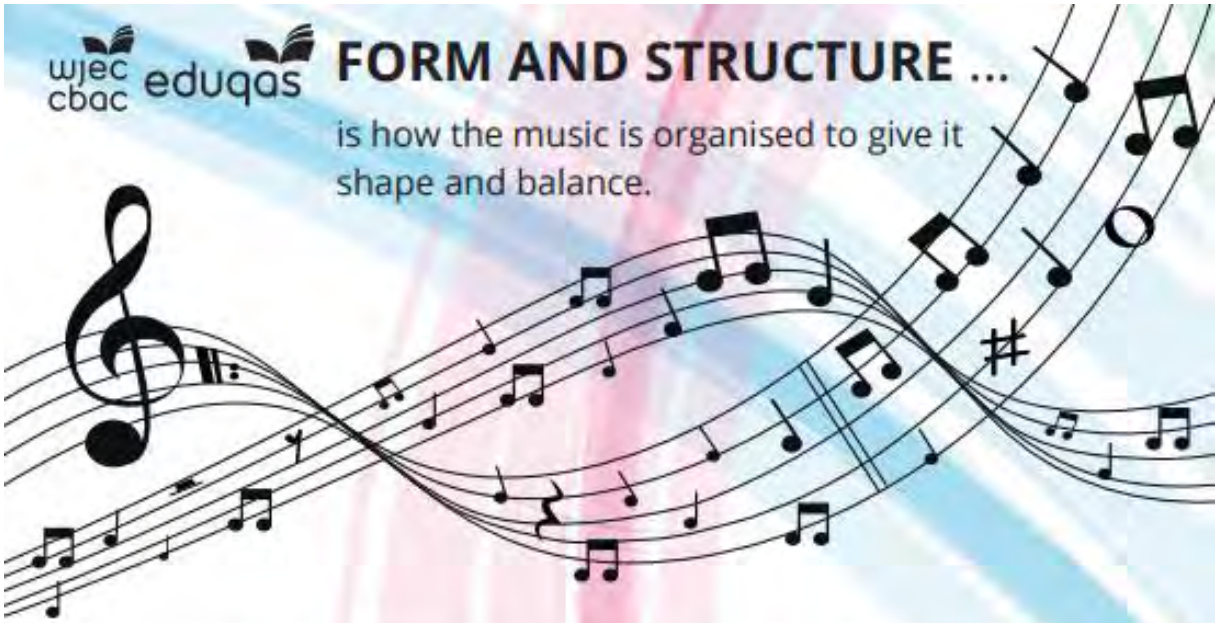
The majority of the song is in **B major** whilst the choruses are all in **A major**.

Tempo:

The tempo is **moderately fast**.

FORM AND STRUCTURE ...

is how the music is organised to give it shape and balance.



Each section in the music is usually labelled with a capital letter, i.e. A, B, C, and so on.

Binary: A B

Strophic: A A A

32 bar song: A A B A

Ternary: A B A

Theme and Variation:

Main theme
Variation 1
Variation 2
Variation 3
etc.

Minuet and Trio:

|: A B :|:C D :|A B

Rondo:

A B A C A

12 bar Blues:
A repeated chordal pattern

I	I	I	I
IV	IV	I	I
V	IV	I	I

Some structural sections:

Introduction (Intro) - Opening of a piece which introduces the main ideas.
Outro - Last part of a piece used in 'pop' music.
Coda - Final section of a piece of music.
Bridge - Piece of music that links two other sections together.
Break - Section that offers a contrast or 'break' from the rest of the piece/song.
Verse - Section of a song which has the same music but different lyrics when repeated.
Chorus - Section of a song which has the same music and lyrics when repeated.
Middle 8 - Eight bars in the middle of a song which provide a contrast.

Some structural devices:

Regular phrasing - Melody divided up into balanced, symmetrical phrases.
Irregular phrasing - Melody divided up into unbalanced phrases.
Riff - Catchy idea in 'pop' music which is repeated.
Fill - Idea that fills in the 'gaps' at the end of phrases.
Ostinato - Continuously repeated phrase or idea.
Call and response - Short musical idea followed by an answering phrase.
Loop - An idea continuously repeated by technical means.
Repetition - When an idea is repeated.
Contrast - A change in the music which offers a difference in the musical elements to provide contrast to the initial material.

HARMONY is...created through chords in music.

CONSONANT HARMONY:

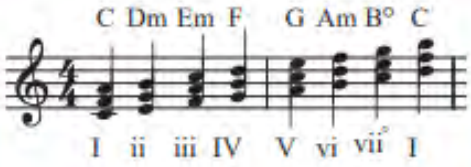
when the notes sound 'good' together.

DISSONANT HARMONY:

when the notes 'clash'.

DIATONIC HARMONY

is based on the major / minor scale system - triads are built on every note of the scale:



CHROMATIC HARMONY

Chromatic harmony is far more complex and includes accidentals not belonging to the home key.

Every one of the 7 notes, (or DEGREES) of the scale is given a name:

7th note: **LEADING NOTE**
6th note: **SUBMEDIANT**
5th note: **DOMINANT**
4th note: **SUBDOMINANT**
3rd note: **MEDIANT**
2nd note: **SUPERTONIC**
1st note: **TONIC**

A CADENCE is a progression of two chords, found at the end of a musical phrase.

PERFECT CADENCE: *Uses chords* **V → I**
Sounds complete and always stops on the tonic chord. Both chords are major.
IMPERFECT CADENCE: *Lands on chord* **V, e.g. I → V; ii → V; IV → V; vi → V**
Sounds incomplete. The 2nd chord is always chord V of the key, which is major.
The chord before may be major or minor.
PLAGAL CADENCE: *Uses chords* **IV → I**
Sounds complete and finishes on chord I. Both chords are major.
It is sometimes known as the 'Amen' cadence because it is often found at the end of a hymn.
INTERRUPTED CADENCE: *Uses chords* **V → vi**
Sounds incomplete. In a major key, it involves a major chord moving to a minor chord. It is sometimes known as a 'surprise' cadence, because it seems as if chord V will resolve to chord I, but it does not - stopping instead on a minor chord.

MELODY is...

a line of musical notes with varying pitches that is satisfying to listen to.

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Anacrusis:
a note (or notes) that come before the first strong beat in a piece. Sometimes called the 'up-beat' or 'pick-up'.

Motif:
a short melodic or rhythmic idea.

Leitmotif:
a recurrent musical idea representing a person, place, feeling or idea.

Countermelody:
a 2nd melody played at the same time as the main theme.

Pitch:
whether the musical notes are high, middle-sounding or low.

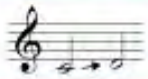
Range:
the distance from the lowest sounding note to the highest sounding note in a piece of music.

Ornaments:
used to 'decorate' the music, e.g. trill, mordent, turn.

Chromatic:
when the tune moves in semitones (like a chromatic scale).

Pentatonic:
a musical scale based on 5 notes.

Intervals:
distance between 2 pitches

Microtone	smaller than a semitone
Semitone	
Tone / major 2nd	
Major 3rd	
perfect 4th	
Perfect 5th	
Major 6th	
Major 7th	
Perfect 8th (Octave)	

Question and answer phrases:
an initial idea (the questioning phrase) balanced by a 2nd idea (the answering phrase).

Theme:
the main musical idea in a piece of music.

Sequence:
repetition of a musical idea at a higher or lower pitch.

Imitation:
when a musical idea is copied in another part.

Repetition:
when musical ideas are repeated.

Contrast:
when there is some type of difference in the music.

Fanfare:
a musical 'announcement', based on the pitches of a chord.

Blue notes:
the flattened notes in a Blues scale.

Types of scales:
Major, Minor, (up to 4 sharps and flats), Pentatonic, Blues.

Useful terms and their meanings

Conjunct:
Stepwise movement in a melody (scalic).

Disjunct:
When the melodic movement includes lots of leaps or intervals.

Arpeggio / broken chord:
When the notes of a chord are played separately and in succession.

Anticipation note:
When a note of the next chord is played early, preparing for the intended pitch in the chord.

Triadic:
Musical movement that uses the notes of a triad.

Pentatonic melody:
Melody based on a 5-note scale.

METRE

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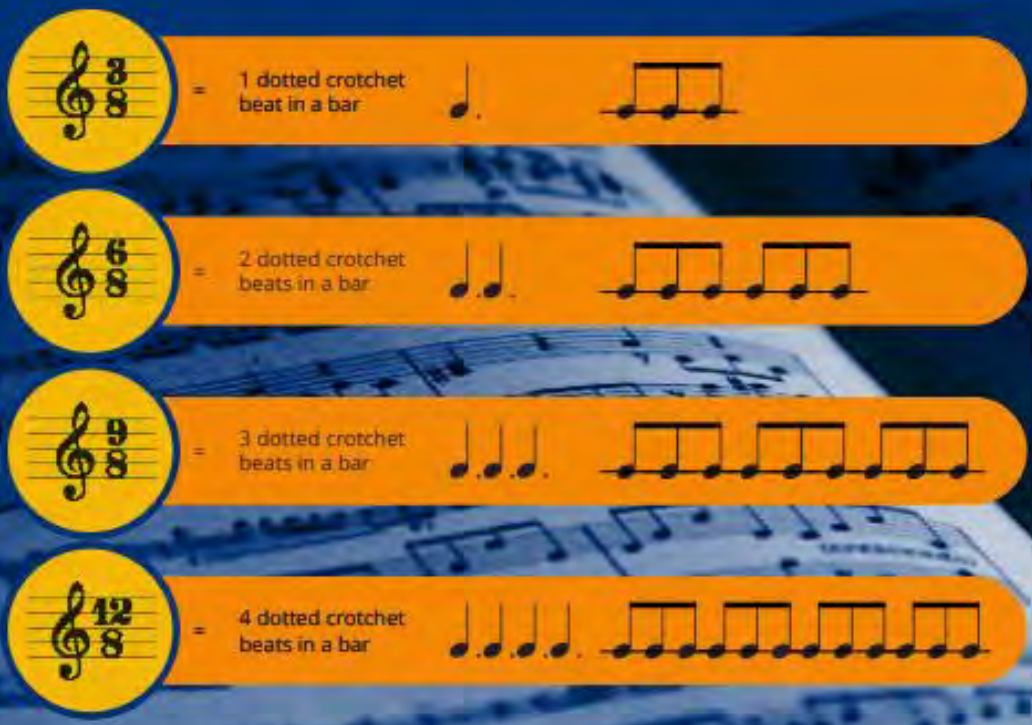
Simple Time

counts crotchet beats in every bar.

Compound Time

counts dotted crotchet beats in every bar.



MUSICAL STYLES

...are the different types of music

AOS 1: Musical Forms and Devices

BAROQUE ERA
(1600 – 1750)

CLASSICAL ERA
(1750 - 1810)

ROMANTIC ERA
(1810 - 1910)

AOS 2: Music for Ensemble

JAZZ AND BLUES

MUSICAL THEATRE

CHAMBER MUSIC

AOS 3: Film Music

Music to accompany film or television scenes - appreciating how musical elements are used to create the mood and atmosphere through engaging with the story.

AOS 4: Popular Music

Rock	Hip-Hop	
Pop	Ballad	
Soul	Reggae	
Fusion	Minimalism	Bhangra

Rhythm is ...

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the way the time values and patterns of notes are organised and used.

Note	Note name	Rest
	Semibreve (4 crotchet beats)	
	Minim (2 crotchet beats)	
	Crotchet (1 crotchet beat)	
	Quaver (½ crotchet beat)	
	Semiquaver (¼ crotchet beat)	

Syncopation / 'off-beat' ...is when the strong accent is placed on a normally weak beat.

On the beat ...is when the accents are on the strong beats, e.g. the first beat of the bar.

Dotted notes ...a dot placed after a note adds half the original value to the note.

Triplets ...when 3 equal note values are played in the time of 2 note values.

CHAAL is an 8 note dotted rhythmic pattern found in **BHANGRA**.

Tied notes ... *are two notes of the same pitch joined together by a short curved line called a tie.*

Swing rhythms give a dotted / triplet rhythm feel to the beat.

Driving rhythms are energetic, 'driving' the music on.

Dance rhythms are typical rhythms of any kind of dance.

Rock rhythms are rhythmic riffs and patterns associated with 'rock' music.

SCALES

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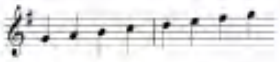
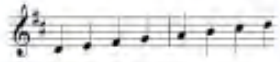
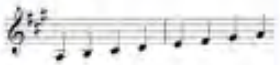
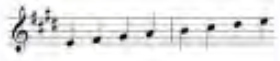
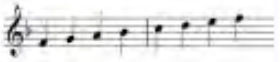
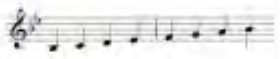
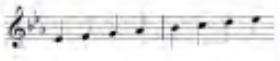
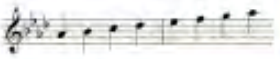
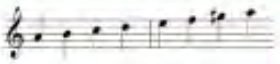
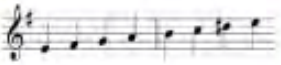
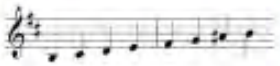
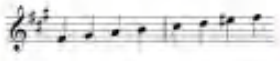
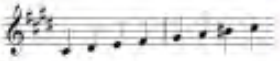
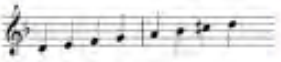
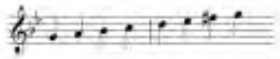
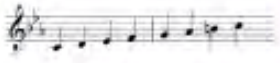
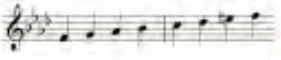
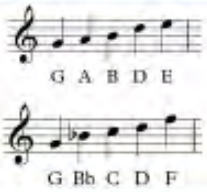
MAJOR sounds are happy / bright.

Key	Scale
C major	
G major	
D major	
A major	
E major	
F major	
B♭ major	
E♭ major	
A♭ major	

MINOR sounds are sad and rather mournful.

Key	Scale
A minor	
E minor	
B minor	
F# minor	
C# minor	
D minor	
G minor	
C minor	
F minor	

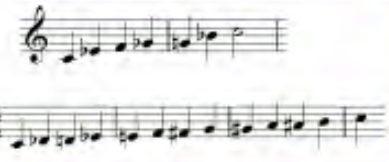


The **major pentatonic** uses notes 1,2,3,5 and 6 of a major scale.

The **minor pentatonic** uses notes 1,3,4,5,7 of the natural minor scale.

Blues scale in C

Chromatic scale on C



SONORITY...

eduqas

is all about the quality of sounds in music – the types of voices, instruments and technology and how they are used.

Percussion: Timpani, Drum Kit, Snare Drum, Cymbal, Hand Held Percussion, Glockenspiel, Xylophone, Tabla, Dhol

Rim shot – when the rim and head of the drum are hit at the same time.
Drum roll – beats played in a rapid succession.

Brass: Trumpet, French Horn, Trombone, Tuba

Muted – when mutes are used to 'dampen' the sound.

Woodwind: Flute, Oboe, Clarinet, Saxophone, Bassoon

Slurred – joining notes 'smoothly'.
Tongued – notes are separated, sounding 'defined'.

Voices: Soprano, Alto, Tenor, Bass

A cappella – without accompaniment.
Humming – vocal sound made with closed mouth.
Syllabic – one note for each syllable.
Melismatic – each syllable has a number of notes.
Vibrato – rapid, slight variation in pitch.
Falsetto – male voice in a higher range than usual.
Belt – lower, more powerful part of voice range.
Rap – words spoken in a rhythmical way.
Scat – jazz singing, no words or nonsense words.
Backing vocals – singers providing extra harmonies.

Strings: Violin, Viola, Cello, Double Bass, Harp

Pizzicato – 'plucked'.
Double stopping – one instrument playing 2 notes at the same time.
Tremolo – rapid bowing to give a dramatic effect.
Divisi – 2 parts in the same musical line.
Arco – 'bowed'.
Mutes – used to 'dampen' the sound.

Guitars: Classical / Spanish, Electric + Bass guitars, Sitar, Saranga, Tumbi

Distortion – effect which 'distorts' notes.
Hammer-on – finger brought down sharply on a string.
Slap bass – bouncing strings against the fret board.
Pitch bend – altering pitch of a note very slightly.

Keyboards: Piano, Organ, Harpsichord

TEMPO is...

the speed of the beat.

wjec eduqas cbac

Allegro Vivace	Fast / Lively / Quick
Moderato Andante	Not too slow / at a moderate pace, a 'walking' speed
Allegretto	Moderately fast
Adagio Lento	Slow / Leisurely

Accelerando gradually getting faster.

Ritardando / Rallentando slowing down.

Rubato a 'freer' interpretation of the tempo.

Pause a symbol which means the note must be held for longer than its original value.

Some other useful terms:

Presto	–	very quick
Largo	–	very slow
A tempo	–	in the original tempo
Ritenuto	–	in slower time

TEXTURE is...

the way that the melody, chords and musical ideas have been woven together to achieve different effects – the 'layers' of music and how they relate to each other.

Monophonic

A single melodic line with no harmonies or other melodies. It may be sung or played by more than one voice or instrument.

Homophonic

A chordal style, or a melody plus chords, which sometimes provide a rhythmic contrast.

Polyphonic

A more complex style which presents the melody (or melodies) in imitation or in counterpoint.

Unison:
When all parts are playing the same music at the same pitch

Chordal:
When parts move together creating a succession of chords

Drone:
Constantly repeated or sustained note(s)

Stab chords:
Short, 'staccato' chords that add impact and 'punch' to the music

Imitation:
When one part 'copies' another

Counter-melody:
A new melody, combined with the theme

Descant:
A decorative (higher) line added to the main tune

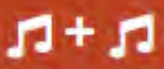
Round:
A short (vocal) canon

Canon:
When the melody is repeated exactly after the first, with some overlapping

Alberti Bass:
A type of accompaniment figure that uses broken chords

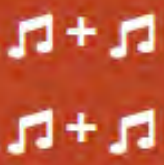
Walking bass:
A steady, continuous, mainly stepwise bass line

2-part texture:
Music written for 2-part voices or instruments



3-part texture:
Music written for 3-part voices or instruments

4-part texture:
Music written for 4-part voices or instruments



Tonality

is... the key of the music – it depends on the types of scales used.

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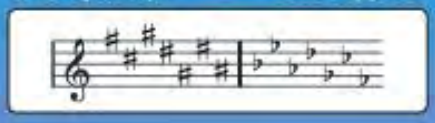
You must know the key signatures in all the major and minor keys up to four flats and four sharps. These scales are what the music is based on.

order of sharps *order of flats*



order of sharps →

F C G D A E B

← *order of flats*

THE PENTATONIC SCALE

This type of scale is made up of five notes within the range of an octave.

For example:

MODULATION is when the music changes key.

Modulation to the dominant is when the music moves from the tonic to the dominant key. The dominant key is based on chord V of the original key, e.g. from C major to G major.

Modulation to the relative minor key is when the music moves from the tonic major key to the relative minor key. The relative minor key is the minor key which shares the key signature with the home key, e.g. the relative minor of C major is A minor.

Modulation to the relative major key is when the music changes from the tonic minor key to the relative major key. The relative major key is the major key which shares the key signature with the home key, e.g. the relative major of A minor is C major.

Key signature	Major keys	Minor keys
No flats or sharps	C major	A minor
1 sharp (F#)	G major	E minor
2 sharps (F#, C#)	D major	B minor
3 sharps (F#, C#, G#)	A major	F# minor
4 sharps (F#, C#, G#, D#)	E major	C# minor
1 flat (B♭)	F major	D minor
2 flats (B♭, E♭)	B♭ major	G minor
3 flats (B♭, E♭, A♭)	E♭ major	C minor
4 flats (B♭, E♭, A♭, D♭)	A♭ major	F minor

Performing Arts

COMPONENT 3 BTEC TECH PERFORMING ARTS (ACTING)

Devise a performance in response to a stimulus provided by the exam board. Both parts of the task (written and performance) will be completed under supervision. There is a 12 week window for all parts to be completed. The component is marked out of 60.

Assessment objectives

AO1 - Understand how to respond to a brief. Discuss and practically **EXPLORE** the stimulus considering: target audience, performance space, planning and managing resources, running time and style of work.
Develop ideas considering: structure of work, style and genre used, skills required, creative intentions.
Work effectively as a member of the group making an individual contribution and responding to the contribution of others.

AO2 – Select and develop skills and techniques in response to a brief.
Demonstrate **HOW** to select and develop skills and techniques that are needed for the performer and whole group and take part in the rehearsal process.

AO3 – Apply skills and techniques in a workshop performance in response to a brief
Contribute to a workshop performance using: vocal, physical and interpretative skills. (18 marks)

AO4 – **Evaluate the development process and outcome in response to a brief**
Evaluate the process and performance. Consider: the brief, stimulus and contribution from other group members. Reflect on: selection of skills used, individual strengths/areas for improvement, overall and individual contribution to the group, impact of the groups work.

Key vocabulary

Target audience – who you will perform to and why
Performance space – choosing where the performance will take place if not on the stage and why
Running time – length of the performance
Style of work – genre or practitioner who will influence your work
Vocal skills – ability to adapt voice to suit a character
Physical skills – movement, gestures, body language, facial expressions
Interpretative skills – presenting yourself to the audience and creating emotion
Commitment –how much effort you put in individually and as a group
Rehearsal – practicing the performance
Blocking – deciding where an actor should stand
Performance – Showing of the piece of work to the target audience
Evaluate – identify strengths and areas for improvement of both the rehearsal and performance
Characterisation - creating a character through your movement and dynamic choices

PE

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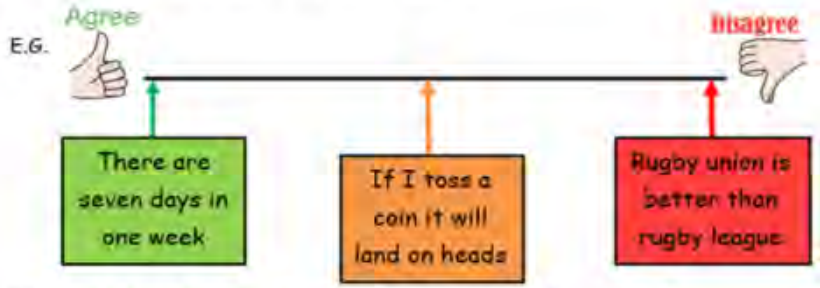
Component 2 Classification of Skills

Classifying skills on a continuum

- You need to classify skills on a continuum!
- A continuum is a line that goes between two extremes!
- We can put information on the continuum!



We need to know three continua (continua = more than 1 continuum)

Open ——— Closed

Basic ——— Complex

Low Organisation ——— High Organisation

Open and closed skills

	Open Skills	Closed Skills
Description	Open skills **ARE** affected by their surrounding environment. Extreme open skills need to be constantly adapted by the performer as situations change around them. Conditions are unstable and **UNLIKELY** to be the same each time a skill is performed	Closed skills are **NOT** affected by their surrounding environment. Extreme closed skills don't need to be constantly adapted by the performer as situations around them are stable. Conditions are **LIKELY** to be the same each time a skill is performed
Example of the skills	• Dribbling in football • Passing in basketball • Tackling in rugby • Shooting in hockey	• Penalty in football • Gymnastics vault • Tennis serve • Free shot in basketball

Low organisation and high organisation skills

	Low Organisation Skills	High Organisation Skills
Description	Are easy to do Have clear separate phases Easy to break down and practice	Are hard to do Have phases that are not clear Hard to break down and practice
Example of the skills	• Tennis serve • Triple jump • Back hand push shot • Batting in rounders	• Golf swing • Tumbling in gymnastics • 10m High dive

Basic (simple) and complex skills

	Basic/Simple Skills	Complex Skills
Description	Are simple to perform Requires little thought Don't need much information to be processed Requires little decision making	Are difficult to perform Requires thought and concentration Require a lot of information to be processed Requires a lot of decision making
Example of the skills	• Running • Cycling • Swimming • Chest pass in netball	• Lay-up shot in basketball • Rock climbing • Overhead kick in football • Backhand smash (badminton)

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Component 2 Types of Guidance

Visual guidance

Explanation: Visual guidance is when the performer is shown the skill e.g. videos, pictures and Demonstrations

- Pictures must be clear
- Demonstrations must be seen more than once & be of good quality so poor movement is not copied
- Demonstrations must be clearly visible

When would you use it: Is good for beginners so they can see what the skill looks like and create a mental image of what the movement should be
It is also good when it is not possible to hear verbal guidance e.g., during play

Advantages	Disadvantages
• Can copy the movement • Can be done with large groups	• If demonstration is poor incorrect movement learnt • Time consuming • Videos are expensive • Complex movements are difficult to recognise

Verbal guidance

Explanation: Verbal guidance is when the performer is told information about how to complete the correct technique

- Information must be clear so it is understood
- Information must be concise (not confusing)
- Performer must be able to hear the information

When would you use it: Is good for more experienced performers who know what the movement should look like and can make sense of the information.
It is also used when demonstrations are not possible e.g. a break in play

Advantages	Disadvantages
• Instructions can be given quickly • Can be used during a performance • No equipment is required	• Some movements are difficult to explain • Relies on the coach's communication skills being good enough for the performer to understand

Manual guidance

Explanation: Manual guidance is where the coach physically supports or moves the performer to help them get into the correct position

- Tennis coach moving the racket arm in the correct range of motion for a forehand drive
- A trampoline coach supporting a front somersault
- A gymnastics coach supporting a balance to get the right shape

When would you use it: This can be used with performers of all abilities and skill levels it is particularly useful for beginners

Advantages	Disadvantages
• Can get a feel for the movement • Build's confidence • Can help break down the movement into phases	• The feeling is not actually the same as actually doing the skill unaided • Performer can become dependent on the support • Incorrect feel can lead to incorrect movement being learned • Can only be used 1 on 1

Mechanical guidance

Explanation: mechanical guidance is where the coach uses equipment to support the performer to help them with technique.

- Using a harness when learning backward somersaults on a trampoline
- Using floats to develop leg strength when swimming

When would you use it: This can be used with performers of all abilities and skill levels it is particularly useful for beginners. It may be important to use mechanical guidance when the activity is dangerous such as using a harness when a performer is learning a new trampoline routine

Advantages	Disadvantages
• Can get a feel for the movement • Build's confidence • Reduces danger	• The feeling is not actually the same as actually doing the skill unaided • Performer can become dependent on the support • Incorrect feel can lead to incorrect movement being learned • Cannot be used in large groups

Summary

Visual Guidance

A coach is giving visual guidance to a novice basketball player on how to grip the ball

He can see how the skill should be performed and can copy it

It is a clear demonstration so the performer uses the correct technique

Verbal Guidance

Jose Mourinho gives verbal guidance to an elite athlete. He gives him instructions quickly on how to improve technique

Because the athlete is experienced, he understands and makes sense of the information

Instructions are concise and easy to understand

Manual Guidance

Manual guidance is given to a novice performer on how to perform a serve

The performer gets a feeling for the motion and develops confidence to perform the skill in a game

Mechanical Guidance

A performer is using manual guidance (harness) to practice a trampolining routine

It's the first time the performer has attempted the routine so it reduces the danger

It develops the confidence of the performer as he can safely get a feeling for the movements involved

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Component 2 Types of Feedback

Type of Feedback	Explanation	Application
Intrinsic	Intrinsic feedback is **within** the performer They understand how the movement feels from feedback from the muscles It is important so performers can spot their own errors Intrinsic feedback should be developed so the performer is not reliant on others	Used by **experienced** performers as the skill is well learnt and they can make amendments to their own performance based on their internal feedback E.g. When a gymnast is performing a somersault, they will be able to use internal feedback from their muscles to readjust their body to successfully perform the skill
Extrinsic	Extrinsic feedback is feedback from **outside** the performer Extrinsic is important as someone watching the skill can observe and explain what needs to be done to correct it	Used by **less experienced** performers as they are unlikely to detect their own errors E.g. When a gymnast is performing a somersault the may land falling backwards. A coach may tell them to stay tucked for longer, which will enable them to land on their feet
Concurrent	Concurrent feedback is given **during a game**	Used by **experienced** and **less experienced** athletes and can be **intrinsic** or **extrinsic** E.g. A gymnast may alter their body position during a somersault to perform it correctly (intrinsic) A coach may tell the performer to point their toes during a somersault, this will aid performance (extrinsic)
Terminal	Terminal feedback is given after the performance This may be due to the rules or the skill not being suitable Feedback should be given as soon as possible after the performance	E.g. A Gymnast performs a practice somersault. The coach would give feedback on how to improve the skill. The gymnast then performs again

Feedback

The ability and experience of a performer and the type of skill will affect the type of feedback given!

Effective feedback is used to:

- Provide information about the skill being performed
- Help improve performance or the skill
- Reinforce good practice

To be effective it must:

- Be shot and concise
  (you can only process small amounts of information)
- Be given as soon as possible
  (while it is still fresh in their memory)
- Be relevant to the performer
  (specific to them not the whole group)

Summary

Intrinsic Feedback

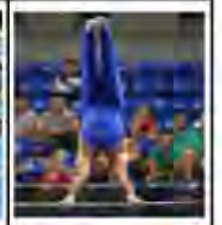
An experienced performer uses intrinsic feedback from their muscles to adjust their body position to perform the skill successfully

Extrinsic Feedback

A less experienced performer gets extrinsic feedback from their coach to explain how their performance can be improved

Concurrent Feedback

A coach gives concurrent feedback during a game of basketball



Terminal Feedback

Team GB cycling team analyse data and performance after a race so feedback can be given to improve performance

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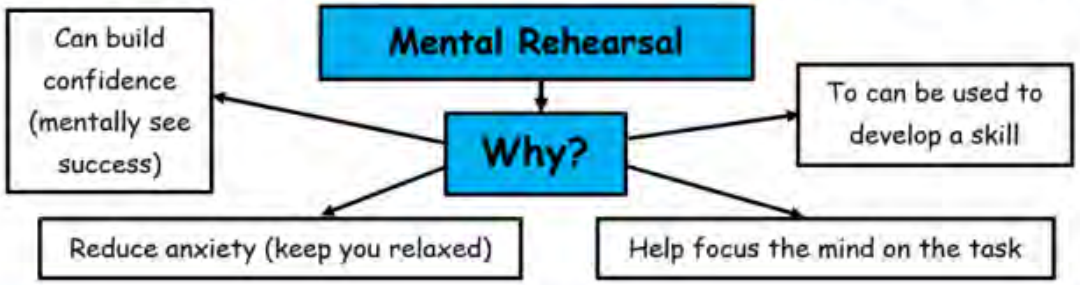
Component 2 Mental Rehearsal

Mental Preparation

Mental preparation or mental rehearsal is a technique used by elite performers. It involves mentally practicing a skill before actually doing it.



Mental Rehearsal

	Explanation	Example 1	Example 2
Warm-up	One of the reasons why we warm-up is to mentally prepare, this can be done by mental rehearsal The performer goes through a skill or sequence of events they are about to perform in their mind This helps them clarify the skill they are about to perform, so they are confident they are ready to perform	Before a gymnastics performance they will imagine performing the actual routine, going through the various skills and visualising the whole routine	Before participating in the bobsleigh, the driver will mentally go through the race, visualising every bend and turn down the track before actually racing
During an event	Although mental rehearsal is completed before the start of a performance as part of their warm-up. It can also be used during a break or during the performance During a match when play is paused	If awarded a free kick in football the performer will see themselves completing the skill and where the ball is going to go before they take it	During a free throw in netball the performer will imagine themselves successfully completing the shot before taking it

Sports Studies

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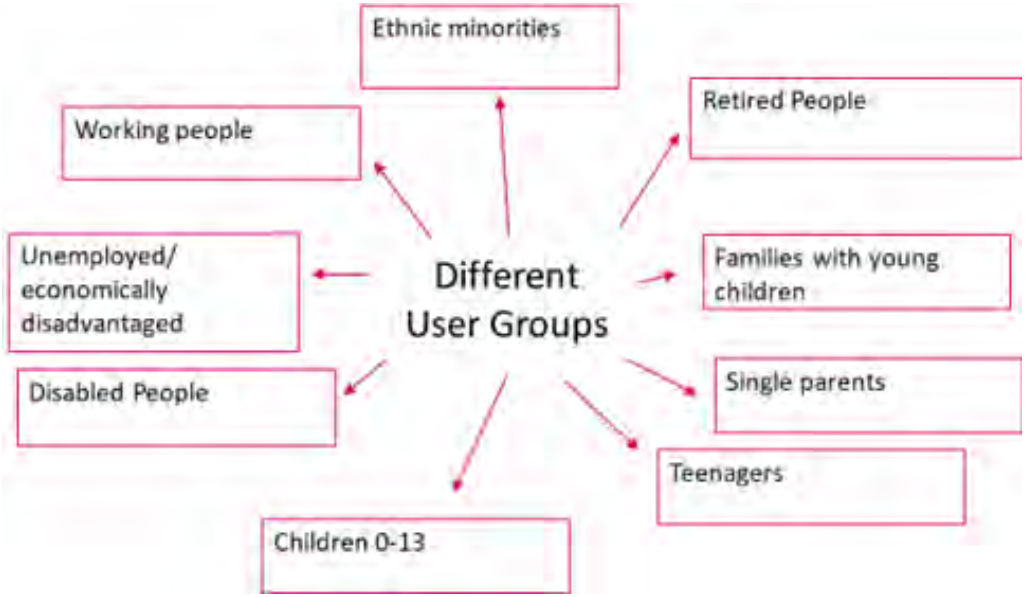
Exam Revision
Resit



3 Ways to overcome barriers: Provision, Access, Promotion (PAP)

Provision:

- Programming sessions for use by different user groups (e.g. sessions for wheelchair sports)
- Providing appropriate activity options for the demands of specific user groups (e.g. different age groups want different options)
- Planning of times to suit different user groups (e.g. for parents with young children, midmorning after the school run)

Access:

- Access to facilities (e.g. provision of transport in rural areas, ramps for wheelchair access to buildings)
- Access to equipment (e.g. a hoist for swimming pool access) - sensible pricing/concessions (e.g. reduction of charges for unemployed people or young children)

Promotion:

- Targeted promotion (e.g. by advertising in appropriate places to increase visibility to different user groups)
- Using role models to encourage participation among different user groups
- Initiatives aimed at promoting participation and inclusion (e.g. free swimming for under16s and over-60s)

Possible barriers which affect participation in sport

- Employment/time (e.g. not much free time available)
- Work restrictions and family commitments (e.g. women still seen as bringing up the family and not being involved in sport)
- Disposable in come (e.g. cannot afford cost of participation)
- Accessibility of facilities/equipment (e.g. transport not available, no disabled access)
- Lack of role models (e.g. few ethnic role models, few female role models)
- Provision of activities (e.g. limited activities on offer which do not meet the requirements of the participant)
- Awareness of activity provision (e.g. what is currently available)
- Portrayal of gender issues by the media (e.g. mainly male sports shown on TV, mainly male presenters of sport programmes)

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Factors that affect the popularity of a sport: MS RAPPERS
Make sure you are able to give a n example of all

Spectatorship

The more people are viewing sports will increase participation rates of those sports

Media coverage

Some sports channels show sport 24/7, this increases participation in the sports that the media show

Participation

More people participate in sports that have widespread mass participation

Provision

Provision varies in the UK. People cannot participate with little or no provision or access to facilities

Environment

Weather in the UK can impact upon participation rates. There is a lack of snow in the UK for skiing

Roles models

Positive Roles models increase participation in the sport. A lack of role models has a negative impact

Acceptability

Many people believe boxing should be banned as it's dangerous

Success for teams

Sporting success inspires people to take part in the sports such as GB cycling

Why PED's are taken:

- Pressure to succeed as individual
- Pressure to succeed as a Nation
- Improved performance
- Improved strength/stamina or power
- Improved recovery time
- Increased ability to train
- To mask pain/ to relieve pain
- To lose weight
- Beliefs that other are taking drugs

Values promoted through sport:

- Team spirit
- Fair play
- Citizenship
- Tolerance and respect
- Inclusion
- National pride
- Excellence

The Olympic Values:
(FRED ICE)
The Olympic Values are:

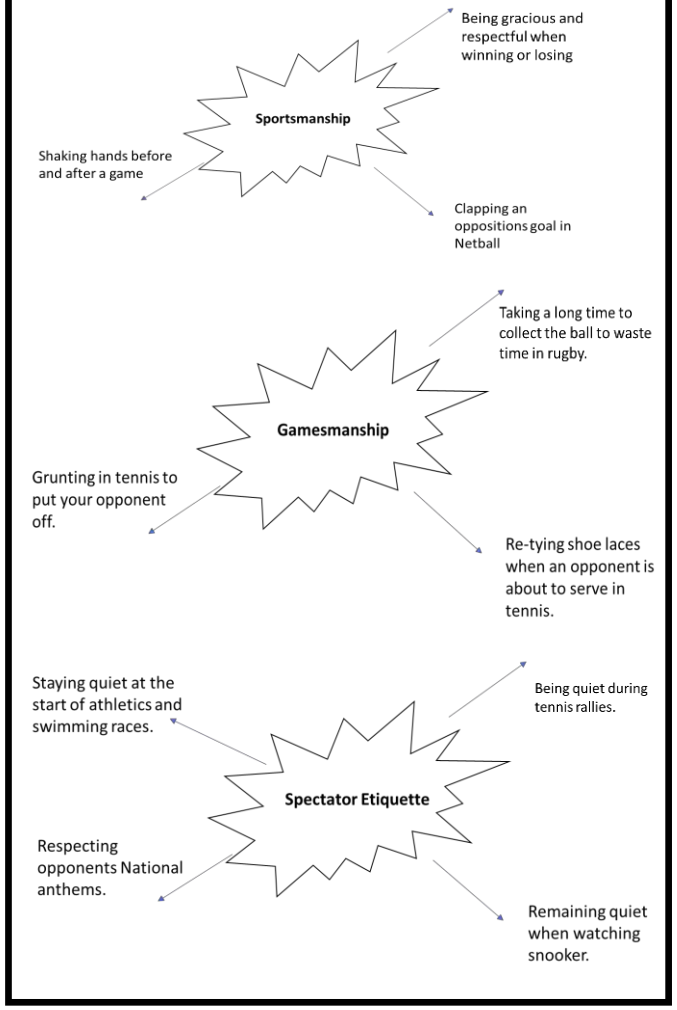
- Friendship
- Respect
- Excellence

The Paralympic values are:

- Determination
- Inspiration
- Courage
- Equality

The Olympic symbol of five interlocking rings is designed to represent :
The five continents that take part

Etiquette and Sporting Behaviour: Sportsmanship, Gamesmanship & Spectator Etiquette



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Lance Armstrong – EPO is a type of blood doping that can help improve endurance.

Maria Sharapova - Meldonium –Increase blood flow to the heart, shortening recovery time.

Nesta Carter – Stimulant-They are used by athletes to reduce tiredness and fatigue, and to increase alertness, competitiveness and aggressiveness

Justin Gatlin – Anabolic Steroids- stimulate muscle tissue to grow and "bulk up" in response to training by mimicking the effect of naturally produced testosterone on the body

Dr Richard Freeman (Team Sky & British Cycling)– Ordered testosterone gels

Reasons for taking drugs:

- Pressure to succeed as individual
- Pressure to succeed as a Nation
- Improved performance
- Improved strength/stamina or power
- Improved recovery time
- Increased ability to train
- To mask pain/ to relieve pain
- To lose weight
- Beliefs that other are taking drugs

Reasons against taking drugs:

- Can lead to health problems.
- Can damage kidneys and liver.
- Potential dangerous side effects.
- It is cheating.
- Can become addictive.
- Athlete feels that they can't win without them.
- Dishonest – spectators feel cheated.

Drug Testing:

What is the whereabouts rule from WADA?

WADA need to know where you are at all times, if you leave the country / move house / change training facility you must inform them!

How does the rule work?

All athletes must make themselves available to drug testers for one hour a day between 6 AM and 11PM

The rule is important as you could be called at any time, you will be given a time to attend and you must attend, failure to attend could result in a ban.

Key words:

Annually – Happen every year – Champion League Final, Wimbledon

Biennially – Every second year – Ryder Cup golf event that alternates between Europe and the United States. Events that take place every 4 years the Olympics.

Regular – Happens often at set intervals – E.g. annually or biennially

Recurring – Periodically repeated in the same place – E.g. Formula 1 Grand Prix / Wimbledon.

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Coursework Development

Review Practical Performance :

- **Review strengths and weaknesses**
  - Level of ability
  - Why skills are strengths/weaknesses
  - Type of skill
  - When these skills are important in the chosen sport
  - How they will impact on your performance or during training

- **Methods to improve**
  - Progressive practices/drills
  - Different types of practice, fixed/variable/whole or part practice
  - Could play with more or against better players

- **Measuring Improvement**
  - Video analysis
  - Activity tracker
  - Monitoring competition results over a period of time

Types of skills:

Open Skills:
An open skill is usually affected by the environment as this is something that can be ever changing, this meaning that how the skill is performed will have to be adapted when performing it.

Closed Skills:
Closed skills are skills that are predictable in a stable environment where it doesn't change.

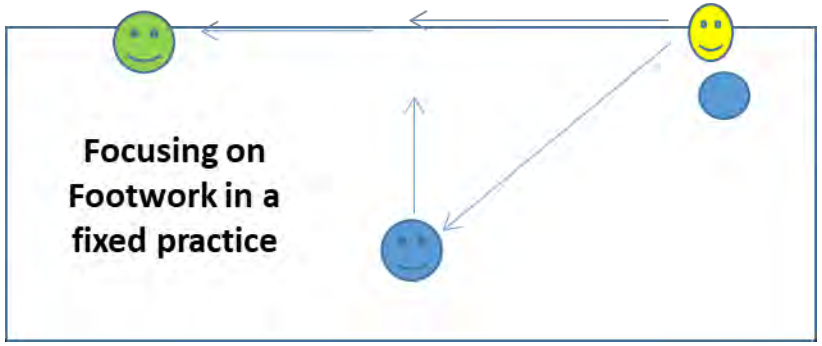
Simple/basic skills:
Simple skills are those that don't require much processing or thinking about. The skill will only have a small number of parts.

Complex Skills
Complex skills are those that are made up of sub-routines and require lot of decisions to be made.

Year 11 CNAT Sport Summer Knowledge Organiser

There are 4 types of practices that will support your weaknesses when creating drills;

1. **WHOLE** – The whole skill is performed at once (e.g. triple jump)
2. **PART** - The skill is broken down into parts which are practised separately (e.g. front landing in trampolining)
3. **VARIABLE** – The skill is practised in the range of different situations that could be experienced in a performance (e.g. short corners in Football)
4. **FIXED** – Specific skill or technique is repeatedly practised in the same way.



Travel & Tourism

Component 3 – The Scale of the Travel and Tourism Industry / Factors affecting the travel and tourism

C1 Importance of the UK as a global destination

Tourist numbers – world ranking, tourist arrivals, main generating areas.

Economic importance – value of inbound tourism, tourism receipts and employment, contribution of tourism to UK balance of payments and gross domestic product (GDP), the UK's role in international tourism.

C2 Employment in travel and tourism

Direct employment in travel and tourism: transport principles, transport hubs and gateways, tour operators, travel agents, visitor attractions, accommodation, trade associations and regulatory bodies, information and promotional services.

Indirect employment in organisations that support travel and tourism: insurance companies, brochure and website content researchers and maintenance, suppliers for retail, catering and hospitality, souvenir shops and manufacturers, travel journalism.

Roles: customer-facing (telephone and web -based roles), support or administration, graduate programmes or trainees, managerial and supervisory.

C3 Visitor numbers

Visitor numbers by type of tourism – Inbound, outbound, domestic, business, VFR, day trips.

Visitor numbers by other factors – type of transport, country of origin or destination, accommodation type, region or city visited, by types of activities carried out.

Trends: growth areas of origin and destination, changing purpose of visit, transport type used, length of stay, increase and decline in popularity of destinations, tourism types.

Define the term GDP

C4 Income and spending

Income and turnover – contribution to GDP (defined as the value of a country's economy), leakage (defined as tourist income that comes into a country but is not retained by that country), multiplier effect (defined as direct spending by tourists, which is circulated through the economy on indirect products and services), profit margins and commission levels.

Spending on – accommodation by type, food, drink, souvenirs by type, transport (local and arrival), entertainment, admission fees to attractions.

In its article, Love2Travel has included VisitBritain™ data, shown in Table 1 below.

The table is missing some data.

(b) Complete the table by filling in the **three** blank boxes.

3 marks

Table 1 – Inbound UK visits and spend in 2014

Purpose of travel to the UK	Visits in millions	Spend in £ billions	Nights stayed in millions	Average number of nights stayed per visit
Holiday	13.58	8.66	83.31	6.13
Business	8.28	5.02	34.28	(1)
VFR	9.76	4.62	101.11	10.36
Study	(1)	1.71	27.14	43.21
Other	2.13	1.70	18.73	8.79
Total	34.38	21.71	(1)	

(Source: adapted from http://www.visitbritain.org/nation-region-country-data#sthash.XOAQNBXW.dpuf)

The data in Table 1 is produced and used by the travel and tourism sector information and promotional service providers.

(c) Explain how **one** other travel and tourism sector could use this data.

2 marks

Component 3 – The Scale of the Travel and Tourism Industry / Factors affecting the travel and tourism

D1 Product development and innovati

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