

The Trafalgar School at Downton

# Knowledge Organiser

Year 10: Terms 5 and 6



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Name.....House.....

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## Using a Knowledge Organiser well

### **What is a Knowledge Organiser?**

A Knowledge Organiser is a document that sets out the key information you need to understand, learn and memorise in each of the subjects you study this term.

### **Why do I have to carry my Knowledge Organiser around with me?**

Your teachers will want you to use your Knowledge Organisers in lessons. They are yours forever and you may want to annotate or highlight on them when your teacher talks about things in them. They will certainly be used in lessons when you have a cover teacher and you can use them whenever you find yourself with some spare time.

### **How should I use my Knowledge Organiser?**

You should use your Knowledge Organiser to learn this key information and commit it to memory. Your teachers will often quiz you on the information on the Knowledge Organiser in your lessons. The best way of using it is to use the look, cover, write, check method which you will have been introduced to in your Knowledge Organiser launch assemblies.

### **What do I do with my Knowledge Organiser at the end of the term?**

You don't have to carry your Knowledge Organiser around with you anymore but you should keep it somewhere safe where you can easily get it out and use it. Remember that the information on the Knowledge Organiser includes things you will need to remember for your GCSE exams, so your teachers will continue to quiz you on it.

### **Why is a Knowledge Organiser important?**

New GCSE specifications mean that students have to memorise more facts, equations, quotations and information than ever before and there are things you will learn right from the start of year 7 that you will need to know in year 11 when you sit your GCSE exams – the Knowledge Organiser helps you to identify the things that you need to try and commit to your long term memory and return to over and over again during your time at secondary school. There are also things that we think it is important you learn about and remember that might not be in a GCSE exam but represent useful knowledge for life.



# Learning the knowledge in the organiser

Your Knowledge Organiser is a vital document. It contains all the key things from your lessons that you will need to work on committing to your long-term memory.

The best method to use when you are working on memorising things from your Knowledge Organiser is to self-quiz, using the Trafalgar Revision Method, below:

Really read and understand	Read the information 3 or more times and ask for help in understanding
Reduce the knowledge	Rewrite the information, making revision cards or mind maps
Remember	Reread and test that you can remember
Repeat	Repeat the process above until you can recall the information quickly and accurately. Only at this point have you acquired the knowledge!



## How do I remember? Activating your memory

Students often say “I can’t remember” and the reason for this is that the information they are trying to remember and learn is not yet in their **long term memory**.

Your long term memory gets activated by repetition over a number of days. And so repeat the following process to embed knowledge in your long term memory.

<b>Look</b>	Read the information 3 or more times 
<b>Cover</b>	Now cover what you have just read up
<b>Write</b>	Now try and write down the information you have just read 
<b>Check</b>	Did you write down the information correctly? If you made mistakes, correct them with a different colour pen and repeat daily until you “just know it”.



### Methods to include:

Here you will find some challenges – these are skills that we would like you to include.

These will be colour coded and, if you click on them, they will take you to another slide explaining the technique and giving you some examples.

Every Week B, you will have a FWC ppt loaded to your google classroom. Your homework is to ensure that you practise the skills/methods ready for your writing lesson in Week A.

Here you will find an image. Sometimes, the image will be to illustrate or contextualise your task. For some tasks, the image will be part of the writing challenge.

### Don't forget to plan writing!

Here you will find information to help you during your writing session. There will be prompts so you do not forget the important things – full stops, capital letters, paragraphs etc

## Homophones



- ❖ there: I'd love to go **there**.  
their: Is that **their** cat?  
they're (they are): **They're** late.
- ❖ to: I'm going **to** work.  
too: I've had **too** much to eat!  
two: I have **two** hands.
- ❖ no: We have **no** chance.  
know: How do you **know** that?
- ❖ your: What's **your** name?  
you're (you are): **You're** not alone.
- ❖ new: She has a **new** phone.  
knew: I already **knew** that.
- ❖ which: **Which** colour do you like?  
witch: She was a wicked **witch**.
- ❖ of: Please have a piece **of** pie.  
off: Get **off** the grass!
- ❖ where: **Where** are you going?  
wear: What should I **wear**?  
were (was): **Were** you joking?
- ❖ our: I want **our** team to win!  
are: When are you home?
- ❖ here: Please come back **here**.
- ❖ hear: Can you **hear** the birds?



Use *lie* to indicate the act of reclining: I am tired just watching the dog *lie* in the warm sunlight.  
(to lie: lie(s), lay, lain, lying)

Use *lay* to indicate the placement of something: Please *lay* the paper on the table.  
(to lay: lay(s), laid, laid, laying)

### PROPER GRAMMAR



### IT SAVES LIVES.

with the apostrophe ↓	without the apostrophe ↓
<b>it's</b>	<b>its</b>
<b>Contraction of "it+is" or "it+has"</b>	<b>Possessive form of "it"</b>
It's great to see you. It's been fun. It's clear to see.	The tree dropped its leaves. The pencil lost its point. A robot recharged its battery.
<small>Zaner Writing Co.</small>	<small>Zaner Writing Company.com</small>

## Language Methods to Practise in your Fortnightly Writing Challenge

ALLITERATION:

You'll never put a better bit of butter on your knife

ANECDOTE:

Talking to his children about the dangers of running in the house, a dad might include an anecdote about falling and breaking his arm.

ANTITHESIS:

That's one small step for man, but a giant leap for mankind.

CHIASMUS:

'Let us never negotiate out of fear, but let us never fear to negotiate.'

EXPERTS:

'Group chat can often be a source of upset,' warned psychologist Dr Linda Pappadopolis.

EXTENDED METAPHOR:

*The Road Not Taken*, by Robert Frost, is one of the most famous examples of extended metaphor; in the poem, he compares life's journey to a forest path.

FORESHADOWING:

The witches in *Macbeth* are used to foreshadow that Macbeth is not innocent: 'Fair is foul and foul is fair', a line he echoes in his first appearance when he says 'so foul and fair a day I have not seen'.

IMPERATIVE VERBS:

Chill out! Do as I say! Don't eat the daisies! Please be quiet! Be quiet!

METAPHOR:

'The sun in the west was a drop of burning gold that slid near and nearer the sill of the world.'

MODAL VERB:

You must be home by midnight. You could be tired if you're any later. You should ring your uncle. E.g. mustn't, can, might, shouldn't, may, will

PATHETIC FALLACY

In *Macbeth*, the night the King is murdered 'has been unruly ... in th' air, strange screams of death .... Some say the Earth was feverous and did shake.'

SENSORY  
DESCRIPTION:

Wind swirled around the beach house, whistling loudly. **He felt the snowflakes melting on his skin, their liquid trickling down his neck, cold, wet, seeping into his clothes.**

SIMILE:

**Without warning, Lionel gave one of his tight little sneezes: it sounded like a bullet fired through a silencer.**

STATISTICS:

You have a 20% chance of surviving a 60mph crash if you don't wear a seatbelt!

SUPERLATIVE:

This is the worst day of my life but at least we're in the finest café in London.

ONOMATOPOEIA:

**The dog knocked over the vase with a crash!**

PERSONIFICATION:

**Dancing on the water, the sun shone endlessly.**

REPETITION:

'As my grandfather went, arm over arm, his heart making sour little shudders against his ribs, he kept listening for a sound, the sound of the tiger, the sound of anything but his own feet and lungs.'



**Use fronted adverbials:**

**Rather slowly**, (manner)  
**During the night**, (time/temporal)  
**Every minute or two**, (frequency)  
**At the end of the corridor**, (spatial)

**Just beyond the stairwell on his left**,  
he opened the door.

**Use a two and then three word sentence:**

It hurt. I was dying!

Snow fell. Flakes floated precariously.

**Use anaphora:**

**Now is the time** for action. **Now is the time**  
to take up arms. **Now is the time** to fight for  
your country.

**Use epiphora (epistrophe)**

I can't believe I was robbed. Everything is  
**gone**. My television and electronics are **gone**.  
The money I left on my nightstand is **gone**.

**Use a range of sentence structures:**

The spotted green frog jumped  
into the pond.  
**(simple)**

The spotted green frog jumped into the pond  
**and** he splashed water on me.  
**(compound – coordinating conjunction: for,  
and, nor, but,  
or, yet, so)**

The spotted green frog jumped into the pond  
**when** the hawk flew overhead.  
**(complex – subordinating conjunction: if,  
although, as, before, because, when, after,  
since, until, so that, while etc.)**

**When the hawk flew overhead**, the spotted  
green frog jumped  
into the pond.  
(subordinate/dependent clause start)

The frog, **which had been lurking  
underwater**, jumped on the lily pad.  
**(embedded clause)**

**Use a past participle - 'ed' start:**  
**Glazed** with barbecue sauce, the rack of ribs  
lay nestled next to a pile  
of sweet coleslaw.

**Use a present participle - 'ing' start:**  
**Whistling** to himself, he walked down the  
road.

**Use anadiplosis (yoked sentence):**

Building the new motorway would be  
**disastrous, disastrous** because many houses  
would need to be destroyed.

'Fear leads to **anger**. **Anger** leads to **hate**.  
**Hate** leads to suffering.'  
Yoda, *Star Wars*.

Use a tricolon (tripartite list):

'I stand here today **humbled** by the task  
before us, **grateful** for the trust you have  
bestowed, **mindful** of the sacrifices borne by  
our ancestors.'

Snap! Crackle! Pop! **(Rice Krispies slogan)**

**Use a conditional sentence:**

When people smoke cigarettes, their health  
suffers.

If I had cleaned the house, I could have gone  
to the cinema.

**Use paired adjectives to describe a noun:**

Take a look at this **bright red** spider.

Luckily, it isn't a **wild, dangerous** one.

**Use different sentence types:**  
The wind is blowing. **(declarative)**

Put your pen down. **(imperative)**

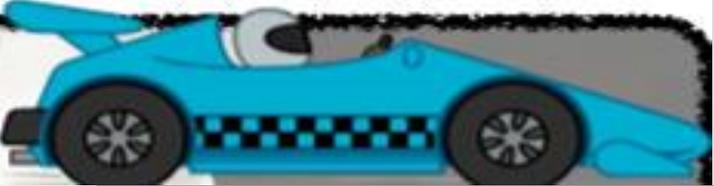
Who do you trust most in the world?  
**(interrogative)**

Pollution is killing us! **(exclamation)**

**Use discourse markers to begin paragraphs  
and start/link some sentences:**

First of all, To begin with, Firstly,  
Therefore, Consequently, Hence, As a result,  
Furthermore, In addition, Additionally,  
Moreover,  
Meanwhile, Later that day, Seconds later,  
Subsequently, That afternoon,  
On the whole, Interestingly, Basically, In  
short, Broadly speaking,  
Alternatively, Conversely, Similarly, On the  
other hand, Despite this, Likewise, However,  
To conclude, Finally, In conclusion, Eventually,  
In the end,

# PUNCTUATION PIT STOP



## Full Stop

Full stops are used to:

- 1) mark the end of a sentence.



Carefully, he kicked the ball into the goal.

- 2) show when a word has been abbreviated.

Saint Peter's Road is on the High Street.  
→ St Peter's Road is on the High Street.

## COMMAS

Commas are used to separate:

- 1) items in a list.

Bert, Ernie and Elmo are my three pet rats.

- 2) dependent clauses and phrases.

While I was in the bath, the cat scratched at the door. That meant, because I was on my own in the house, I had to get out to let him in. Thankfully, I had a towel handy!

## Quotation Marks

Quotation marks show exact words that are spoken or written by someone.



'Don't be late!' shouted Mrs Smith

'I will be,' Molly said, and added, 'don't expect me before 11.'

Mrs Smith replied, 'What time?'

## Question Mark

Question marks are used at the end of direct questions instead of a full stop.

What is your favourite food?

How do you feel today?



An indirect question ends with a full stop, rather than a question mark:

I'd like to know what you've been doing all this time. I wonder what happened.

## Exclamation Mark

Exclamation marks express strong emotions: forcefulness, commands, excitement, anger, surprise etc.

Don't buy that car! Stop telling me what to do! I'm free! You're late! She actually won!

They're also used for most interjections:

'Hi! What's new?'

'Oh! When are you going?'

'Ouch! That hurt.'



## Semi-colon

Semi-colons are used to separate two sentences that are closely related:

It was winter; the snow was falling heavily.

They can also be used to separate items in a list made of longer phrases.

I have been to Newcastle, Carlisle, and York in the North; Bristol, Exeter, and Portsmouth in the South; and Cromer, Norwich, and Lincoln in the East.



## Colon

Colons are used to:

- 1) begin a list.

I have three pet rats: Bert, Ernie and Elmo.

- 2) indicate that what follows it is an explanation or elaboration of what precedes it.

Unfortunately, the weather forecast was wrong: it rained all day!



## Apostrophe

An apostrophe is used to show:

- 1) omission - where a letter or letters has been missed out.

does not → doesn't I am → I'm

- 2) possession - when some thing/one owns something.

Thankfully, they played Susan's game.  
Interesting, David's house does not have a garden, but Sarah's house does.



## Dash -

Dashes are used for parenthesis: a word or phrase inserted as an explanation or afterthought into a passage which is grammatically complete without it. E.g.

Last year, they roasted the winning brisket — the size of pillow — in a mighty clay oven.

Paul was scared — more scared than he'd ever been.

## Brackets

Brackets are used in pairs for parenthesis: a word or phrase inserted as an explanation or afterthought into a passage which is grammatically complete without it. E.g.

Andrew Jacklin (last year's losing finalist) is expected to win this heat.

Tigers are carnivores (meat eaters)!

## Ellipsis

Ellipsis is used to:

- 1) show a pause or hesitation in someone's speech or thought.

I don't know ... I'm not sure.

- 2) build tension or show that something is unfinished.

Looking up, Paul couldn't believe what he saw ...



# PUNCTUATION PIT STOP



## Writing the text for a leaflet

### Stay Safe and Sound Online

clear/apt/original title

### Manage your online reputation

subtitles

Anything that you upload, email or message could stay online forever. Therefore, before you post anything online, consider whether or not you would want your parents, teacher or a future employer seeing it. If the answer is no, don't post it! Your privacy is key here.

### Privacy Matters

effectively/fluently sequenced paragraphs

Make sure you set high privacy settings on social networks. Regularly you should change passwords and never share or put online any of your personal details like a phone number, address or your school details. Make sure your safety and privacy settings are activated on your mobile devices too, so you aren't sharing private information. Be aware that using public WiFi might not filter inappropriate content, so look for friendly WiFi symbols when you're out and about.

....

### Remember:

- make sure you know how to block abusive comments and report worrying content;
- don't arrange to meet people in real life that you've only talked to online;

bullet points

## Journey Description

Sitting in my seat – aisle, two rows from the front – I look out. Illuminating a town engulfed in darkness, lights flash past me: shop lights, street lights, car lights, and as the clouds part just enough for the moon to penetrate through the smog, moonlight!

Inside it's silent. No one speaks. The bus windows shut, lulled by the rocking motion, side-to-side, back-and-forth, up-and-down, my eyes feel heavy. Outside, I'm mesmerised by the noise I can only see, only imagine: mouths asking, replying, laughing, traffic screeching, angry drivers honking, shop doors opening and closing.

Once more the bus door opens and, as if I've lifted my head out from underwater, I can hear the street bustle, smell the takeaways, taste the diesel fumes.

## Dystopian Narrative:

### The Machine Stops by E.M. Forster

Above her, beneath her, and around her, the Machine hummed eternally; she did not notice the noise, for she had been born with it in her ears. The earth, carrying her, hummed as it sped through silence, turning her now to the invisible sun, now to the invisible stars. She awoke and made the room light.

"Kuno!"

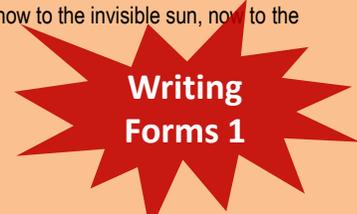
"I will not talk to you," he answered, "until you visit me."

"Have you been on the surface of the earth since we spoke last?"

His image faded.

Again she consulted the book. She became very nervous and lay back in her chair palpitating. She directed the chair to the wall, and pressed an unfamiliar button. The wall swung apart slowly. Through the opening she saw a tunnel that curved slightly, so that its goal was not visible. Should she go to see her son, this would be the beginning of the journey.

Of course she knew all about the communication-system. There was nothing mysterious in it. She would summon a car and it would fly with her down the tunnel until it reached the lift that communicated with the air-ship station: the system had been in use for many, many years, long before the universal establishment of the Machine. Those funny old days, when men went for change of air instead of changing the air in their rooms! And yet — she was frightened of the tunnel: she had not seen it since her last child was born.



spatial discourse markers

adjectives

## Description of Place

Green limbs tangled above the decaying shells of long-abandoned vehicles, forming a canopy that barely permitted the harsh rays of the sun to burn through. The stealthy fingers of squat oak trees reached out tenaciously towards them. The vehicles themselves were coated in a thick layer of green moss, their copper - and were battered and bruised through years of exposure to the elements.

Like a queue of taxi cabs, the vehicles waited patiently in the forgotten depths of the forest. Specks of light from the midday sun, which had successfully fought their way through the overhead canopy, lit up their broken bodies. Their trunks rained open wearily and their shattered eye sockets stared blindly forward.

The aroma of rust and decay occupied the clearing: it was choking, corrosive. No fresh breeze could infiltrate the thick shrubbery to provide relief. The cars lay there, suffocating on their own putrid stench. It was overpowering. Meanwhile, the squawks of blackbirds echoed like sirens around the clearing. The chilling sound was relentless. It echoed through the car's hollow bodies, feeling its way through the cracks in windows and doors, stroking the upholstery of the rotting seat as it passed.

Spread over the floor of the clearing, a thick blanket of autumn leaves hid the earth beneath. They had turned a shade of burnt red and had bleached edges that resembled torn parchment. They were brittle and cracked from the heat of the clearing. Amongst them, all manner of insects scuttled- manoeuvring themselves between moments of shade, before the unforgiving rays of sun could scorch their exposed bodies.

Metaphor, simile, personification

sensory description

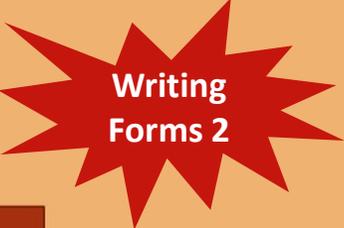
sensory description

spatial discourse markers

sensory description

adjectives

**Writing a formal letter**



**writer's address**  
35 Hibiscus Crescent  
Andover  
Hants  
SP10 3WE

**reader's address**  
221B Bakers Street  
London  
NW1 6XE

**date**  
20<sup>th</sup> February, 2020

**Formal Salutation: Sir/Madam/Mr Roderick/Mrs Roderick**  
Dear Sir or Madam

I am writing because you chair a committee in charge of the compulsory wearing of school uniforms. I am a student at Brinsley High School, a friendly and successful school where uniforms are not worn.

Of course, ... that students won't spend all morning choosing what to wear or beg parents for clothes that will impress ... there is another side to this case: uniforms breed uniformity. We are a culturally diverse nation and if we all dress the same, this encourages us to be the same. At Brinsley High, we are encouraged to express our individuality, yet this seems to be in contradiction of the message enforced uniform sends us.

Furthermore, ...  
Yours faithfully  
**Sherlock Holmes**

**fluently sequenced paragraphs**

**formal sign off: Yours faithfully (Sir/Madam = Faithfully) (Mr/Mrs = Sincerely)**

**Text for a Speech**

**'Address to Nation on the Challenger' by Ronald Reagan (28<sup>th</sup> January, 1986)**

Ladies and Gentlemen, I'd planned to speak to you tonight to report on the state of the Union, but the events of earlier today have led me to change those plans. Today is a day for mourning and remembering. Nancy and I are pained to the core by the tragedy of the shuttle Challenger. We know we share this pain with all of the people of our country. This is truly a national loss.

**a clear address to an audience**

For the families of the seven, we cannot bear, as you do, the full impact of this tragedy. But we feel the loss, and we're thinking about you so very much. Your loved ones were daring and brave, and they had that special grace, that special spirit that says, 'Give me a challenge and I'll meet it with joy.' They had a hunger to explore the universe and discover its truths. They wished to serve, and they did. They served all of us.

**rhetorical indicators that an audience is being addressed throughout**

The crew of the space shuttle Challenger honoured us by the manner in which they lived their lives. We will never forget them, nor the last time we saw them, this morning, as they prepared for the journey and waved goodbye and 'slipped the surly bonds of earth' to 'touch the face of God.'

**a clear sign off e.g. 'Thank you for listening'.**

Thank you.

**Article**

**Andy Murray's Appliance of Science**  
By Jim White

**If the Caledonian superman wins Wimbledon this year, it will be thanks to pieces of sushi a day, a magic potion and a battalion of experts.**

If you want to know what it is about Andy Murray that makes him stand out from the rest of us – apart from that fizzing backhand return and the huge-mouthed celebratory yodel – it is summed up in one word: science!

**Sample Check**  
Today, before he even steps out on to the Centre Court for his Wimbledon semi-final, the huge-hitting Pole Jerzy Janowicz, Murray will have been subject to several of these. He does a urine sample every time he pops to the lavatory. The osmolarity check is conducted by one of his staff, its purpose to gauge the percentage of water and minerals in his urine, to show whether his body is correctly hydrated. The fact is, if Murray wins today, it may be thanks to the bloke who inspects his wee.

**Daily Diet**  
At 7.30 this morning, while many of the 100 arriving at Wimbledon's press restaurant will have begun their day assaulting the glittering Himalaya of fried starch, Murray will have eaten yogurt, fruit and a bagel smeared in peanut butter ...

**clear/apt/original title**

**by-line**

**strapline**

**sub-headings**

**introductory (overview) paragraph**

**fluently sequenced paragraphs**

**Writing in the Essay Form**

**clear title**

**Zoos Should be Banned**

**effective introduction**

In America, approximately 175 million people visit a zoo each year. That's half of America's population. Clearly this suggests that zoos remain popular places for people to visit for entertainment and to learn about wild animals. However, although some people are of the opinion that zoos can provide a source of educational entertainment and a sanctuary for endangered animals, I believe that the cruelty that animals suffer outweighs this benefit, and that they should be shut down!

**effectively/fluently linked paragraphs to sequence a range of ideas**

On the surface, zoos are a huge tourist attraction because they allow families to spend a day out in the sun, looking at animals, and eating overpriced junk food. But what most people don't know is that zoos are far more sinister than selling small bottles of water for £5.00. Statistics show that in all zoos, fifteen percent of animals die every year due to living in captivity. Obviously then, zoos must be an unsuitable environment for wild animals and should, therefore, be abolished. How can zoos justify their existence by claiming animals in captivity provide people with the experience of observing wildlife they wouldn't otherwise experience, when it costs at a cost to their life?

**a range of ideas (no room to reproduce the other two paragraphs here)**

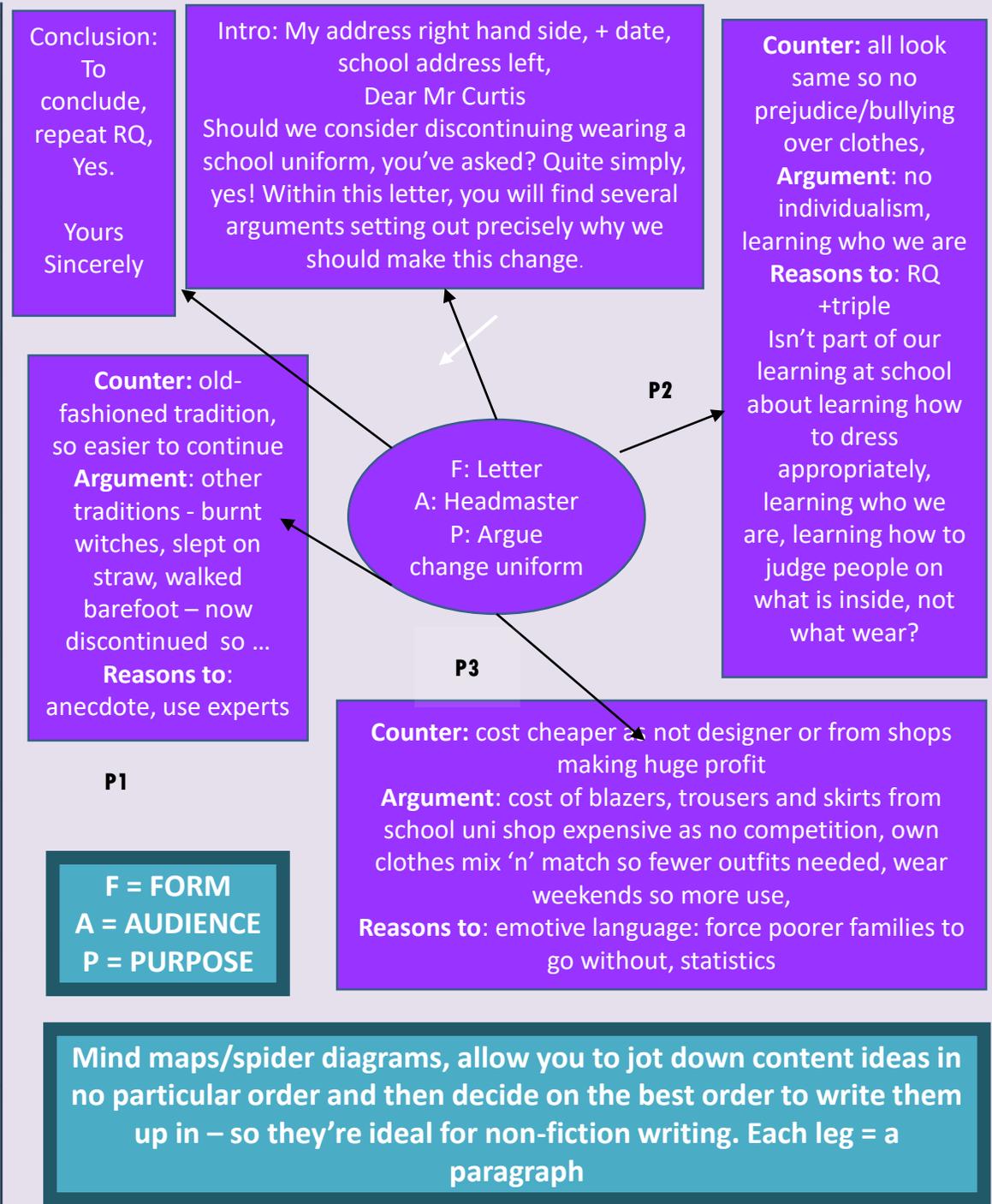
In conclusion, a zoos only purpose is to make as much money as possible by showing thousands of people per day to gawk at animals and spend far too much money on souvenirs and junk food. Zoos do not protect or help to repopulate animals, nor do they educate people on the specifics of these animals, and therefore should be abolished.

**convincing conclusion**

**BEST FOR PLANNING NARRATIVES (STORIES).**



**HOW TO PREPARE AND PLAN EFFECTIVELY**



Best for planning descriptions from a picture: **Boxing/framing** sections of a picture forces you to focus your description on specific areas within the image, zooming in on specific detail and then out again to focus on another area. Each boxed area = a paragraph

**1** introduction: Here you will find everything you need to know about buying a goldfish. Follow this advice to

**2** First of all, research fish needs and best fish breeds for starters

**3** Next, decide where to put ... bedroom could be best habitat for your fish because ... However, it might be better to ...

**4** After this, it's back to the research. Make a list of ... Don't ... Do ...

Linear flow and vertical charts are useful for planning writing that has to follow a step-by-step process. Each section/shape = a paragraph.

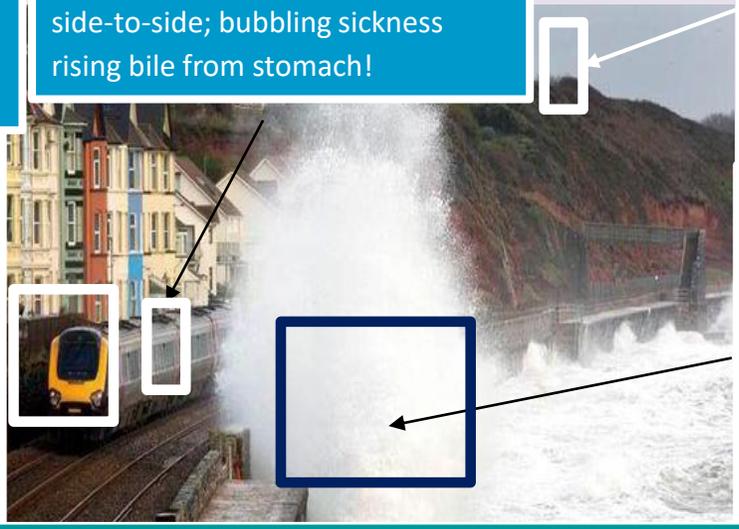
The Grid Plan is good for making sure you include lots of different methods, or to compare two/more things side-by-side. Each row/column = a paragraph.

houses, Like soldiers standing to attention they are defending their inhabitants. Diff pastel colours of a seaside town: prawn pink, salmon peach, oyster grey, seaweed green, cracking paintwork

zoom in on one carriage window, motion sick. Windows hit by spray that 'like a tamed cat' has 'turned savage' today. Passenger pitched side-to-side; bubbling sickness rising bile from stomach!

canopy of sky above threatening Adjectives for mood: grey sky, stuffed clouds full of cold, sharp rain, Verb: beating down, attacking,

train victim moving across railway line past houses towards destination - personify - victim, alliteration, metaphor: A caterpillar, the train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, eating away at it, killing it. Rattles. Will it survive?



waves engulfing and devouring the sea side town - noisy and disruptive, onomatopoeia crash, whip, smash personify so violent/threatening movement

Paragraph content/topic	Language method/vocab	Sent struc	Punc
1: waves engulfing and devouring the sea side town - noisy and disruptive, movement	onomatopoeia crash, whip, smash personify so violent/threatening	'ing' start verbs (pres part)	! ;
2: train victim moving across railway line past houses towards destination	personify - victim, alliteration, metaphor: A caterpillar, the train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, eating away at it, killing it. Rattles. Will it survive?	Chain/tricolon Question	? - -
3: zoom in on one carriage window, motion sick	Windows hit by spray that 'like a tamed cat' has 'turned savage' today. Passenger pitched side-to-side; bubbling sickness rising bile from stomach!	Anadiplosis (yoked)	' ' ; !
4: houses	Like soldiers standing to attention they are defending their inhabitants. Diff pastel colours of a seaside town: prawn pink, salmon peach, oyster grey, seaweed green, cracking paintwork	Fronted spatial adverbials	( ) :
5: canopy of sky above threatening	Adjectives for mood: grey sky, stuffed clouds full of cold, sharp rain, Verb: beating down, attacking.	Two then three word sentences	... ;

## Language Methods

**Alliteration:** a number of words having the same first letter or sound placed close together.

**Allusion:** reference to a person, place thing, or idea of historical, cultural or literary significance.

**Assonance:** the repetition of vowel sounds.

**Consonance:** the repetition of consonant sounds.

**Colloquial language:** informal, creating a conversational tone.

**Imagery:** vivid and descriptive language that engages the human senses, making us imagine a sight, sound, touch, smell or taste.

**Irony:** language that says one thing, but implies the opposite e.g. sarcasm.

**Lexical choice:** the decision a writer has made about which particular word/s to use.

**Metaphor:** a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable but suggests a comparison.

**Pathetic fallacy:** the environment is described to reflect the inner experience/emotion of a narrator or character.

**Personification:** figure of speech in which a non human thing/idea/animal is given human attributes

**Plosive:**(harsh sounding) consonant which, when said in certain words, momentarily blocks the vocal tract, so released as burst of air e.g. 'c' in 'cat', but not in 'nice'.

**Semantic field:** group of words all related to one another through their similar meanings, theme, concept or subject.

**Sibilance:** words close together that contain sibilants (consonants which, as said in certain words, tongue is brought near roof of mouth so air pushed past making a hissing sound: s, z, sh, th, c).

**Simile:** a comparison between two unlike things which are similar in one aspect, introduced by 'like' or 'as'.

**Tone:** (mood) the writer's attitude to the subject they're describing.

## Structural Methods

**Anaphora:** repeating a word/sequence of words at the beginning of neighbouring clauses.

**Caesura:** a rhythmical pause in a poetic line or sentence, usually signalled with punctuation, either medial (middle of line), initial (start of line), or terminal (end of line).

**Cyclical structure:** (circular) coming full circle by repeating something from beginning, at end.

**Contrast:** opposite feelings, concepts etc.

**End stopped:** a line of poetry ending in a piece of punctuation which results in a pause.

**Enjambment:** a sentence/phrase that runs on from the end of one line, into the next line/stanza without punctuation (pause).

**Epistrophe:** repeating a word/sequence of words at the end of neighbouring clauses.

**Foreshadow:** a hint of what is to come.

**In medias res:** begin in the middle of something.

**Juxtaposition:** contrasting things placed next to each other.

**Quatrain:** four line stanza.

**Sestet:** six line stanza.

**Stanza:** (verse) a group of lines in a poem.

**Volta:** turning point in the line of thought/argument in a poem.

## Form

**Blank verse:** poem in iambic pentameter, but no rhyme.

**Dramatic monologue:** poem written in the form of a speech of a single individual character, in a specific situation, at a critical moment.

**Free verse:** non-rhyming, non-rhythmical poetry which follows the rhythms of natural speech.

**Speaker:** the narrator, voice, or person in the poem.

**Sonnet:** poem of 14 lines, typically five-foot iambics rhyming according to a prescribed scheme. The Petrarchan sonnet treats its theme in two parts: first eight lines state problem/question/emotional tension (*abbaabba*), last six lines (*cdecde* or *cdccdc* or *cdedce*) resolve it; English sonnet: three quatrains, each having an independent rhyme scheme (*abab cdcd, efef, gg*), and ended with a rhymed couplet.

**Rhyming couplet:** a pair of rhyming lines next to each other.

**Meter:** pattern of beats (stressed/unstressed syllables) in a poem used to create a poem's rhythm.

## Discourse Markers to Compare

### When poems have similarities:

Similarly, ... Both poems convey/address ... Both poets explore/present ... This idea is also explored in ... In a similar way, ... Likewise, ...

### When poems have differences:

Although ... However, ... whereas ... Whilst ... In contrast, ... Conversely, ... On the other hand, ... Unlike...

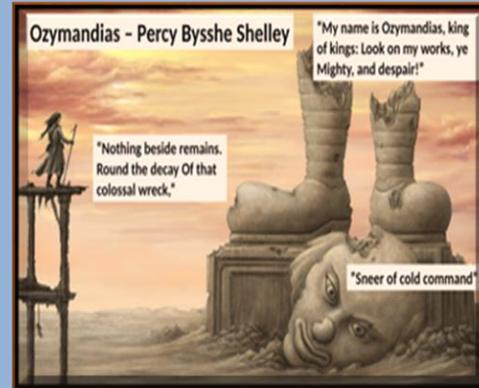
## Discourse Markers to Analyse

In ... presents, In other words ... This suggests ..., This implies ..., Here ... is suggesting /implying ... It is almost as if ..., Or perhaps ... Possibly ... chose to ... because ...

## 'Ozymandias' by Percy Bysshe Shelley (1817)

Tone: ironic (mocking)

**Summary:** Narrator meets a traveller who tells him about a decayed statue he saw in a desert. Statue is of long forgotten ancient King, the arrogant **Ozymandias**. Poem is ironic and one big metaphor: Ozymandias had inscribed on his huge statue that other 'Mighty' kings would never outdo him in his work, but now lays crumbled in empty desert - so even most powerful humans can't defeat nature's power - human power is only temporary.



**Context:** Shelley Romantic poet (emphasis on **power** and beauty of nature). Personal contempt of monarchy/oppressive rulers. Ozymandias, Egyptian Pharaoh (aka King Ramesses II, 13BC) tyrant, thought himself indestructible, filled Egypt's Valley of Kings with monuments to himself and had one huge statue inscribed '**...king of kings: Look ...**', boasting empire he'd built would last forever. Shelley inspired by 1817 discovery and excavation of statue's remains.

**Language:** Alliterating with plosives - '**cold command**' = emphasises power, cruelty; '**Look on my works, ye Mighty, and despair!**': imperative and exclamation highlights commanding tone of boast; ironic he tells 'Mighty' kings to admire size of his statue and 'despair', when now it's a '**shattered**', '**trunkless**', '**decay**' - so all powerful should despair as influence and supremacy only temporary; alliteration in '**lone and levels sands stretch far away**' (sand icon of time) emphasises huge, immortal desert outlasts statue - so insignificance of human power.

**Form/structure:** Written in sonnet form (14 lines, iambic pentameter) - mostly used for love poetry (arrogance/ self love) but uses an irregular rhyme scheme - perhaps reflecting how, like statue, human structures (art, literature, architecture) can be destroyed, decay.

## 'London' by William Blake (1794)

Tone: angry, disapproving

**Summary:** Speaker describes walk around London offering glimpse of terrible conditions faced by inhabitants: child labour, prostitution, restrictive property laws. He's maddened by sights and sounds of poverty, misery, despair everywhere - not even hope for new-born infants. He criticises how every aspect of life in London owned/controlled, even river, implying powerful wealthy (landowners, Church, Government, monarchy) to blame for the poverty/inequality.



**Context:** Blake lived and worked in capital so writing from his experience of effect conditions having on people. Industrial Revolution taken its toll on citizens who now felt tired, sad and disconnected, lived in degrading conditions in London, but more than anything, poem is fierce critique of man's failure to build a society based on love, joy, freedom, communion with God.

**Language:** Metaphor '**mind-forged manacles**' - people trapped in poverty but 'forged' = formed/constructed, suggesting they're powerlessness a belief constructed by those in power to control them, now trapped by own perception of their limits in life; 'forged' = also means forgery, so perhaps wants London poor to see fake so could challenge and be free. Repetition '**In every..**' to emphasise amount affected and '**each chartered street/ ...chartered Thames**' to emphasise everything owned by rich, criticising the powerful; emotive language '**infant's cry of fear**'. '**Every black'ning church appals**' - church inactive, unwilling to help/corrupted.

**Form and Structure:** Blake divides poem into four quatrains (four line stanzas) employing a regular rhyme scheme of ABAB for each. When read makes poem sound rhythmic, and visually look regulated and controlled - might be Blake trying to reproduce sense of narrator's steady walk through London (*abab* = left, right, left, right), OR enhance feeling of restriction and control the working class of London are under: links to idea of control expressed in poem.

## 'Stealing the Boat' by William Wordsworth

Tone: confident -> fearful-> reflective

**Summary:** Written as a flashback to time Wordsworth, as young boy, found boat tied up **'One summer evening'**, stole it, rowed across lake, at first calm, confident, admires beauty. Suddenly huge mountain looms into view; size and seeming power scares him (theft guilt?), so rows quickly back to shore. Haunted by event, he reflects on how it's changed him: now aware of power nature has with its **'huge and mighty forms, that do not live like living men'**. Nature not just pretty/idyllic images, we should respect its remarkable power.



**Context:** Written 1799 when 29, published 1850 shortly after his death as part of 'The Prelude', a very long poem (14 books) that told story of his life. He loved nature, and was a romantic poet, so his poetry typically explores themes of nature, human emotion, and way human identity and character shaped by experience.

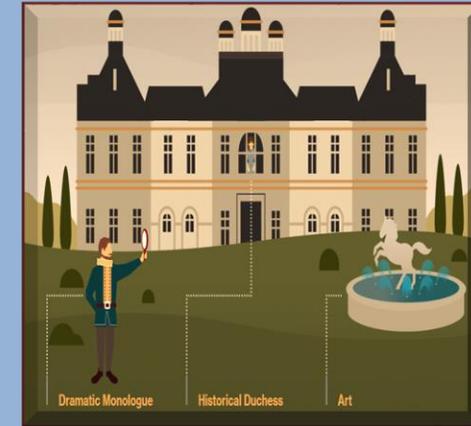
**Language:** Nature personified **'...(led by her)'** to show his love for it; semantic field/lexical' choices suggesting magical beauty: **'glittering', 'sparkling', 'elfin pinnacle'** = elfin/fairy boat: (metaphor) so used to juxtapose with **'huge peak, black and huge'** - repetition 'huge' emphasises size, nature's physical power, threat, all in contrast with manmade small boat; **'Upreared its head'** - personifying mountain as powerful beast with a **'measured motion like a living thing'** unrushed, purposeful, complete control, all direct contrast with speaker.

**Form and Structure:** Wordsworth writes extract in one stanza with three distinct sections: CONFIDENT - in first, tone light, carefree - **'I dipped my oars into the silent lake'**; FEAR - he uses a volta line 21/22 to introduce change as mountain appears, tone becomes more fearful - **'with trembling oars'**; final section REFLECTION, Line 33 onwards, tone pensive as speaker dwells on how experience has changed him - **'o'er my thoughts there hung a darkness'**.

## 'My Last Duchess' by Robert Browning (1842)

Tone: sinister, bitter, angry

**Summary:** The Duke (speaker) is showing a marriage broker (on behalf of a count) around his art collection, proudly revealing (curtained) a portrait (painted by fictional famous artist) of last wife, now dead. He reveals he was annoyed by her over-friendly, flirtatious behaviour, and put a stop to it (murder?). Taking the broker downstairs, he shows off bronze statue **'Neptune, ...Taming a sea-horse'** he'd commissioned by another (fictional) famous artist.



**Context:** Browning best known for dramatic monologue form, many expressing his criticisms of social norms. Possibly inspired by story of Italian Duke of Ferrara: wife died suspiciously (rumour poisoned). Neptune is Roman God of sea, controlled water.

**Language:** Rhetorical questions to imply the Duke is completely in control/controlling the envoy; **'I gave commands; Then all smiles stopped together'** = euphemism for his wife's murder + words with plosives help reader hear Duke's power and cruelty + 'commands' sounds military, not familial or kind + sibilants/alliterating with an 's' perhaps to help reader hear his mocking, nasty, threatening tone – like hissing snake or vicious cat. **'Notice Neptune ... Taming a sea-horse'** sculpture, symbolic/image of domination/control.

**Form and Structure:** Dramatic monologue ideal form to show Duke egocentric, arrogant, domineering – as complete focus on speaker! Cyclical structure brings poem full circle as at start reference to famous (imaginary) artist/artwork (showing off wealth and power), and does same at end, foreshadowing destiny of next wife OR he will never change his ways.

## 'Charge of the Light Brigade' by Alfred, Lord Tennyson (1854)

Tone: energetic, tragic, haunting

**Summary:** Tells story of when, obeying a miscommunicated command, a British light cavalry of 600+ soldiers on horseback bravely charged into long valley surrounded by enemy firing cannons from three sides (for half a league: one and a half miles).



**Context:** Published six weeks after the disastrous battle of Balaclava, Crimean War. Light cavalry are armed with lances and sabres, mounted, intended for reconnaissance and skirmishing only; mistakenly sent into valley, on a frontal assault, against heavy artillery! Of 670 - 673 British who started charge, two thirds killed, injured or captured. As Poet Laureate, ALT responsibility to inspire nation, portray war in positive light (propaganda). Although glorifies soldiers as heroes for willingness to sacrifice themselves without questioning orders, he also highlights fact (a commander) '**Someone had blunder'd**' - a controversial point to make in Victorian times when blind devotion to power expected.

**Language:** Uses biblical allusion '**Valley of Death**' ('though I walk through the valley of the shadow of death, I will fear no evil' - Psalm 23) suggests inevitability of outcome - they were doomed but patriotically/dutifully did as ordered, and portrays war as a supremely powerful, or even spiritual, experience. Personifies war '**jaws of Death**' and '**mouth of Hell**' - as an evil animal/monster that consumes its victims.

**Form and Structure:** Chronological order six stanzas (possibly one stanza to represent each hundred of the soldiers). Repetition of '**the six hundred**' at the end of stanzas 1-3 to remind us of number of soldiers, and greater impact and emphasis when phrase changes: 'not' in stanza 4 and 'left of' in stanza 5 focuses us on lives lost; addition of 'Noble' in last line leaves focus on the men and their bravery: emphasises huge loss.

## 'Exposure' by Wilfred Owen (1917)

Tone: tragic, haunting, trance-like

**Summary:** Speaker describes war as a battle against the weather and conditions that are as lethal as the enemy. He uses imagery reflecting the delusional mind of a man dying from hypothermia. Owen wanted to draw attention to the suffering, monotony and futility of war.



**Context:** Owen wrote poem from first-hand experience of extremely cold winter of 1917 in the trenches of WW1, after he and fellow soldiers had been forced to lie outside in freezing conditions for two days. There are signs the men suffering from Hypothermia: sluggish thinking, confusion, and amnesia. Image Owen painted of the horrors of war and life on the front line would have contradicted previous scenes of war glory portrayed in British press.

**Language:** Weather presented as enemy in '**merciless iced east winds that knife us**' - uses lots of words in line containing sibilants such as 'c', and 's', combined with plosives 'd' and 't' to create a bitter, cutting edge to the elements which '**knife**' the men, leaving us in no doubt about level of pain weather has power to inflict; personifies weather - the flakes '**with lingering stealth come feeling for our faces**', the miserable '**Dawn massing**' with '**her**' army, the gusts of wind that are '**mad**', and '**tugging on the wire**', but '**nonchalant**', suggesting, like the enemy, indifferent to the soldiers' suffering, and makes the pain and discomfort it inflicts appear intentional. Metaphor '**Our brains ache**' = mental (PTSD/shell shock/hypothermia) suffering.

**Form and Structure:** Owen creates sense of stasis by using a cyclical structure as ends first and last stanza with same line: '**But nothing happens**' - perhaps to reflect powerlessness to escape harsh weather OR frustrating monotony of trench life: unable to gain ground against Germans.

**'Bayonet Charge' by Ted Hughes (published 1957)**

**Tone: bewildered, desperate, trance-like**

**Summary:** Describes terrifying experience of 'going over the top' as soldier runs towards enemy with fixed bayonet. He becomes disorientated, pauses for a split-second, notices a hare thrashing about, dying, resumes charge. Shows how this type of warfare transforms soldier from a living, thinking person into dangerous weapon of war or machine.



**Context:** Set in WW1 (father served and survived the battle of Gallipoli - a doomed mission - so would have described details of trench warfare to him). Bayonet charges common part of warfare in WW1 and resulted in heavy casualties.

**Language:** Hughes personifies bullets, patriotism, 'rifle' - 'numb as a smashed arm', dynamite etc. linking them to body parts, humanising the weaponry, dehumanising soldier, possibly to suggest blurring of line between weapon and man in a warfare strategy such as a charge, and emphasising how, in it, soldiers are used as the weapons - not treated as human beings. 'The patriotic tear that brimmed in his eye/ Sweating like molten iron' = his sense of duty (tear) now turned into hot sweat of fear + pain. Simile comparing heat of sweat to 'molten iron' - extreme heat - suggests heroic ideals he had now replaced by extremely painful reality. Uses simile 'his foot hung like statuary in midstride' implying immobilised with fear/bewilderment.

**Form and Structure:** Starts in medias res, perhaps to convey shock soldier feels, sense he really has just 'Suddenly ... awoke' to reality of what he's doing OR convey the pace of charge and speed of soldier's thoughts + actions over short time it will take to reach end/enemy!

**"Storm on the Island" by Seamus Heaney (1966)**

**Tone: dark, violent, fearful**

**Summary:** Narrator describes how a rural island community is well-prepared for a coming storm but when it hits, they are shocked by its power: its violent sights and sounds are described using the metaphor of war. Final line of poem reveals their fear of nature's power.



**Context:** First eight letters of the poem's title spell 'Stormont' - name of Northern Ireland's parliament buildings, so perhaps poem metaphor for political storm that was building in the country at the time poem published (1968-98, a period of deep unrest and violence between those who wanted to remain part of UK and those who wanted to become part of Ireland).

**Language:** Lexical choices/semantic field of words associated with war to show mother nature's dangerous and unsentimental side - 'wind dives and strafes invisibly' (wind a fighter plane) and 'Exploding' we associate with bombs, minefields, and grenades - to suggest mother nature capable of being war-like, not gentle, sentimental or comforting. Simile 'spits like a tame cat turned savage' compares nature to an animal that has turned on its owner; lexical choices/semantic field associated with violence to show mother nature's ugly, aggressive side and her omnipotence: 'pummel' means to beat, strike, thump or bash - and what is more violent or aggressive than a beating? It shows wind's power and dominance over man and so its danger!

**Form and Structure:** Poem in one stanza, perhaps to represent the island itself, on its own, in the middle of the sea (space around it), with nothing to protect it, vulnerable to all that nature wishes to expose it to. Poem in the **present tense**, creating and involving the reader in the sense of drama - as if the storm is happening at the time we're reading the poem - and also reinforcing the idea that the storm is continuous and unstoppable.

**'Poppies' by Jane Weir (published 2005)**

**Tone: tender, tragic, trance-like**

**Summary:** Poem describes loss parent feels when son leaves home (join army/go to war, potentially killed). Explores emotional implications of last goodbye as mother feels sad, lonely, scared, so who's really the brave one? As leaves, she smartens his uniform, remembers doing same to school one. After gone (home/life) she goes to place that reminds her of him, to find trace of him. Poem about suffering of those closest to fallen soldier.



**Context:** Weir asked by poet laureate, CAD, to write modern war poem for 21<sup>st</sup> century war poetry collection as way of expressing suffering and grief caused by British soldiers dying in Iraq and Afghanistan, so she wrote 'Poppies' from a mother's perspective and as sons not in army, thought of Susan Owen's (mother of WW1 poet, Wilfred Owen) possible feelings.

**Language:** Metaphor '**blackthorns of your hair**' possibly alluding to Jesus who, according to Christian belief, wore crown of thorns when he was crucified, hinting that in order to save country, son might have to sacrifice own life! Metaphor - stomach is a piece of material being sewn together into various complicated folds of '**tucks, darts, pleats**' = the amassing pain the mother is experiencing through loss of her son as he departs for war, or as casualty of war. Metaphor '**I listened, hoping to hear your playground voice catching on the wind**' shows longing for dead son. Adjective used in line '**I was brave ...**', usually more familiar to describe soldiers so lexical choice emphasises different casualty in conflict: loved one.

**Form and Structure: Cyclical structure** - Weir starts and ends poem with references to a churchyard and the loss war causes opening with comment about poppies on 'individual' graves, reminding us of individual suffering, then focuses on mother's personal suffering, but ends with reference to a 'war memorial' – a monument commemorating all killed in war, making point about the scale of loss during war, and/OR cyclical – never-ending loss in war.

**'Remains' by Simon Armitage (published 2008)**

**Tone: tragic, haunting, anecdotal**

**Summary:** Speaker describes shooting a looter dead in Iraq and how it has affected him on his return from war, and the mental suffering that persists long after the physical conflict is over.



**Context:** Armitage's poems often 'dark' and focus on concerns about how people are affected by violence (used to be a probation officer); poem inspired by testimony of Guardsman Rob Tromans, who fought in Basra, Iraq, in 2003. Poem contains signs speaker may be suffering from some symptoms associated with PTSD: reliving – flashbacks/hallucinations/nightmares, anger, difficulty sleeping/concentrating, guilt.

**Language:** Repetition throughout mainly to reflect way memory of killing is repeated in the speaker's mind '**week after week**'. Graphic imagery: the round '**rips through his life**' and then one them '**tosses his guts back in his body**'. Metaphor '**blood-shadow**' comparing looter's left-over blood to a shadow: like a shadow, the speaker/soldier cannot remove this memory as it's always there; '**his bloody life in my bloody hands**' – alludes to 'Macbeth' – (Macbeth: warrior with PTSD, Lady Macbeth: bloody hands with guilt).

**Form and Structure:** Monologue told in the present tense to convey a flashback (a symptom of PTSD). Begins *in medias res*: implies one of a number of similar events and emphasises how easy for soldiers in conflict to become anaesthetised to violence they're expected to witness and perform; however, clear volta beginning of fifth stanza - soldier's tone, thoughts and emotions are changed by guilt haunting him day and night, suggesting desensitisation short-lived for soldiers, and after-pain never-ending.

**'Tissue' by Imtiaz Dharker (published 2006)**

**Tone:** thoughtful, gentle, uncertain

**Summary:** Speaker considers paper (holy books, maps, grocery receipts) as a metaphor of human life: like human life, paper powerful as has power to 'alter things', record/give details of things, it's important; speaker highlights paradox (conflict - contradiction), despite its power, it's fragile/vulnerable as paper documentation will not stand the test of time. In the final two stanzas, speaker links paper to human tissue: although also fragile and temporary, human tissue (person's life/reputation/significance) will outlast paper records we make of it.



**Context:** Koran or Qur'an - holy book for Muslims - how to live a good, rewarding life in obedience to the commandments of Allah in this life, and to gain salvation in the next.

**Dharker often writes poems about the important value of things that may at first seem to be trivial, taken for granted, or easily lost or destroyed.**

**Language:** Extended metaphor paper = life and way we live it (record); semantic field of words associated with vulnerability (lack of power): **'thinned', 'well-used', 'turned transparent', 'drift', 'fall', 'shift'** emphasising fragility of paper/life/paper records of life. Paper (life) fragile as it is at the mercy of greater forces: **simile 'might fly our lives like paper kites'** - could be lost, susceptible to elements.

**Form/structure:** Short stanzas build poem up in layers, reflecting idea in poem tissue (paper) and so human life, is built in layers. Very short single line stanza at end so stands out to focus reader on **'your'** (their) own **'living tissue'** – or perhaps she's addressing a child, reminding us, like paper, living tissue is transient (temporary), becomes **'transparent'** (aged) but is the family history (the skin: tissue/paper) we pass on from generation to generation so outlasts paper records of it – therefore has more of an influence on our identity.

**'War Photographer' by Carol Ann Duffy (published 1985)**

**Tone:** pained, detached, angry

**Summary:** A war photographer is just home in 'Rural England' developing latest photos from foreign war zone: as develops, begins to remember the brutality and horrors of war for all concerned, which leads him to consider indifference of those who might view the photos in newspapers and magazines, living in comfort, unaffected by war. At the end of the poem, he is returning to the/another warzone.



**Context:** reference made to 'napalm girl' picture (terrified children, including Kim Phuc, run from aerial napalm attack as South Vietnamese plane accidentally dropped its flaming napalm on South Vietnamese troops and civilians, 8<sup>th</sup> June, 1972) **an iconic Pulitzer Prize-winning war photograph taken by Nick Ut.** Ut says he knew, immediately he pressed the button, picture would stop the war (caused America to withdraw troops/funding). Duffy friends with two war photographers and seems to suggest such pictures don't affect us like this any more.

**Language:** Recalls sickening 'Napalm girl' image **'running children in a nightmare heat'** – to suggest danger war poses to the innocent. Metaphor **'blood stained into a foreign dust'** – lasting impact of war. Noun **'agonies'** to suggest extreme pain and suffering – and the plural form to emphasise not just one agony but a **'hundred'**, so intense pain felt by many people (photographed) suffering because of a conflict/war.

**Form and Structure:** Cyclical structure emphasises never-ending number of wars people are victims of across world and/OR accentuates idea reader continually sees such images so become almost immune to them.

**'The Emigree' by Carol Rumens (published 1993)**

**Tone: mournful, defiant, nostalgic**

**Summary:** Speaker is adult living in exile looking back at city she spent childhood in but was forced to flee due to war. Despite negative news of city now, she still sees it in positive light as she's been **'branded by an impression of sunlight'** by it/of it.



**Context:** Not from personal experience; speaker never specifies the city, and so she could mean it to be any one of many places throughout history where people have had to go into exile because of a change of regime or natural disaster, such as Tehran, Damascus, Beirut, Baghdad, as is exploring general emigrant experience of nostalgic longing for home.

**Language:** Semantic field of words associated with conflict: **'tyrants', 'war', 'tanks'** etc. perhaps to suggest city might not be as perfect as her memories of it (power of memory/ conflict between memory and reality). Personification to describe city **'sick with tyrants'** and later it **'comes to'** her and **'lies down'**, and then takes her **'dancing'**; she then protects it as it **'hides behind'** her, emphasise power of speaker's love, and later yearning, for place she remembers, or like a member of family, feels allegiance towards it. Verb **'branded'** metaphorical suggesting nothing can remove positive view of city OR like branded cattle part of identity.

**Form and Structure:** Repeats last line of each stanza **'sunlight'** reinforcing overriding positivity (idealised) of the city even though that is in conflict with reports (power of memory).

**'Kamikaze' by Beatrice Garland (published 2003)**

**Tone: sorrowful, pitiful**

**Summary:** Poem explores a kamikaze pilot's failed mission. It includes an account from perspective of pilot's daughter, speculating to own children why their grandfather, half-way there, suddenly turned back, as he **'must have seen and thought'**, things that perhaps prompted him to remember his childhood, and choose life over certain death (and patriotic duty). Poem presents us with consequences of his choice, as everyone treats him as if he no longer exists.



**Context:** In WW2, Japanese Kamikaze pilots were used to destroy American warships by deliberately crashing into them; in Japan, suicide had long and honourable tradition dating back many centuries, and cowardice/surrender brought shame in wartime Japan: Kamikaze pilots who failed to complete mission, for whatever reason, were ostracised, held in contempt.

**Language:** Metaphor **'full of powerful incarnations'** implies pilot under some form of spell/ brainwashing forcing him to complete mission, so shows his immense mental strength/power of nature to help him overpower it and turn home. Metaphor **'dark shoals of fish flashing silver'** image links to a Samurai sword/plane/battleship – conveying conflict between his love for nature/life and his sense of duty. Colours used to describe nature **'silver', 'pearl-grey'** associated with precious, highlighting beauty, suggesting positive power of nature on man as stops suicide.

**Form and Structure:** Writing poem from perspective of pilot's daughter, not hearing pilot's voice at all, poet emphasises idea (conflict) that pilot's been cut off from society (not allowed a voice) and accentuates distance between him and daughter (family). Very little boundary punctuation (beginning capital and end full stop) perhaps to imply decision he made as his memories flowed, was impulsive, did not stop to think of consequences of returning from 'suicide mission'.

**'Checking Out Me History' by John Agard (published 2005)**

**Tone:** defiant, angry, cynical, rebellious

**Summary:** Speaker represents voice of a man from Caribbean colony of British Guiana, frustrated by history curriculum he was taught at school as little attention to black history, biased towards legendary whites and nursery rhyme characters. Speaker feels history is key to understanding your identity, and if you don't know your own history it's a kind of disability.



**Context:** Agard was himself born in the Caribbean in 1949 and moved to UK 1970s. Toussaint l'Ouverture led slaves to victory in Haitian revolution; Nanny de Maroon is Jamaican national heroine who fought against slavery; Mary Seacole was a Jamaican nurse in the Crimean war.

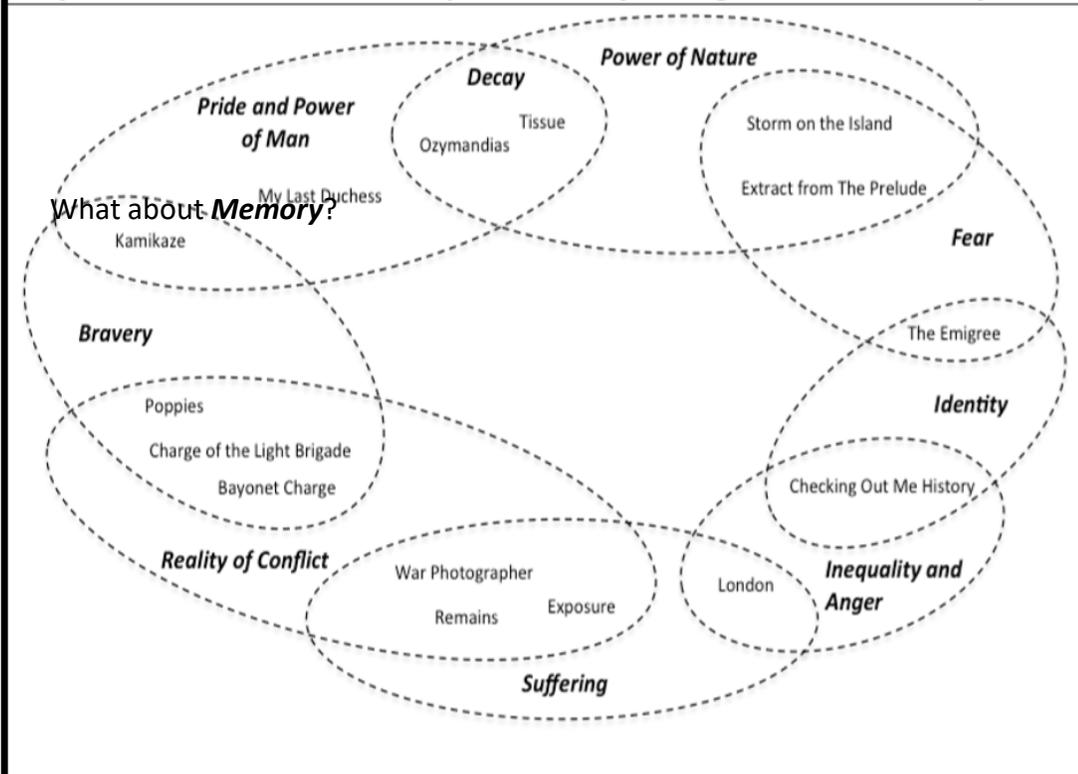
**Language:** Metaphors to do with deliberate removal of sight, **'Bandage up me eye with me own history'** and **'Blind me to me own identity'** to suggest purposely prevented from seeing own history/identity; verb **'Blind'** emphasises as disability, and implies longer term, so power of curriculum in his country to keep his true heritage hidden, disabled/restricted/hindered him from fully being/knowing who he really is. Contrasts simple, literal description of white legends he's been taught about, Dick had a **'cat'**, Florence had a **'lamp'**, with powerful imagery using light, for all three black legends he's discovered: **'beacon'**, **'fire'**, **'healing star'**, **'yellow sunrise'**, perhaps suggesting power to illuminate his identity, just as they lit up lives of others with their achievements.

**Form and Structure:** In dramatic monologue form, employing Creole to give floor entirely to voice of black man, angered/frustrated by a Eurocentric history syllabus. He organises parts of poem about British history in plain font, skips over them quickly, implies boring/not interesting him, but uses interesting/appealing font for black historical legends and goes into their impressive feats in detail, making them sound more exciting/appealing OR to give them more respect. Lack of punctuation could represent speaker's rejection of further rules (English punctuation) taught him!

Key Themes

Nature	❖ Powerful ❖ Beautiful ❖ Sublime ❖ Dangerous	Identity	▪ Complex ▪ Established ▪ Fluid ▪ Challenging
War	➤ Violent ➤ Disorientating ➤ Traumatic ➤ Glorious	Memory	✓ Changeable ✓ Unreliable ✓ Disturbing ✓ Temporary

**Key themes and connections: poems that you might choose to compare**

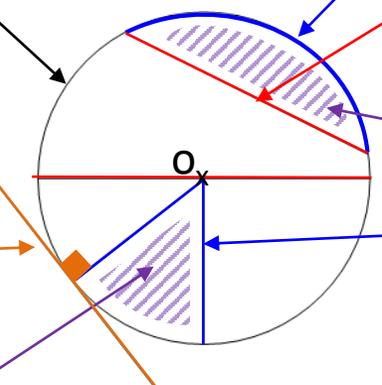


What do I need to be able to do?

- Know the vocabulary and definitions of features of a circle
- Understand properties of congruent and similar shapes
- Understand the properties needed to construct unique triangles : SSS, SAS, ASA RHS
- Construct standard ruler and compass constructions including:
- Perpendicular bisector
- Perpendicular from and to a point on a line
- Angle bisector
- Use constructions % properties of triangles to construct key angles: 30, 60 45 and 90
- Understand and solve loci problems
- Prove and apply circle theorems

### Features of a Circle

Hegarty : 592

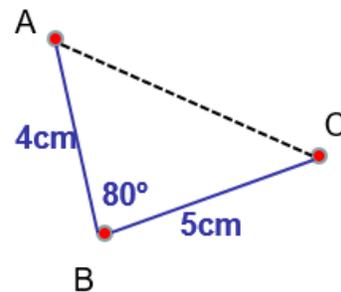
<b>Circumference</b> – outer edge (perimeter) of circle	<b>Centre</b> of the circle – usually labelled "O"	<b>Arc</b> – part of the circumference of the circle
<b>Semi-circle</b> – half a circle. Area bounded by diameter and arc		<b>Chord</b> – line crossing the circle from one part of the circumference to another
<b>Diameter</b> – a chord that passes through the centre		<b>Segment</b> – Area bounded by a chord and an arc
<b>Tangent</b> – Line touching circle that is 90° to the radius at that point (perpendicular to radius)	<b>Key Circle Formulae:</b> Circumference = $\pi \times \text{diameter}$ Area = $\pi \times \text{radius}^2$	<b>Radius</b> – line connecting the centre to the circumference 2 radii = 1 diameter
<b>Sector</b> – Area bounded by two radii and an arc (looks like a slice of pizza!)		<b>Quadrant</b> – sector that is a quarter of a circle (radii are at 90°)

### Constructing Unique Triangles

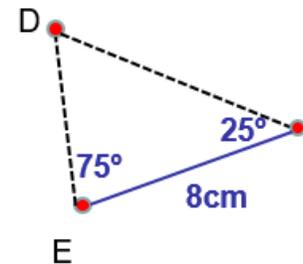
Hegarty : 683

We can always construct the same unique version of a triangle if we know....

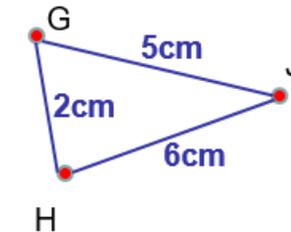
- 1) **Side Angle Side (SAS)** or **Angle Side Angle (ASA)** or **Side Side Side (SSS)** or **Right angle Hypotenuse Side (RHS)**



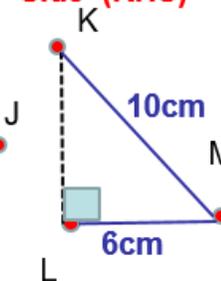
We are given: the length of two sides and the angle between



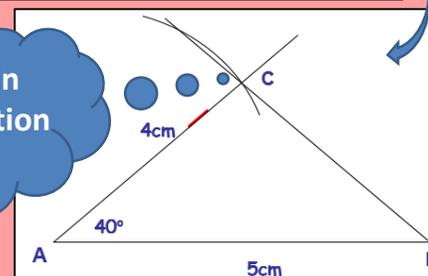
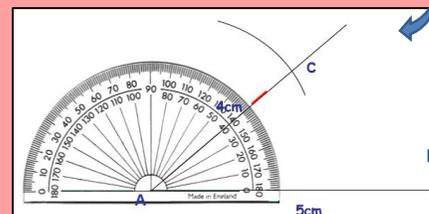
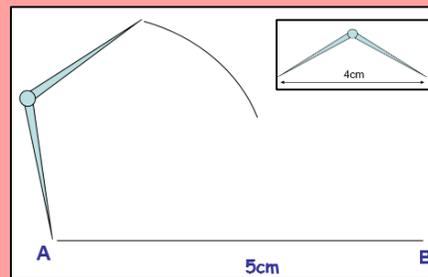
We are given: the size of two angles and the side between



We are given: the length of all three sides



(Pythagoras' Theorem means all 3 sides are known RHS → SSS)



Leave in construction lines

### Side, Angle, Side (SAS)

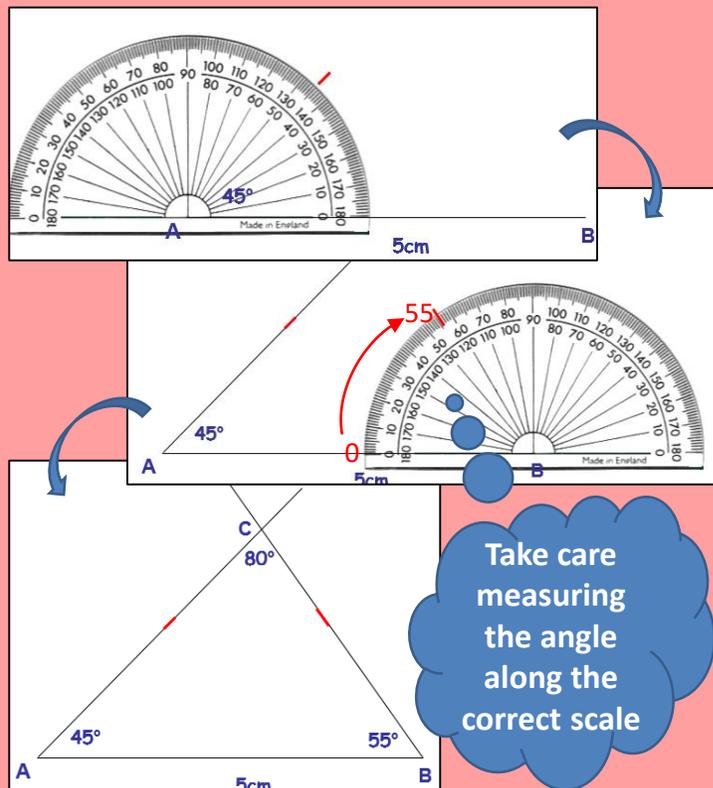
**Example 1: Construct triangle ABC with AB = 5cm, angle A=40° and AC = 4cm**

1. Draw a line 5cm long. Label it AB
2. Stretch your compass out to 4cm
3. Place the point on A and make a long arc above the line AB
4. Measure an angle of 40° at A
5. Draw a long line out from A Remember to write in the angle
6. Join the crossing point to B.
7. Label the point C Remember to mark the length of side AC

# Angle Side Angle (ASA)

**Example 2: Construct triangle ABC with AB side 5cm and angles A=45°, B=55°**

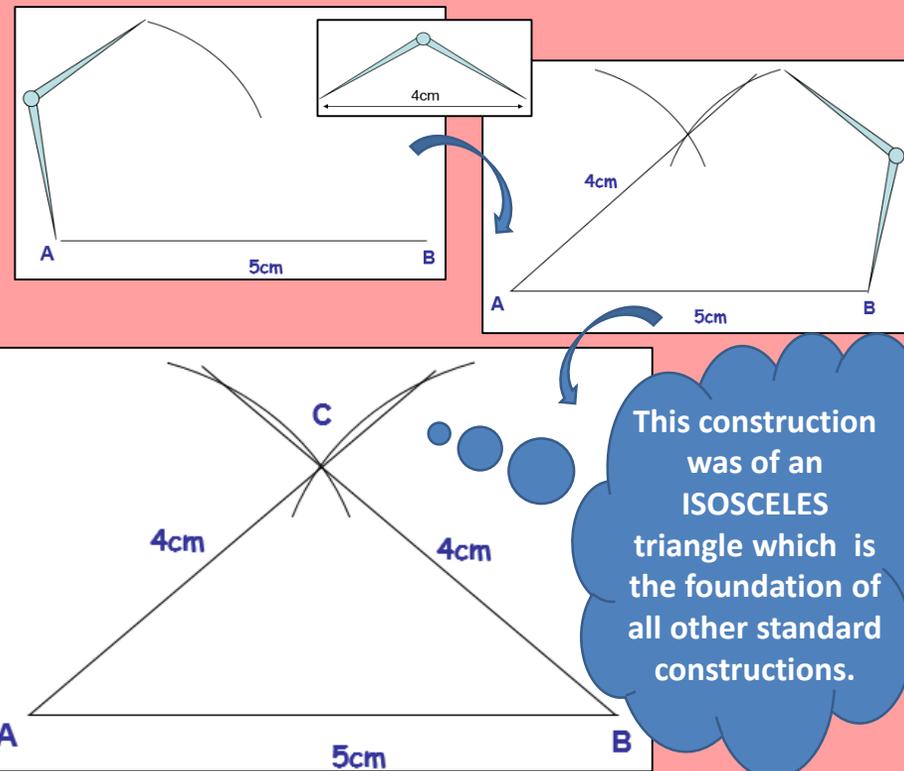
1. Draw a line 5cm long. Label it AB
2. Measure an angle of 45° at A
3. Draw a long line out from A  
Remember to write in the angle.
4. Measure an angle of 55° at B
5. Draw a long line out from B  
Remember to write in the angle
6. Label the crossing point C



# Side, Side, Side (SSS)

**Example 3: Construct triangle ABC with AB = 5cm, AC = 4cm and BC = 4cm**

1. Draw a line 5cm long. Label it AB
2. Stretch your compass out to 4cm
3. Place the point on A and make a long arc above the line AB
4. Check that your compass is (still) stretched to 4cm
5. Place the point on B and make a long arc above the line AB
6. Join the crossing point to A and B.
7. Label the point C. Remember to mark the length of sides AC and BC



# Isosceles Triangles

Being able to construct an isosceles triangle is really important for more advanced constructions...

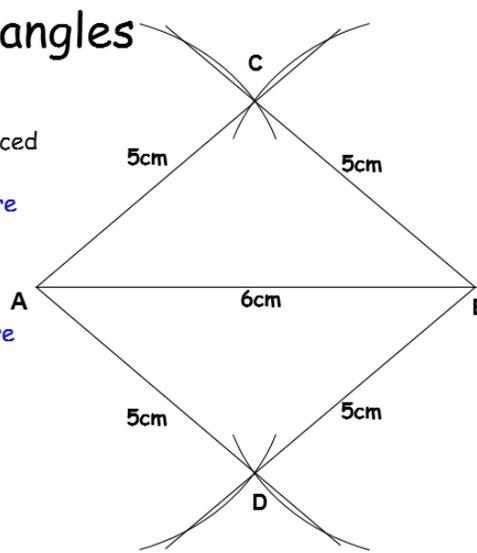
Q1: Construct  $\triangle ABC$  where

- $AB = 6\text{cm}$
- $AC = BC = 5\text{cm}$

Q2: Construct  $\triangle ABD$  - a reflection of  $\triangle ABC$  - where

- $AB$  is common; and
- $AD = BD = 5\text{cm}$

What shape is  $ACBD$ ?  
**Rhombus**



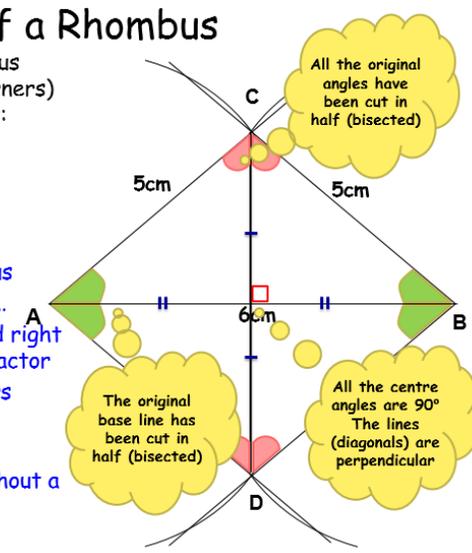
# Importance of a Rhombus

The diagonals of a rhombus (lines joining opposite corners) have some key properties:

- They are
- perpendicular
  - bisect each other
  - bisect each angle

So constructing a rhombus Means you can construct...

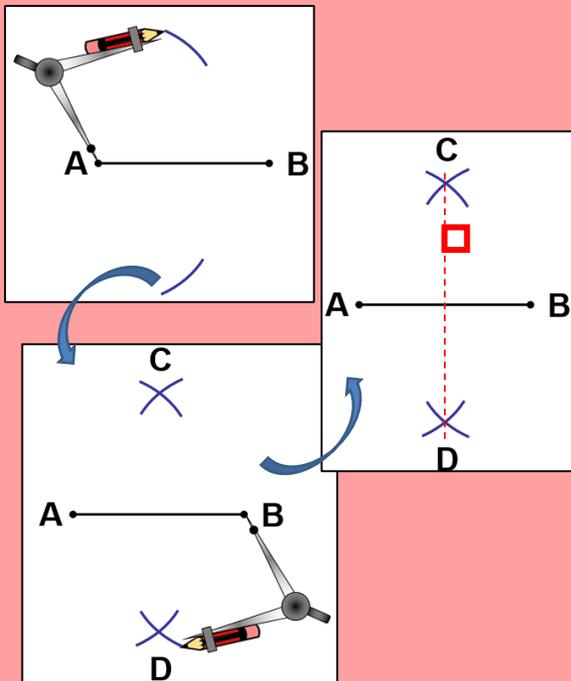
- Perpendicular lines and right angles without a protractor
- Perpendicular bisectors of a line
- Angle bisectors
- 45° and 30° angles without a protractor.



## Perpendicular Bisector

### Example 1: Construct a perpendicular bisector of line AB

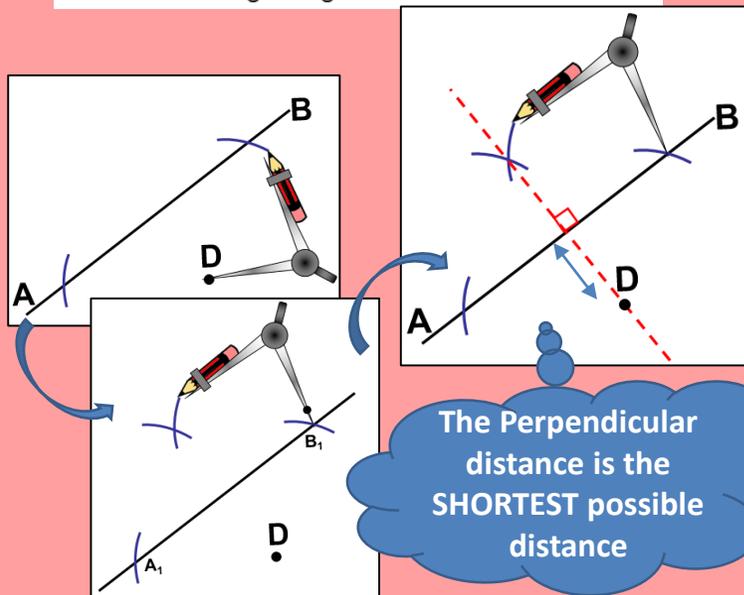
1. Stretch your compass out more than half the distance of AB  
(it is a good idea to measure what distance you use to ensure that you can keep it the same throughout)
2. Place the point on A and make a long arc above and below the line AB
3. Without changing the stretch of your compass, place the point on B and make a long arc above and below the line AB
4. Join the crossing points with a line crossing AB.
5. Label the right angle and equal lengths.



## Perpendicular from a point to a line

### Example 2: Construct a line from D that is perpendicular to line AB

1. Stretch your compass out more than the distance from D to AB  
(it is a good idea to measure what distance you use to ensure that you keep it the same throughout)
2. Place the point on D and make two arcs each cutting the line AB (or one long arc cutting the line AB twice) one nearer A ( $A_1$ ) and the other nearer B ( $B_1$ )
3. Without changing the stretch of your compass, place the point  $A_1$  make a long arc above AB
4. Repeat by making a long arc from point  $B_1$
5. Join the point where these two arcs cross to D with a line crossing AB.
6. Label the right angle

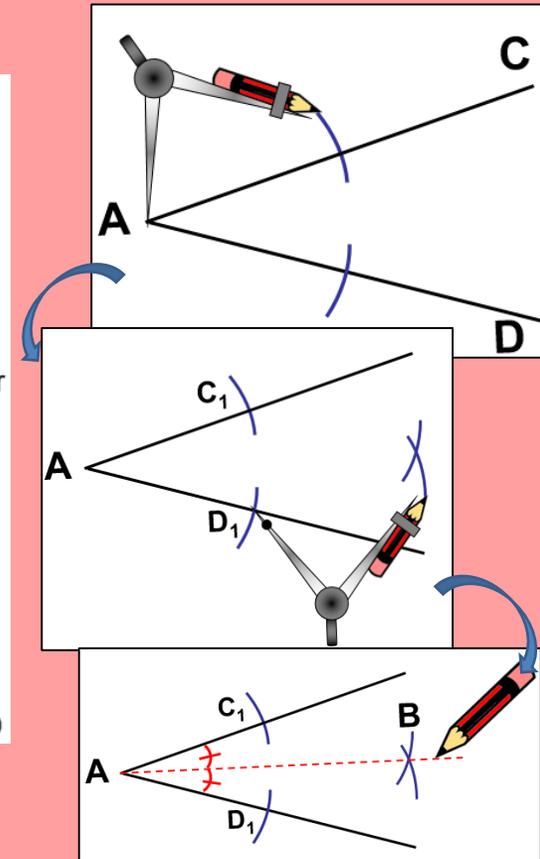


The Perpendicular distance is the **SHORTEST** possible distance

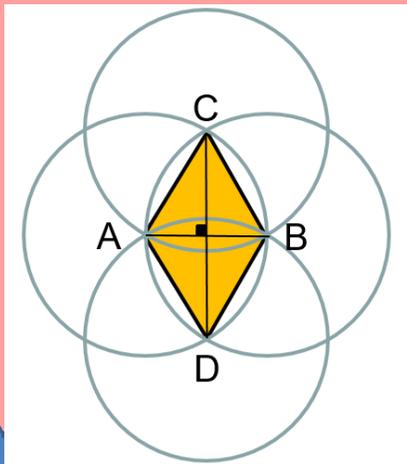
## Angle Bisector

### Example 3: Construct an angle bisector of the angle CAD

1. Stretch your compass out to a known distance (so you can keep the same distance throughout)
2. Place the point on A and make a long arc (or two short ones) one cutting the line AC (at  $C_1$ ) and the other cutting the line AD (at  $D_1$ )
3. Without changing the stretch of your compass, place the point  $C_1$  make an arc in the space between the lines AC and CD
4. Repeat by making an arc from point  $D_1$
5. Join the point (A) where these two arcs cross to B
6. Label the two equal angles created at  $\angle CAD$



Note: all the arcs drawn in these standard constructions are from of 4 overlapping circles which create a rhombus



Combining different constructions can create:  
 60° and 30° angle (construction of equilateral triangle and angle bisector)  
 90° and 45° angle (construction of perpendicular lines and angle bisector)  
 Parallel lines (combine perpendiculars from 2 points on a line) leading to rectangles

“Locus” is Latin for “place” or “position”  
Its plural is “LOCI”

In maths, LOCI problems involve rules determining the position or movement of points. LOCI scenarios which can be solved using **standard constructions**

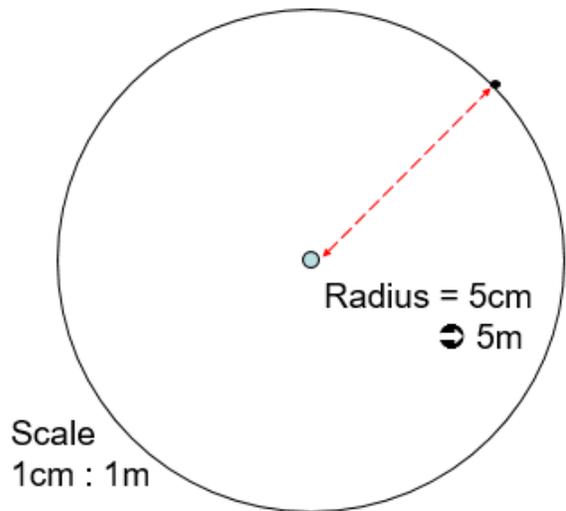
Hegarty : 674- 679

**Example 1:**

A goat is tethered by a 5m long rope. Show the area in which the goat can move.

**Construction Solution :**

Construct a circle of given radius



**Example 2:**

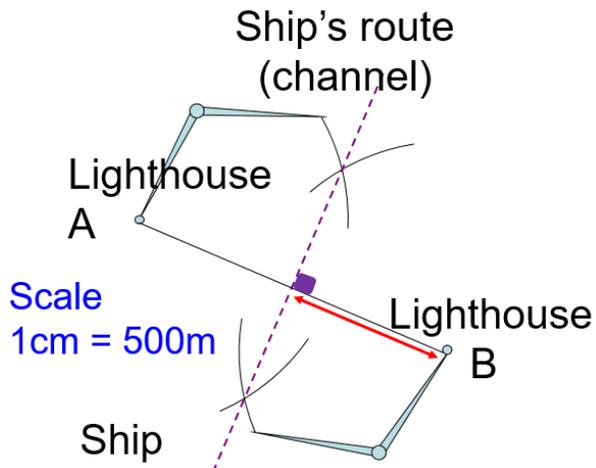
A and B are two lighthouses. Ships must pass an equal distance from both to have safe passage through the channel.

- (a) Show the channel.
- b) What is the closest that the Ship will be to the Lighthouse?



**Construction Solution :**

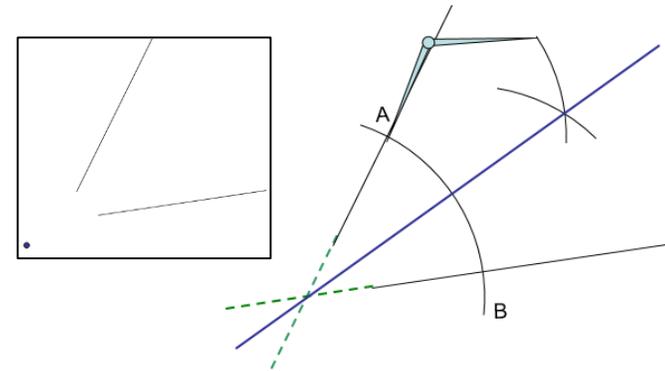
- a) Perpendicular Bisector of a line between two points
- b) Perpendicular distance from a point to a line



**Example 4:**

A Movie star doesn't want to disappoint his fans waiting at two barricades so decides he must walk an equal distance from each. Show the path he must follow.

**Construction Solution :**  
Angle bisector

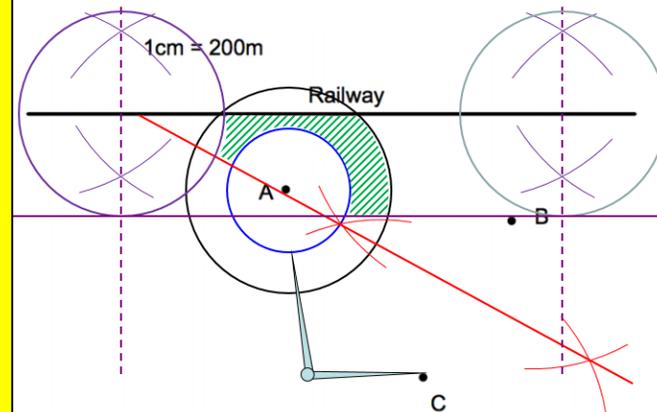


**Example 5:**

A phone box is located near 3 houses, A B and C.  
i) The phone box is less than 500m from the railway track  
ii) The phone box is between 300m and 500m from House A  
iii) The phone box is closer to house C than house B  
Shade the region on the map where the phone box could be.

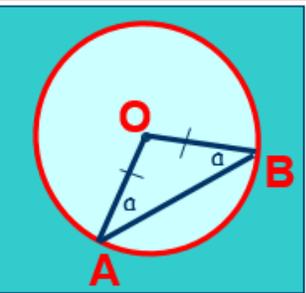
**Construction Solution**

- i) 2 perpendiculars and circles of given radius (5cm) to create parallel line
- ii) Circles of given radius (3cm & 5cm)
- iii) Perpendicular bisector between 2 points



# Angle facts and Circles

Previous learning: Year 9  
KO Term 3&4 Angles and Polygons



If a triangle is drawn from a chord and 2 radii it must be an **isosceles**

Hegarty : 593

**Example 1:** OA and OB are radii of the circle. Angle AOB = 134°  
**Find angle OAB**

$\Delta AOB$  is isosceles therefore  $\angle OAB = \angle OBA$   
(base angles of an isosceles triangle are equal)  
 $\angle AOB = (180 - 134) \div 2 = 23^\circ$   
(Sum of angles in a  $\Delta = 180^\circ$ )

**Geometric Reasoning Problems**  
Always: Show your workings

- State the "angle fact" that you are relying on to make a calculation
- Check the question for additional information – if a shape is named you can rely on its properties
- Try to use the diagram effectively – draw in given lengths and angles to help you work out other angles

Never: make assumptions about a shape on what it looks like – rely on given or proven facts only!

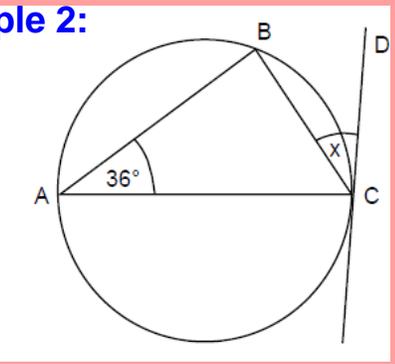
# Circles Theorems

## Higher Tier

Hegarty : 594-606

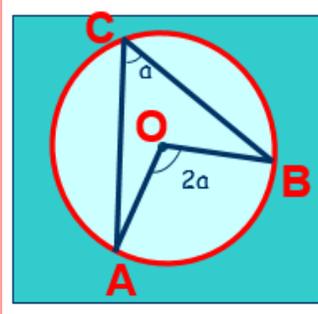
Circle theorems are just circle "angle facts"  
Whenever they are applied to solve a problem you **MUST** state the circle theorem using key words:

**Example 2:**

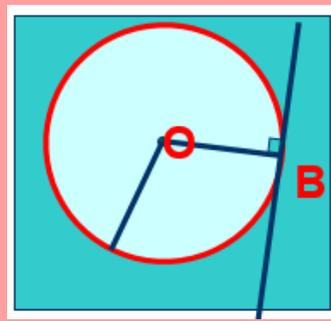


The diagram shows a circle. AC is a diameter of the circle and CD is a tangent. Work out the size of x.

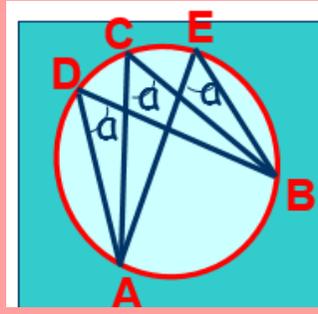
$\angle ABC = 90^\circ$  (the angle created in a semi circle is a right angle)  
 $\angle BCA = 180 - (90 + 36) = 54^\circ$   
(angles in a  $\Delta$  sum to  $180^\circ$ )  
 $\angle ACD = 90^\circ$  (a radius is  $90^\circ$  to a tangent at that point)  
**Therefore  $X = 90 - 54 = 36^\circ$**



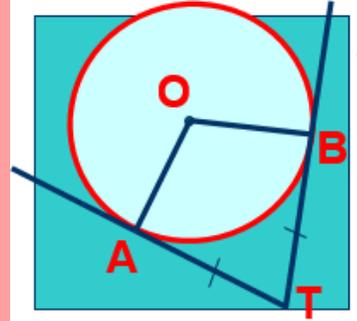
The angle at the centre is double that at the circumference drawn from the same arc



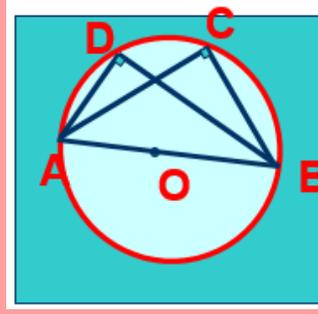
The radius and a tangent at that point are perpendicular (at  $90^\circ$ )



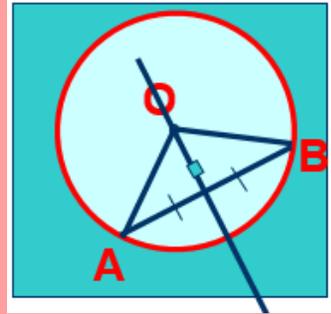
The angles drawn in the same segment from the same arc are equal



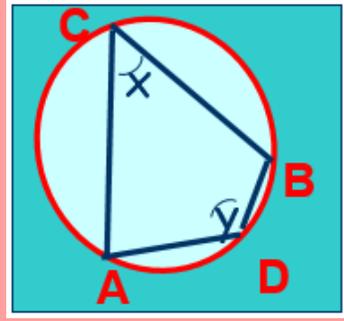
Tangents drawn from the same point are equal



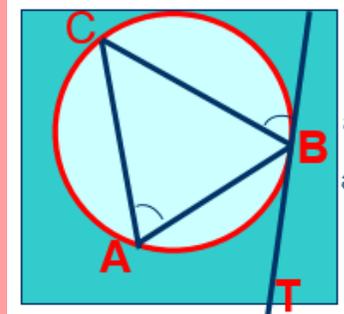
The angle in a semi-circle is a right angle  
**Reverse logic can also be applied: If "C" is not 90 then AB is not a diameter**



The perpendicular bisector of a chord passes through the origin



Opposite angles of cyclic quadrilaterals add up to 180  
**Cyclic Quadrilaterals MUST have all 4 vertices on the circumference**



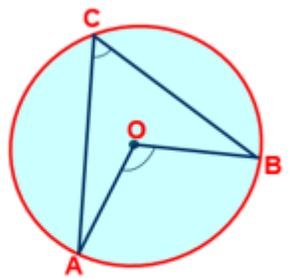
**Alternate Angle theorem**  
Angle between a chord and tangent is equal to the angle drawn in the alternate segment from the same points  
**Reverse logic can be applied: If not equal then TB not a tangent**

# Circle Theorem Proof

## Example 1

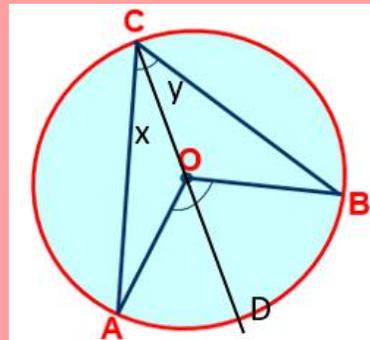
## Example 2

Prove that...

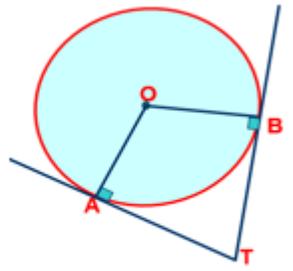


Angle at the centre is double that at the circumference drawn from the same arc

First step: draw in diameter, COD

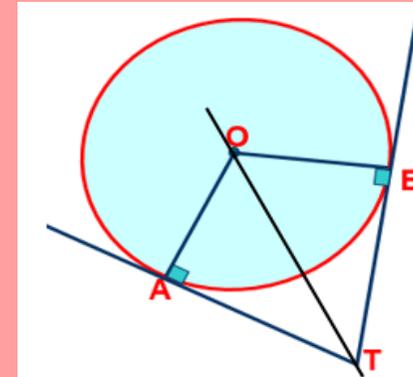


Prove that...



Tangents drawn from the same point to a circle are equal.

First step: draw in diagonal OT



**Proof:** Let  $\angle ACO = x$  and  $\angle BCO = y$  so  $\angle ACB = (x+y)$   
 As  $OA=OB=OC$  (radii of circle)  $\Delta s$   $AOC$  and  $BOC$  are isosceles  
 Therefore:  $\angle ACO = \angle OAC$  and  $\angle OCB = \angle OBC$   
 (base angles of isosceles triangles are equal)  
 $\angle AOC = 180 - 2x$  and  $\angle BOC = 180 - 2y$   
 (angles in a triangle sum to 180)

$\angle AOC + \angle BOC = 180 - 2x + 180 - 2y = 360 - (2x + 2y)$   
 Angles at a point sum to 360 therefore in minor sector:  
 $\angle AOB = 360 - [\angle AOC + \angle BOC] = 360 - [360 - (2x + 2y)]$   
 $= 2x + 2y = 2(x+y)$

Therefore angle at the centre ( $\angle AOB$ ) is double that at the circumference ( $\angle ACB$ ) drawn from the same arc  $AB$

This proof can be used at the basis to prove

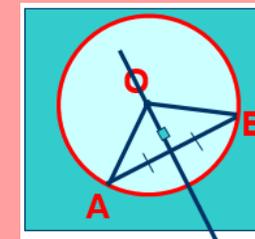
- **Angle in a semi circle is  $90^\circ$**   
 (because if  $\angle AOB = 180$  then  $\angle ACB$  must be  $90$ )
- **Angles in the same segment are equal**  
 (because centre angle will remain the same and the proof can apply to any angle drawn to the circumference in the major sector from  $AB$ )

**Proof:**  
 $OA = OB$  (radii of a circle)  
 $TA$  and  $TB$  are tangents to a circle (given)  
 Therefore:  $\angle TAO = 90^\circ$  and  $\angle TBO = 90^\circ$   
 (radius and a tangent at that point are perpendicular)  
 Therefore:  $\Delta OAT = \Delta OBT$  - congruency by reason RHS  
 (Right angle:  $\angle TAO = 90^\circ$  and  $\angle TBO = 90^\circ$ )  
 (Hypotenuse:  $OT$  is common)  
 (Side:  $OA = OB$ )

As  $\Delta OAT$  and  $\Delta OBT$  are congruent all corresponding sides are equal therefore  $TA = TB$  and thus, tangents drawn from the same point ( $T$ ) to a circle are equal

This proof can be used at the basis to prove

- **Perpendicular bisector of a chord passes through the origin**  
 (because if tangents are drawn from  $T$  to  $A$  and  $B$ , this proves  $OATB$  is a kite and the properties of a kite include diagonals are perpendicular and one is bisected by the other)



A **geometry proof** — like any mathematical **proof** — is an argument that begins with known facts, goes through a series of logical deductions, and ends with the thing you're trying to prove.

You can draw in additional lines – for instance Example 1 started by drawing in a diameter - but only “honest” ones (here point  $O$  was clearly the centre of the circle).

You cannot make just assumptions about lines, angles or shapes ... and you can't use the angle fact you are trying to prove in your proof of that angle fact!

Many geometric proofs are based on the properties of unique congruent triangles: SSS, SAS, ASA RHA

Most circle theorems can be proven from first principles. It is really important to state your reasoning (the “angle facts” you are relying on) at every stage.

Note: These examples are not the only ways to prove these circle theorems, nor are they the only circle theorems that can be proved:

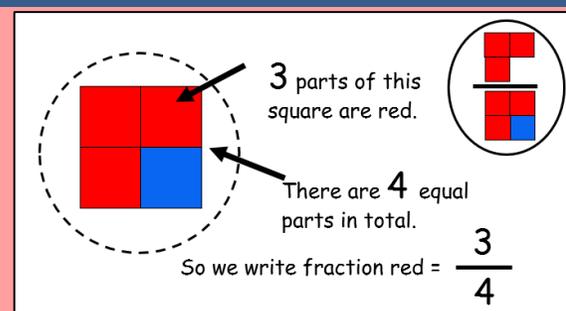
# Year 10 Maths Term 5/6 Ratio, Proportion and Proportionality

## What do I need to be able to do?

- Use fractions and percentages to describe a proportion of an amount
- Calculate percentage increases and decreases using multiplication
- Solve problems involving percentage change including repeated proportional change
- Find the original value of a quantity after a percentage increase or decrease
- Set up solve and interpret growth and decay problems including compound interest
- Divide a quantity in a given ratio and reduce a ratio to its simplest form
- Calculate unit ratios and recognise scale factors and maps scales as a unit ratio
- Understand direct proportion in “real life” scenarios such as recipes, best buys, maps scales and compound measures and use proportionality to solve problems
- Use scale factor to convert between lengths on maps and scale diagrams and distances they represent
- Use, calculate convert between standard units of measure and compound units
- Solve direct and indirect proportion problems
- Describe direct and indirect proportion relationships using equations
- Recognise graphs showing direct and indirect proportion

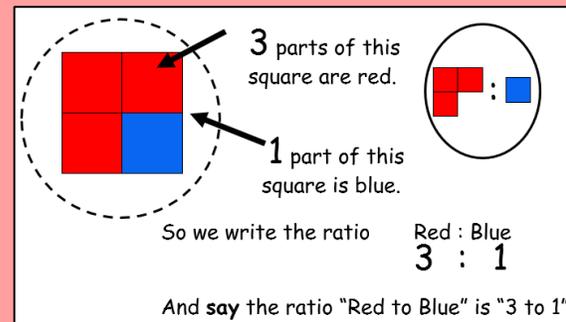
## Key terms:

**Proportion:** a proportion of an amount can be expressed as a **fraction**, **decimal** or **percentage**. A proportion compares the parts into which an object is divided with total parts ie the whole

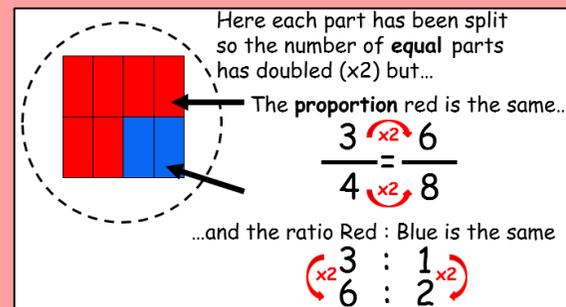


## Previous learning: Year 9 KO Term 1&2 Fractions decimals and percentages (Hegarty maths Lesson 52-87)

**Ratio:** a ratio shows the relationship between the **parts** into which an object has been divided.  
 A ratio compares **part to part** (note: ratios are written with a colon (part : part) which is said as the “to”)  
 Since the ratio only gives information about the relationship between the parts, the total number of equal parts can be calculated by adding these parts together.



**Proportionality** – pairs of values are **in proportion** if the **multiplicative relationship** between them is the same.  
 Multiplicative relationships are only the same if **all elements have been multiplied by the same factor**. (Scale factors are most correctly given as a **multiplier** but as multiplying and dividing are inverse operations, dividing by the same number will also mean values are in proportion) Equivalent fractions and ratios can be calculated like this.



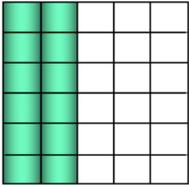
**Direct Proportion** Two sets of values are in direct proportion when they **increase (or decrease) by the same ratio (multiplier)**. Direct proportion relationships are commonly used in every day life – for instance calculating the cost of buying multiple single items; scaling up a recipe, calculating distances from maps scales; and using compound measures

**Indirect or Inverse Proportion** Two sets of values are in indirect proportion if as **one increases, the other decreases** by the opposite proportion so if 2 people build a wall in 5 days, it will take 4 people 2½ days (double workers half the time) but 1 person 10 days (half workers double time)

## Express a quantity as a proportion of another

**Key fact:** fractions show part "out of" a whole – so start by rewriting any quantity comparison as a fraction...

**Example 1:** What proportion of this diagram is shaded?



**Answer**  
 $\frac{12}{30} = 40\%$

Give your answer as a percentage

Step 1: Consider proportion: 12 parts out of 30 total

Step 2: Write as a fraction:  $\frac{12}{30}$  and simplify  $\frac{12}{30} \stackrel{(-3)}{=} \frac{4}{10}$

Step 3: Calculate as a percentage

either rewrite "out of 100"  $\Rightarrow \frac{4}{10} \stackrel{(x10)}{=} \frac{40}{100}$

or find proportion of 100%  $\Rightarrow \frac{4}{10} \times 100\%$

**Remember:** Units of measure **must be the same** when writing one quantity as a proportion of another

**Example 2:** What proportion of 12metres is 150cm?

Step 1: write as values **with the same units**

so use values either in metres: 12m and 1.5m  
or in centimetres: 1200cm and 150cm

Step 2: Write as a fraction and simplify (to correct form)

either  $\frac{1.5}{12} \stackrel{(x10)}{=} \frac{15}{120}$  or  $\frac{150}{1200} \stackrel{(-10)}{=} \frac{15}{120} \stackrel{(-15)}{=} \frac{1}{8}$

**Check:** You have the values correctly written in the fraction: (numerator) compared to or as a proportion of (denominator)

**Example 3:** Chris earns £320 per week. Rudy earns £400

What proportion of Rudy's wages does Chris earn?

"of Rudy's" means Rudy is denominator:  $\frac{320}{400} \stackrel{(-4)}{=} \frac{80}{100} = 80\%$

What proportion of Chris's wages does Rudy earn?

"of Chris's" means Chris is denominator:  $\frac{400}{320} \stackrel{(-80)}{=} \frac{5}{4} = 125\%$

(When comparing quantities percentages can be more than 100% - it just shows that a quantity is bigger than the original)

## Finding the change in proportion – finding profit or loss

Hegarty : 97, 759-64

**Key fact:** this is in effect the same as expressing a value as a proportion of another. Most care needs to be taken over what value is to be written as a proportion of what.

$$\frac{\text{Change in value} \times 100\%}{\text{Original value}} \quad \text{or simply} \quad \frac{\text{NEW} \times 100\%}{\text{OLD}}$$

**Example 1:** Sam buys a picture for £1300 and sells it the following year for £1650.

What is his percentage profit (to 2 sig fig)?

Change in value  $1650 - 1300 = \text{£}350$ ;

ORIGINAL value £1300

Percentage change =  $\frac{350}{1300} \times 100\% = 27\% \text{ (2sf)}$

**Example 2:** Sam buys a car for £15750 and sells it five years later £10000. What is the percentage change in value of the car?

Change in value  $15750 - 10000 = \text{£}5750$ ;

ORIGINAL value £15750

Percentage change =  $\frac{5750}{15750} \times 100\% = 38\% \text{ (2sf)}$

## Finding a proportion of an amount

**Remember:** "finding a proportion of" = multiply by proportion

See Previous learning: Year 9 KO Term 1&2  
Fractions decimals & percentages

**Example 1:** Find  $\frac{3}{4}$  of £320

Method 1 - find  $\frac{1}{4}$  of amount then scale up (x3)

$$\frac{1}{4} \Rightarrow 4 \rightarrow 320 \div 4 = \text{£}80$$

$$\frac{3}{4} \Rightarrow 3 \times \frac{1}{4} \rightarrow 80 \times 3 = \text{£}240$$

Method 2 - (cancel and) multiply fraction

$$\frac{3}{4} \times \frac{320}{1} \stackrel{80}{=} \text{£}240$$

Method 3 - Calculator: find and use the fraction button and multiply

**Example 2:** Find 60% of £320

Method 1 - **Non-calculator**

combine values for "easy" percentages

$$10\% = \frac{1}{10} \Rightarrow \div 10 \rightarrow 10\% \equiv \text{£}32$$

$$50\% = \frac{1}{2} \Rightarrow \div 2 \rightarrow 50\% \equiv \text{£}160$$

$$60\% = 50\% + 10\% \rightarrow 60\% \equiv \text{£}192$$

Method 2 - **Calculator**

Convert to a decimal and multiply

$$60\% = 0.6 \rightarrow 0.6 \times \text{£}320 = \text{£}192$$

## Increase or decrease an amount by a proportion

Hegarty : 89-90

**Non-calculator method**

- find the required proportion then add or subtract from original

**Calculator method (%)**

- convert to a **decimal multiplier** and multiply by the original amount

- **to increase:** decimal multiplier will be  $>1$   $(100\% + \% \text{increase}) / 100$

- **to decrease:** decimal multiplier will be  $<1$   $(100\% - \% \text{decrease}) / 100$

**Example 1:** Increase £450 by 20%

Answer will be  $100 + 20\% = 120\%$  of original

Decimal multiplier  $\Rightarrow 120/100 = 1.2$

Calculation:  $\text{£}450 \times 1.2 = \text{£}540$

**Example 2:** Decrease £450 by 20%

Answer will be  $100 - 20\% = 80\%$  of original

Decimal multiplier  $\Rightarrow 80/100 = 0.8$

Calculation:  $\text{£}450 \times 0.8 = \text{£}360$

## Repeated proportional change

**Key fact:** This means you need to find a proportion of a proportion of a proportion (of an amount) etc. As “of” means multiply, you will need to multiply all proportions (and the amount) together:

**Example 1:** There are 800 pupils in the school.  
 $\frac{3}{8}$  of pupils are girls.  $\frac{1}{2}$  of girls study Spanish.

i) How many girls study Spanish?

Need to find:  $\frac{1}{2}$  of  $\frac{3}{8}$  of 800 pupils

Calculation:  $\frac{1}{2} \times \frac{3}{8} \times 800 = 250$  girls study Spanish

ii) What proportion of pupils are girls who study Spanish?

Either: express as a fraction of an amount:  $\frac{250}{800} = \frac{5}{16}$

Or find  $\frac{1}{2}$  of  $\frac{3}{8} \Rightarrow \frac{1}{2} \times \frac{3}{8} = \frac{3}{16}$

Hegarty : 92

For **repeated percentage change** use decimal multipliers:

**Example 2:** Sam earns £1500 per month  
 Sam spends 85% of this paying bills. His rent bill makes up 70% of all money paid on bills.

i) How much does he pay in rent each month?

Need to find: 70% of 85% of £1500

For percentages – use decimal multiplier

Calculation:  $0.7 \times 0.85 \times 1500 = \text{£}892.50$

ii) What proportion of his income goes on rent?

Calculation:  $0.7 \times 0.85 = 0.595 = 59.5\%$

Remember: fraction decimal & percentages can be equivalent – so chose “easiest” format:

**Example 3:** Sam pays £175 in utility bills each month. 80% of this is his gas and electricity of which  $\frac{1}{4}$  is for the gas.

i) How much is his **electricity** bill each month?

Need to find:  $\frac{3}{4}$  of 80% of £175

Either as fraction:  $\frac{3}{4} \times \frac{4}{5} \times \text{£}175 = \text{£}105$

Or % (as multiplier):  $0.75 \times 0.8 \times \text{£}175$

ii) What proportion of his bills is for electricity?

Calculation:  $0.75 \times 0.8 = 0.6 = 60\%$

## Simple Interest and Compound interest

**Simple Interest** is paid JUST on the original value. The amount received will be the SAME each year.

**Example 1:** A bank offers simple interest at 3% per annum [means 3% each year]  
 Charley invests £500 for 5 years.

i) How much interest does she get in total?

Need to find: 5 x value for 1yr (3% of £500)

Calculation:  $5 \times 0.03 \times 500 = \text{£}75$

ii) How much is in her bank account?

Need to find: Add interest to original amount

Calculation:  $75 + 500 = \text{£}575$

**Compound interest** is paid on the original amount AND any interest already received. The amount will increase each year. This is the form of interest most commonly given by banks.

### Non Calculator Method

**Example 2:** A bank offers **compound interest** at 5% per annum. Charley invests £500.

i) Calculate the value of the investment after 2 years?

**Year 1** Need to find: 5% of £500 and add onto £500

Calculation: **Original + 5% = £500 + £25 = £525**

**Year 2** Need to find: 5% of £525 and add onto £525

Calculation: **5% of £525 = £26.25**

**Total investment = £525 + £26.25 = £551.25**

ii) How much more does she get from compound interest than if simple interest of 5% had been given?

Need to find: 2 x (value of interest for 1 year)

Calculation: **2 x £25 = £50 interest accrued in 2 years so Charley has £1.25 more with compound interest than with simple interest only.**

## [Exponential Growth and Decay]

**Compound interest** is normally a calculator paper topic.

**Formula for compound interest:**  
 $\text{£Original} \times \text{decimal multiplier}^{(\text{time})}$

**Example 3:** A bank offers **compound interest** at 3% per annum. Charley invests £500 for 5 years.

i) How much is Charley's investment after 5 years?

Investment will be worth 103% after 1 year

Need to find: repeated percentage increase of 103%

Calculation:  $1.03 \times 1.03 \times 1.03 \times 1.03 \times 1.03 \times 500$

or:  $1.03^5 \times 500 = \text{£}579.64$  (2dp)

ii) How much interest did she get?

Need to find: **Subtract** original from total investment

Calculation:  $579.64 - 500 = \text{£}79.64$

**Note:** Compound interest and depreciation (growth and decay) is a form of geometric sequence (General rule :  $ar^{(n-1)}$ )

**Depreciation** occurs when a value decreases by given proportion each year – so is calculated like compound interest but percentage decimal multiplier will be less than 1

**Example 4:** Sam buys a car for £15000.

The car depreciates by 15% each year.

What is the value of the car after 3 years?

Car will be worth 100%–15% = 85% after 1 year

Need to find: repeated percentage decrease of 85%

Calculation:  $0.85 \times 0.85 \times 0.85 \times 15\ 000$

or:  $0.85^3 \times 15000 = \text{£}9211.88$  (2dp)

## Reverse proportions :

Hegarty : 79, 96

### Finding the original amount after a proportional change

**Key fact:** this is the inverse process of finding a proportional increase or decrease.

Original  $\rightarrow$  multiply by proportional change  $\rightarrow$  New value

Original  $\leftarrow$  DIVIDE by proportional change  $\leftarrow$  New value

Eg "Increase £100 by 10%" problem:  $\text{£100} \rightarrow \times 110\% \rightarrow \text{£110}$

"Find original amount" problem:  $\text{£110} \leftarrow \div 110\% \leftarrow \text{£110}$

**DO NOT** just find the same proportion of the new value :-

Increase £100 by 10%:  $\text{£100} \rightarrow \times 110\% \rightarrow \text{£110}$

but decreasing £110 by 10% ....  $\text{£110} \rightarrow \times 90\% \rightarrow \text{£99}$

... does not get back to the same value. Remember proportion is relative to the "total" ... and this is different in both cases!

### Fractions:

See Year 9 KO  
Term 1&2

Divide fractions  
= multiply by  
reciprocal: KFC"

**Example 1:** In May, a shop decreased the price of a certain brand of t-shirt by  $\frac{1}{4}$  to £15. What was the price of the t-shirts before the decrease?

A decrease by  $\frac{1}{4}$  means £16 is  $\frac{3}{4}$  of the original

Process to decrease: Original  $\rightarrow \times \frac{3}{4} \rightarrow \text{£15}$

So reverse to find Original  $\leftarrow \div \frac{3}{4} \leftarrow \text{£15}$

Calculation:  $\text{£15} \div \frac{3}{4} = \text{£15} \times \frac{4}{3} = \text{£20}$

**Example 2:** In May, a shop increased its sales income by 15% to £1840 per month. What was its monthly sales before the increase?

An increase of 15% means £1840 is 115% of original

Process to increase: Original  $\rightarrow \times 1.15 \rightarrow \text{£1840}$

So reverse to find Original  $\leftarrow \div 1.15 \leftarrow \text{£1840}$

Calculation:  $\text{£1840} \div 1.15 = \text{£1600}$

### Percentages:

(Calculator  
Method)

**Non-calculator:** The amount after an increase or decrease in value is in direct proportion to the proportional change applied to the original... so use ratio techniques to scale up or down as required. So see using ratios to solve real life problems....

## Ratio

Hegarty : 328-331

A ratio can be used to compare two quantities: **part to part**.

Once the quantities have been linked, equivalent ratios can be found by scaling up both parts by a common multiple or simplified by dividing by common factors (much like equivalent and simplified fractions).

**Example 1:** Harry is 120cm tall; George is 140cm. Express Harry's height to George's as a ratio in its simplest form

Harry : George  $\rightarrow \div 20 \left( \begin{array}{c} 120 : 140 \\ 6 : 7 \end{array} \right) \div 20$

**Example 2:** This year the ratio between Tom and Henry's age will be 2 : 7. If Tom is 10, how old is Henry?

Tom : Henry  $\rightarrow \times 5 \left( \begin{array}{c} 2 : 7 \\ 10 : 35 \end{array} \right) \times 5$   
Scale up ( $\times 5$ )  
If Tom is 10, then Henry is 35 years old.

- Make sure the ratio is written in the correct order for the question:

Harry : George  
6 : 7

George : Harry  
7 : 6

These are actually different ratios.

- Quantities must be in the same units when put into ratio form
- In ratio form, quantities do not contain any units... but units may need to be used when interpreting the ratio in context.

### Ratios in Simplest form

Like fraction, simplify by dividing by the **highest common factor**. Simplest form ratios only include integer values.

**Example:** Simplify  $\div 25 \left( \begin{array}{c} 50 : 75 \\ 2 : 3 \end{array} \right) \div 25$

### Unit Ratios

A unit ratio is one in the form **1 : n**. This is often called a **scale**. Note: as the first value must be 1, unit ratios can include decimals.

**Example:** Write  $\div 30 \left( \begin{array}{c} 30 : 90 \\ 1 : 3 \end{array} \right) \div 30$   
as a unit ratio:

**Scale diagrams and Maps** are the most common form of unit ratios.

Map scales give the scale factor between lengths linked on the map and in real life

Remember – map scales are:

- always written **Map : Real** distance
- always given in the **same units (cm)**

Convert the scale or answer to useable units

**Example :** On a map the distance two points is 4.5cm. What is the actual distance if the map's scale is **1 : 100000** ?

Scale means: 1 cm = 100000 cm  
= 1000m

so  $\times 4.5 \left( \begin{array}{c} 4.5\text{cm} = 4.5\text{ km} \end{array} \right) \times 4.5$

## Dividing in a given ratio

Hegarty : 332-338

The TOTAL number of parts a quantity is divided into can be found by adding the elements of a ratio. This total will scaled up in the same way as the parts – and this can be used to see how a quantity may be divided in a given ratio:

...but be careful to check what information you have been given...

It may be about one of the ratio parts:

Or about the difference between the ratio parts rather than the total!:

## Writing a ratio as a proportion

As TOTAL number of parts can be found by adding the elements of a ratio, information given as a ratio can easily be converted to a proportion:

Remember fractions show **part** **whole**

And a fraction can then be converted to decimals or percentages as required

Example : Jon and Pat share £350 in the ratio 2 : 5. How much will Jon receive?

$$\begin{array}{l} \text{Jon : Pat} \Rightarrow \text{Total} \\ 2 : 5 \Rightarrow 7 \text{ parts} \\ \text{£100 : £250} \Rightarrow \text{£350} \\ \text{Jon receives £100} \end{array} \quad \begin{array}{l} 350 \div 7 = 50 \\ 1 \text{ part} = \text{£50} \end{array}$$

Example : Yellow and blue paint is mixed in the ratio 3:4. Stan has 20 litres of blue paint and more than enough yellow. How much green paint can he make?

$$\begin{array}{l} \text{Yellow : Blue} \Rightarrow \text{Total Green} \\ 3 : 4 \Rightarrow 7 \\ (15\text{L}) : 20\text{L} \Rightarrow 35\text{L} \end{array}$$

Example : Jon and Karl share some money in the ratio 3 : 7. Karl receives £140 than Jon. How much money did they share?

$$\begin{array}{l} \text{Jon : Karl} \Rightarrow \text{Difference} \Rightarrow \text{Total} \\ 3 : 7 \Rightarrow 4 \text{ parts} \Rightarrow 10 \text{ parts} \\ 140 \div 4 = 35 \Rightarrow \text{£140} \Rightarrow \text{£350} \\ 1 \text{ part} = \text{£35} \quad \text{They share £350} \end{array}$$

What proportion of the money does Karl receive? Give your answer as a percentage

$$\begin{array}{l} \text{Jon : Karl} \Rightarrow \text{Total} \\ \text{Ratio} \quad 3 : 7 \Rightarrow 10 \text{ parts} \\ \text{Proportion} \quad \frac{3}{10} : \frac{7}{10} \\ \text{Karl receives } 70\% \end{array} \quad \frac{7}{10} = 70\%$$

## Combining ratios and harder ratio problems

Two or more ratios may be combined if they share a common term. Find the lowest common multiple of that common term and scale each ratio up by that factor. Now combine the ratios around the common value ....

Example : A racecourse has 4 sections A, B, C and D. The distances of each section are in the following ratios

$$\begin{array}{l} \text{A : B : C} \quad \text{C : D} \\ 2 : 3 : 4 \quad 6 : 5 \end{array}$$

Calculate the ratio A : B : C : D

Common section C : common multiple of 4 and 6 = 12

$$\begin{array}{l} \text{A : B : C} \quad \text{C : D} \Rightarrow \text{A : B : C : D} \\ \text{x3} \left( \begin{array}{l} 2 : 3 : 4 \\ 6 : 9 : 12 \end{array} \right) \text{x3} \quad \text{x2} \left( \begin{array}{l} 6 : 5 \\ 12 : 10 \end{array} \right) \text{x2} \Rightarrow 6 : 9 : 12 : 10 \end{array}$$

Example: Given that  $3x : 4 = 7 : 2$

Calculate the value of  $x$

Link the terms and combine around a common value

$$4 \text{ and } 2 \text{ in the same position so } 3x : 4 = 7 : 2 \Rightarrow 3x : 4 = 14 : 4 \quad \text{x2}$$

As ratios are equal then

$$\begin{array}{l} 3x = 14 \\ x = \frac{14}{3} \end{array}$$

Example : What number needs to be added to 5 and 3 so that the ratio of the 1<sup>st</sup> number to the 2<sup>nd</sup> becomes 4 : 3

$$\text{Unknown number added to both} \Rightarrow \begin{array}{l} 5 + n : 3 + n \\ 4 : 3 \end{array}$$

The scale factor between needs

$$\frac{5 + n}{4} = \frac{3 + n}{3}$$

to be the same so create equivalent scale factors and

$$3(5 + n) = 4(3 + n)$$

solve as a linear equation:

$$15 + 3n = 12 + 4n$$

$$\begin{array}{l} \text{Check: } 5 + 3 = 8 \Rightarrow 8 : 6 \\ 3 + 3 = 6 \Rightarrow 4 : 3 \end{array} \quad \div 2$$

$$\begin{array}{l} 15 = 12 + n \\ n = 3 \end{array}$$

# Ratio and Direct Proportion – Problem solving

Ratio which can be used to solve many different types of real life problem when two quantities that are in **direct Proportion** – as one increases the other will also increase in the same proportion:

• **Scaling up recipes**

Hegarty : 739-742

Soup Recipe: (Serves 4)  
 160g onions  
 80g carrots  
 1 tablespoon of oil  
 500g of tomatoes  
 840 ml vegetable stock

Finding Scale factor  
 "New" = 10 → 2.5  
 "Old" = 4

Example 1: Nadia wants to make soup for 10.  
 How much of each ingredient will she need?  
 4 people → 10 people  
 Either: (÷2) 2 people + (x2) 8 people  
 Or 10 ÷ 4 = 2.5 (multiply everything by 2.5)  
 People : Onion : Carrot : Oil : Tomatoes : Stock

4	:	160	:	80	:	1	:	500	:	840
$\times 2.5$		2	:	80	:	40	:	1250	:	2100
		+ 8	:	320	:	160	:	2	:	1000
		<u>10</u>		<u>400g</u>		<u>320g</u>		<u>2½</u>		<u>2100ml</u>

• **Finding "best buys"**

Hegarty : 763-772

Careful you know what your ratio represents – the cost of 1 item or a quantity obtained for £1?

Hegarty : 864-871

Example 2: Two shops have a special on for toilet rolls. Which is the best value for money?  
 Quik Shop                      Bargain Mart  
 9 rolls for £5.22              8 rolls for £4.72  
 Calculate a common ratio for both either unit ratios or a common multiple - here 72 (9x8 rolls)

$\div 9$	(	9	:	£5.22	)	$\div 9$		$\div 8$	(	8	:	£4.72	)	$\div 8$
		1	:	£0.58						1	:	£0.59		

Quik shop is better value (58p per roll) as the price per roll is 1p cheaper than Bargain Mart.

• **Creating scale diagrams**

Example 3: Ian is creating a scale diagram of his house. His living room is 3.8m wide. On the scale drawing the living room is 16mm wide. His living room is 4.4m long, how long is it on the drawing?  
 Link two known variables    Width : Length

		Real life	(	3.8	:	4.4	)	$\times 5$
		Scale drawing	(	16	:	22	)	$\times 5$

Scale factor  
 "New" = 16 → 5  
 "Old" = 3.8

• **Understanding and calculating with compound measures**

Compound measures involve two different units of measure linked in a proportional relationship e.g. Speed (miles per hour) or density (grams per cm<sup>2</sup>)  
 The compound unit can be seen and treated as a ratio – for instance  
 Speed: "70 miles per hour" means 70 miles travelled in 1 hour  
 so travelling at this average speed for 3.5 hours you go 245 miles

$$\times 3.5 \left( \begin{array}{l} 70 : 1 \\ 245 : 3.5 \end{array} \right) \times 3.5$$

Example 1: Gail drives 20 minutes at 48 mph  
 How far does she travel?  
 Speed: 48 miles per 1 hour  
 20 minutes =  $\frac{1}{3}$  of an hour

$$\times 3 \left( \begin{array}{l} 48 \text{ miles} : 1 \text{ hour} \\ 16 \text{ miles} : 20 \text{ mins} \end{array} \right) \div 3$$

Best Practise :  
 Work in the same units as needed for the compound measure

Example 2: Gail drives 40 minutes and travels 30 miles. What is her average speed?  
 Link information then scale  
 Up the time again to 1 hour:

$$\times 1.5 \left( \begin{array}{l} 30 \text{ miles} : 40 \text{ mins} \\ 45 \text{ miles} : 1 \text{ hour} \end{array} \right) \times 1.5$$

• **Calculating percentages including reverse percentages**

Hegarty : 84-92, 96

Percentage of amounts are in proportion: 10% of an amount will be double 5% of the same amount and half 20%! If you are given information linking a percentage of an amount with a value, scale up or down as required.

Example 1: The cost of a train fare increased by 5%  
 A ticket now costs £3.40 extra. How much was the ticket before the increase?  
 Linked information  
 Require 100%  
 The ticket was £68.00 before the increase

$$\times 20 \left( \begin{array}{l} 5\% : £3.40 \\ 100\% : £68.00 \end{array} \right) \times 20$$

Example 3: In a sale the price of a coat was reduced by 40%  
 The cost now costs £54. What was the price before the sale?  
 Coat is currently at (100%-40%) 60% of its original price  
 Linked information

$$\div 6 \left( \begin{array}{l} 60\% : £54.00 \\ 10\% : £ 9.00 \end{array} \right) \div 6$$

Example 2: The cost of a bus fare increased by 20%  
 A ticket now costs £15.60 extra. How much was the ticket before the increase?  
 Ticket is currently 100% + 20% = 120% of original  
 Linked information  
 Require 100%  
 The ticket was £13.00 before the increase

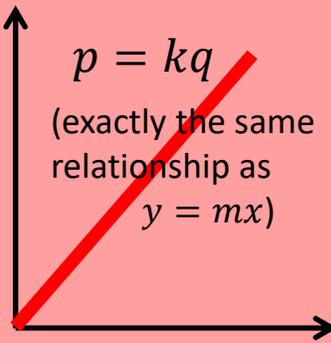
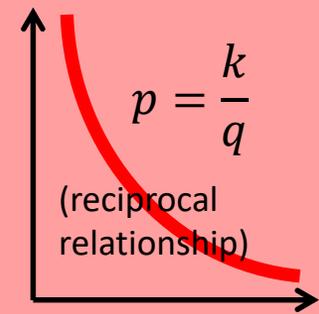
$$\div 6 \left( \begin{array}{l} 120\% : £15.60 \\ 20\% : £ 2.60 \end{array} \right) \div 6$$

$$\times 5 \left( \begin{array}{l} 100\% : £13.00 \end{array} \right) \times 5$$

Require  $\times 10$  (100% : £90.00)  $\times 10$   
 The price of the coat was £90.00 before the sale

# Solving direct proportion problems algebraically

# Solving indirect proportion problems



Variables are in direct proportion if their graph is a straight line cutting through the origin.  
 Rather than using " $y = mx + c$ " to describe the relationship shown by the line a slightly different notation is used **but the principles are the same...**  
 The symbol  $\propto$  means "is in proportion to" and if variable  $p$  is in proportion to  $q$  ( $p \propto q$ ) then you can describe the relationship as  $p = kq$  where  $k$  is a scalar

Variables are inversely (or indirectly) proportional when the **PRODUCT** of the variables is constant

## Example: Indirect proportion in "real life"

If it takes 8 workers 6 days to build a bridge how many days will it take 12 workers?

The more workers used the shorter the time taken to complete the work... but the total work days will remain the same.

**Total work days = 8 workers  $\times$  6 days = 48 work days**

**If 12 workers were employed: 48 work days  $\div$  12 workers = 4 days**

(The change is inversely proportional: the number of workers has been multiplied by 1.5... the number of days has been divided by 1.5)

**Example 1:**  
 $p$  is in direct proportion to  $q$ .  
 When  $p$  is 15,  $q$  is 6  
 a) Find a formula for  $p$  in terms of  $q$   
 b) Use your formula to find  
 i)  $p$  when  $q = 10$   
 ii)  $q$  when  $p = 23$

**If**  $p \propto q$   
**then**  $p = kq$   
**so**  $15 = k \times 6$  ( $p=15$  and  $q=6$ )  
 $k = \frac{15}{6} = \frac{5}{2}$   
**a) formula  $\rightarrow p = \frac{5}{2}q$**   
**b) i) If  $q=10$  then  $p = \frac{5}{2} \times 10 = 25$**   
**ii) If  $p=23$  then  $23 = \frac{5}{2}q$**   
 $q = \frac{23 \times 2}{5} = 9.2$

Process: state relationship  $\rightarrow$  use framework formula  $\rightarrow$  substitution of known values  $\rightarrow$  specific formula  $\rightarrow$  substitution for required values

## Solving indirect proportion problems algebraically

Use the same process as for direct proportion – the only change is the initial relationship: the inversely proportional relationship is a reciprocal:

**if  $p$  is inversely proportional to  $q$  then:  $p \propto \frac{1}{q}$  and  $p = \frac{k}{q}$**

**Example 3:**  
 $F$  is inversely proportional to  $d$ .  
 When  $F$  is 7,  $d$  is 8  
 a) Find a formula for  $F$  in terms of  $d$   
 b) Use your formula to find  
 i)  $F$  when  $d = 0.4$   
 ii)  $d$  when  $F = 448$

**If**  $F \propto \frac{1}{d}$   
**then**  $F = \frac{k}{d} \rightarrow k = F \times d$   
**so**  $k = 7 \times 8$  ( $F=7$  and  $d=8$ )  
 $k = 56$   
**a) formula  $\rightarrow F = \frac{56}{d}$**   
**b) i) If  $d = 0.4$  then  $F = \frac{56}{0.4} = 140$**   
**ii) If  $F = 448$  then  $448 = \frac{56}{d}$**   
 $d = \frac{56}{448} = \frac{1}{8}$

Again take care to check the key relationship. If the question had said " $F$  is inversely proportion to  $d^2$ " then the set up would be:  $F \propto \frac{1}{d^2}$

Make sure that you check what the key relationship in the question is:

**Example 2:**  
 $t$  is in direct proportion to the square of  $v$ .  
 When  $t$  is 5,  $v$  is 3  
 a) Find a formula for  $t$  in terms of  $v$   
 b) Use your formula to find  
 i)  $t$  when  $v = 1.8$   
 ii)  $v$  when  $t = 1.25$

**If**  $t \propto v^2$   
**then**  $t = kv^2$   
**so**  $5 = k \times 3^2$  ( $t=5$  and  $v=3$ )  
 $k = \frac{5}{9}$   
**a) formula  $\rightarrow t = \frac{5}{9}v^2$**   
**b) i) If  $v=1.8$  then  $t = \frac{5}{9} \times 1.8^2 = \frac{9}{5}$**   
**ii) If  $t=1.25$  then  $1.25 = \frac{5}{9}v^2$**   
 $v^2 = \frac{9 \times 1.25}{5} = \frac{9}{4}$   
 $v = \sqrt{\frac{9}{4}} = \frac{3}{2} = 1.5$

Note the process is the same in both examples... what is different is the complexity of the initial relationship

# Year 10 Maths Term 5/6 Quadratic Equations and Graphs

- What do I need to be able to do?**  
 (\*Foundation crossover)
- \*Plot and read Cartesian Co-ordinates
  - \*Recognise quadratic equations and plot quadratic functions
  - \*Understand properties of quadratic functions including
    - Shape (Parabola)
    - Turning points
    - Solutions and discriminant
  - Solve quadratic equations by
    - \*Factorisation
    - Completing the square
    - Quadratic Formula
  - Using graphs to find approximate solutions
  - Solve simultaneous equations involving quadratic and linear functions graphically and algebraically
  - Solve quadratic inequalities and represent solutions on a numberline

**Quadratic equations**  
 A quadratic equation is any equation which contains an  $x^2$  as the highest power.  
 The general format of a quadratic equation is:  

$$y = ax^2 + bx + c$$

**Coordinates** are used to show a position on a graph. They are written with the notation  $(x, y)$ . The first coordinate is the horizontal position (x-axis), the second is the vertical position (y-axis).

A = (4, 4)  
 B = (5, -2)  
 C = (-2, 2)  
 D = (-3, -4)

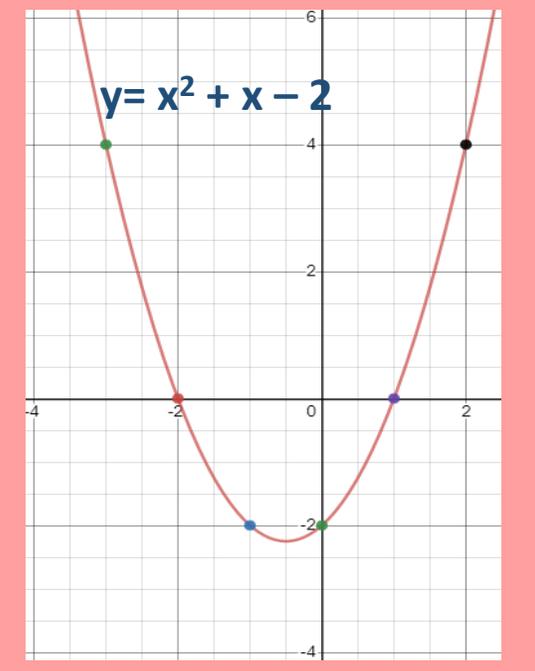
## Plotting Graphs Hegarty : 251

- Draw a table of values
- Calculate the value of y for each value of x
- Non-calculator: break down the equation and calculate for each term before combining to total
- Calculator: remember put any negative x-value into brackets before squaring
- Draw a suitable grid
- Plot the  $(x,y)$  pairs and join with a smooth curve

**Calculator Example 1:**  
 Plot the function:  $y = x^2 + x - 2$

x	-3	-2	-1	0	1	2	3
y	4	0	-2	-2	0	4	10

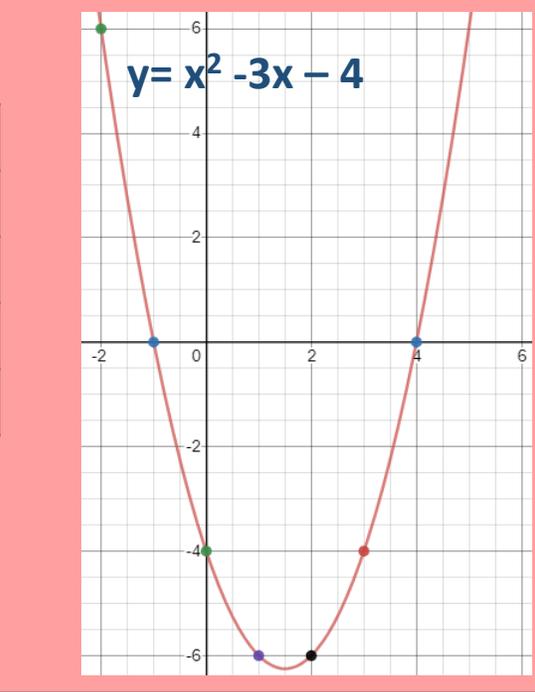
For  $x = -3$  put into calculator:  
 $(-3)^2 + (-3) - 2 (= 4) \rightarrow$  Plot:  $(-3, 4)$   
 For  $x = -2$  put into calculator:  
 $(-2)^2 + (-2) - 2 (= 0) \rightarrow$  Plot:  $(-2, 0)$   
 For  $x = -1$  put into calculator:  
 $(-1)^2 + (-1) - 2 (= -2) \rightarrow$  Plot:  $(-1, -2)$   
 For  $x = 0$ ,  $y = -2 \rightarrow$  Plot:  $(0, -2)$   
 For  $x = 1$  put into calculator:  
 $1^2 + 1 - 2 (= 0) \rightarrow$  Plot:  $(1, 0)$   
 For  $x = 2$  put into calculator:  
 $2^2 + 2 - 2 (= 2) \rightarrow$  Plot:  $(2, 2)$



**Non-Calculator Example 2:**  
 Plot  $x^2 - 3x - 4$

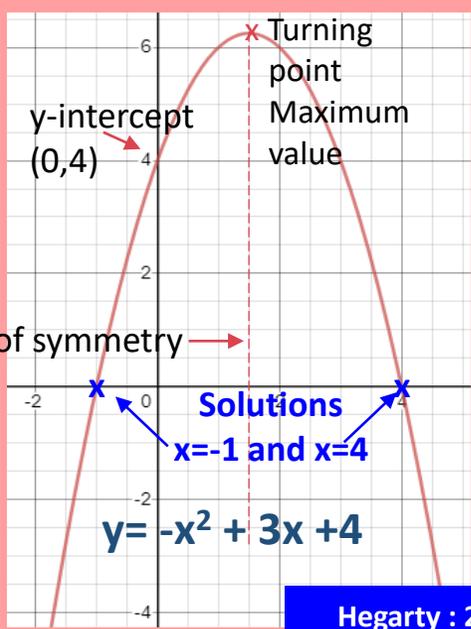
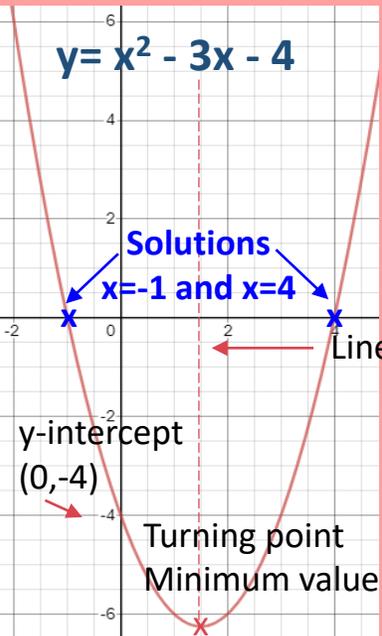
x	-3	-2	-1	0	1	2	3
$x^2$	9	4	1	0	1	4	9
$-3x$	9	6	3	0	-3	-6	-9
$-4$	-4	-4	-4	-4	-4	-4	-4
y	14	6	0	-4	-6	-6	-4

$x^2 \rightarrow$  All positive values  
 Sequence is square numbers  
 $-3x \rightarrow$  Sequence is multiples of  $(-3)$   
 $-4 \rightarrow$  Is constant to be taken from sum of  $x^2 + 3x$  values above



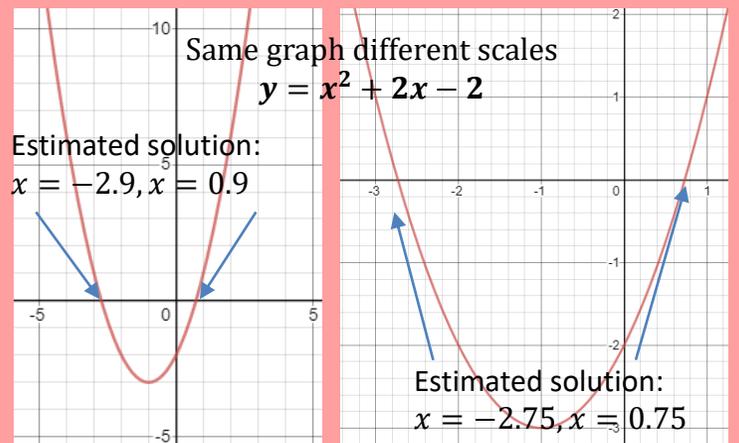
# Key Properties of Quadratic graphs

- Always a **u shape smooth curve** (called a parabola). Negative ( $-x^2$ ) functions are flipped from a u-shape to n-shape
- Always **symmetrical** about a vertical line ( $x=.....$ )
- Always cross the y-axis (y-intercept) at the constant value (0, c) given in the equation
- Always have a **turning point** which is the **minimum** value (of y) for a positive ( $x^2$ ) function (or **maximum** value (of y) coordinate value for a negative ( $-x^2$ ) function). The turning point is on the line of symmetry
- **The solutions – or roots - of a quadratic equation are where its graph crosses (or touches) the x-axis**



# Using graphs to find approximate solutions to quadratic equations

- For any solvable quadratic equation  $y = ax^2 + bx + c$ , the solutions (or roots) of the equation will be where the graph crosses the x-axis i.e. where  $ax^2 + bx + c = 0$
- Read off this value to get the 2 roots
- The accuracy of your reading will depend on the scale of your graph – so always try to plot using the best scale possible.



# Using the general graph to find solutions to related equations

The solutions of an equation  $ax^2 + bx + c = 0$  can be read from a graph at the point the graph crosses the x axis because this is where the two equations:  $y = ax^2 + bx + c$  and  $y = 0$  are equal.

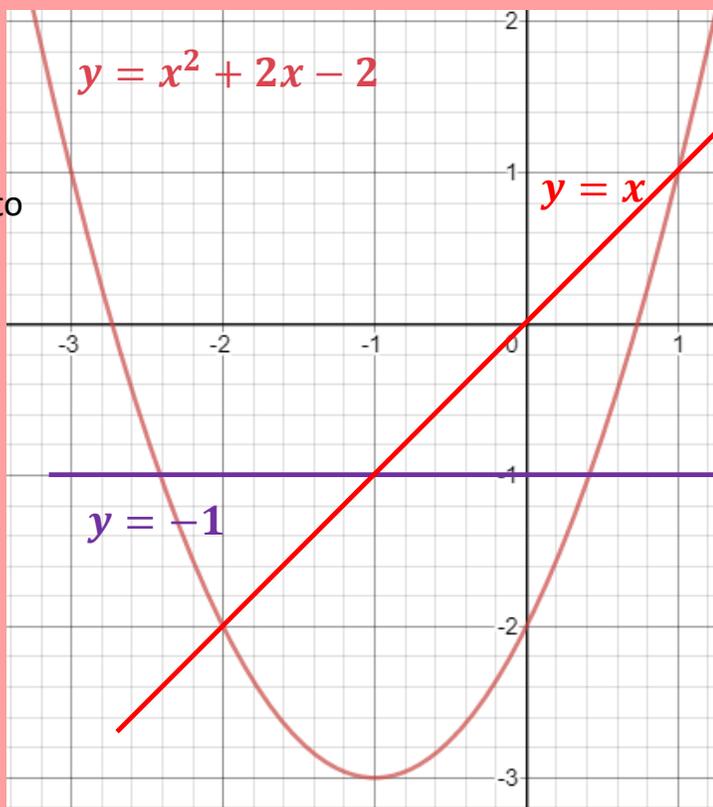
You can use this principle to solve related equation to any given graph by drawing on additional lines:

**Example 1:** Using the graph  $y = x^2 + 2x - 2$ , find the approximate solutions to the equation  $x^2 + 2x - 2 = -1$

Plot the equation  $y = -1$ ,  
Where the two graphs cross is an approximate solution:  $x = -2.4$  and  $x = 0.4$

**Example 2:** Using the graph  $y = x^2 + 2x - 2$ , find the approximate solutions to the equation  $x^2 + 2x - 2 = x$

Plot the equation  $y = x$   
Where the two graphs cross is an approximate solution:  $x = -2$  and  $x = 1$



## Solving Quadratic equations algebraically

Quadratic equations can be solve algebraically in a number of ways

- By factorising
- By completing the square
- By using the quadratic formula
- By iteration (or trial and improvement)

## Completing the square

Hegarty : 235-239

Factorising is generally the best first option to try when trying to solve a quadratic equation.

## Factorising

Hegarty : 223-234

Factorising is generally the best first option to try when trying to solve a quadratic equation.

## Quadratic formula

Hegarty : 240-242

Factorising is generally the best first option to try when trying to solve a quadratic equation.

## KS4 Biology: B6 Preventing and treating disease

Key term	Definition
Vaccine	Dead or inactive pathogenic material used in vaccination to develop immunity to a disease in a healthy person.
White blood cells	<b>Macrophages ingest</b> pathogens ( <b>phagocytosis</b> ), <b>lymphocytes</b> produce <b>antibodies</b> , other white blood cells produce <b>antitoxins</b> .
Antibody	Special proteins that target particular bacteria or viruses and destroy them. You need a <b>unique antibody for each type of pathogen</b> . When your white blood cells have produced antibodies once against a pathogen, they can be made <b>very quickly</b> if that pathogen enters your body again.
Antitoxin	Made by white blood cells, these counteract (cancel out) toxins made by pathogens.
Antigen	Proteins on the surface of cells that act like markers – your immune system can detect antigens that are not your own.
Antibiotic	Cure bacterial diseases by killing the bacterial pathogens inside your body.
Placebo	A medicine that does not contain the active drug being tested, used in clinical trials of new medicines.
Double blind trial	Neither patient or prescribing doctor know if they are taking/giving the drug or the placebo so they cannot be <b>bias</b> .
Mutate	Change in DNA.
Pre-clinical testing	Carried out on a potential new medicine in a laboratory using cells, tissues, and live animals.
Clinical testing	Test potential new drugs on healthy and patient volunteers for safety, efficacy and dosage.

### Vaccination

Introduce a small quantities of **dead** or **inactive** forms of a **pathogen** into the body to stimulate the **white blood cells** to produce **antibodies**. If the same pathogen re-enters the body the WBC respond quickly to produce the correct **antibodies**, preventing **infection**.  
MMR = measles, mumps, rubella vaccine

### Herd immunity

If a large proportion of the population is immune to a pathogen, spread of the pathogen is reduced. Vaccination can speed up herd immunity e.g. measles.

### Antibiotics e.g. penicillin

Kill bacteria whilst they are inside the body without damaging body cells – either taken as a pill or put straight into the blood stream.

#### Specific bacteria treated by specific antibiotic.

Decreased deaths from bacterial infections but some bacteria are now becoming resistant to antibiotics eg MRSA.

**To prevent this:** don't prescribe for viral infections, limit use in agriculture, take the full course.

**ANTIBIOTICS DO NOT TREAT VIRAL INFECTIONS.**

### Treating symptoms:

**Viruses have no cure** (it is difficult to develop drugs that kill viruses without damaging the body's tissues).

You can treat the symptoms of both viral and bacterial infection though.

e.g. Aspirin and paracetamol are pain killers.

e.g. Ibuprofen targets inflammation.

<https://www.enhancetv.com.au/video/operation-ouch-what-is-a-vaccine-and-herd-immunity/63222>

## Discovery and development drugs

Traditionally drugs were extracted from plants and microorganisms.



- The **heart drug digitalis** originates from **foxgloves**.



- The painkiller **aspirin** originates from **willow**.



- Penicillin** was discovered by **Alexander Fleming** from the **Penicillium** mould.

- New drugs synthesised by chemists in the pharmaceutical industry. The starting point may still be a chemical extracted from a plant.

**New medical drugs** have to be tested for:

- Toxicity** – is it safe to use do the benefits outweigh the side effects?
- Efficacy** – does it prevent, cure a disease or make you feel better?
- Dosage** – how much to take to be effective but limit side effects?

**Preclinical testing** – done in a laboratory using cells, tissues and live animals.

**Clinical trials** – **healthy volunteers and patients.**

- Very low doses of the drug and given at the start of the clinical trial.
- If the drug is found to be safe, further clinical trials are carried out to find the **optimum dose** for the drug.
- In **double blind trials**, some patients are given a **placebo**.

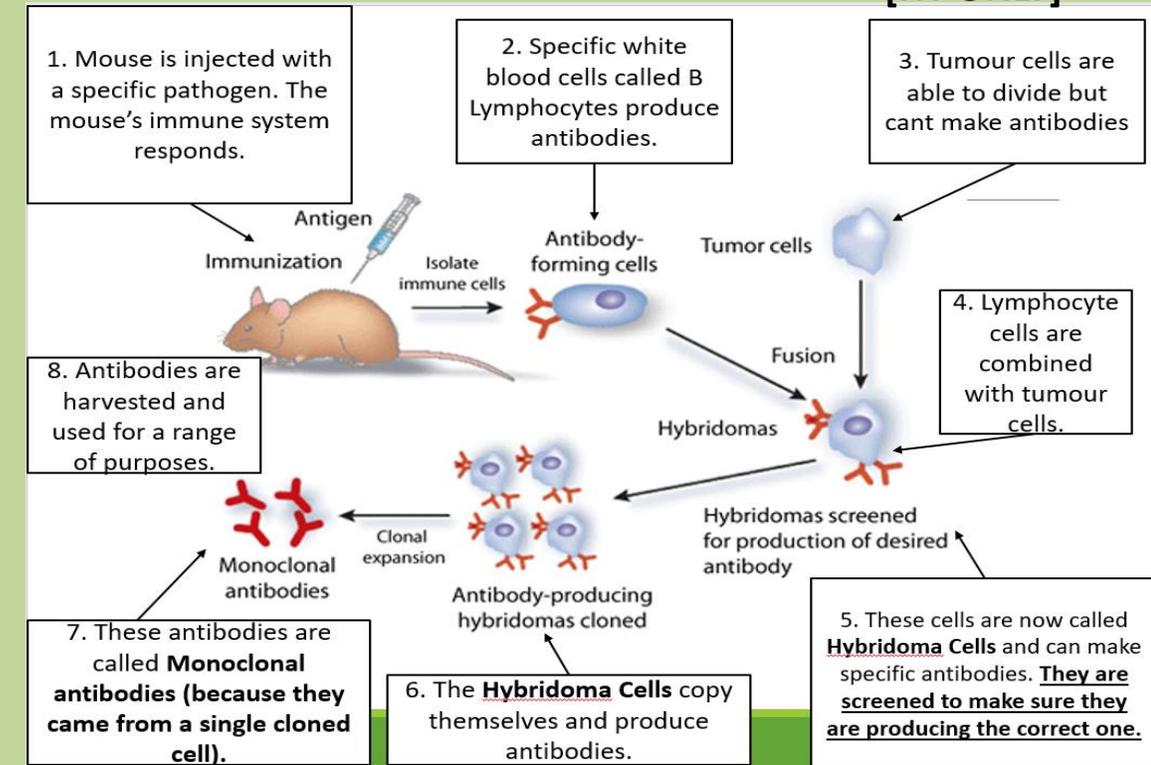
## Biology only - Uses of monoclonal antibodies

[HT ONLY]

- For diagnosis eg **pregnancy kits**
- In laboratories to **measure levels of hormones** and other chemicals in the blood or **detect pathogens**.
- In research to **locate** or **identify** specific molecules in a cell or tissue by **binding them to a fluorescent dye**.
- To **treat** some **diseases**: for **cancer**, the monoclonal antibody can be bound to a **radioactive substance, a toxic drug or a chemical which stops cells growing and dividing**. It delivers the substance to the cancer cells without harming other cells in the body.

## Biology only - Making monoclonal antibodies

[HT ONLY]



Key word	Definition	[HT ONLY]
Clone	Identical copy	
B Lymphocyte	White blood cells that produce antibodies	
Tumour cell	Cells able to divide repeatedly	
Hybridoma cell	Cells made in a lab by fusing antibody specific B-lymphocytes and tumour cells together. Once screened and cloned, they produce monoclonal antibodies.	

## KS4 Biology: B7 Non-communicable diseases

Key term	Definition
Non-communicable diseases	Are <b>not infectious</b> and <b>cannot be passed from one organism to another</b> .
Carcinogen	Agents that <b>cause cancer</b> or significantly increase the risk of developing cancer.
Ionising radiation	Has enough <b>energy</b> to cause <b>ionisation</b> in the material it passes through, which in turn can make them biologically active and may result in <b>mutation</b> and <b>cancer</b>
Correlation	An apparent <b>link</b> or relationship between <b>two factors</b> .
Causal mechanism	Something that explains how one factor influences another.
Mutation	A change in the genetic material of an organism.
Benign tumour	<b>Growths of abnormal cells</b> that are contained in <b>one area</b> , usually within a membrane, and <b>do not invade</b> other tissues.
Malignant tumour	<b>Invade neighbouring tissues</b> and <b>spread to different parts of the body</b> in the blood where they form <b>secondary tumours</b> . They are also known as <b>cancers</b> .



**Health** is the state of being free from **illness** or **disease**. It refers to **physical** and **mental** wellbeing.

Disease and lifestyle **risk factors** such as diet, smoking, alcohol consumption and the use of illegal drugs, can all impact the health of a person.



Some conditions are linked with certain lifestyle choices and **causal mechanisms have been proven**:

- **Liver conditions** associated with poor **diet and prolonged excessive alcohol consumption**.
- **Lung cancer** is linked to **smoking**.
- Memory loss, poor physical health and hygiene are associated with the use of illegal or recreational drugs.
- **Obesity and diabetes** are associated with poor diet.

To study these risk factors, **samples of the population** have been selected to study the correlations.

To select the groups, scientists try to find:

- **LARGE SAMPLE GROUPS** – the more people the more reliable the data.
- **Controls**:
  - Age
  - Gender
  - Lifestyle (diet, exercise)

Impact of disease:

- On families: financial cost if a wage-earner cannot work.
- On Local communities: cost of supporting people wither through taxes or by taking care of affected families.
- On the Nation: expense of treating ill people, loss of money earned when large amount of people are ill.
- Globally: economy suffers especially if young people are ill.
- **Non-communicable diseases affect far more people that communicable diseases so have more impact on human and economic levels.**

## Cancer

The result of changes in cells that lead to **uncontrolled growth and division**.

### Benign tumour

Usually grow slowly.

Usually grow within a membrane and can be easily removed.

Can cause damage to organs and be life-threatening e.g. brain tumours have no space to grow and can put pressure on the brain.

Does not spread around the body

Does not normally grow back.

### Malignant tumour

Usually grow rapidly.

Cancerous

Cells can break away and cause secondary tumours to grow in other areas of the body.

Can spread around the body, via the bloodstream.

**Causes:** Some **genetic** risk factors e.g. early breast cancer, **mutations from carcinogens** e.g. tar in tobacco or asbestos, **ionising radiation** too much UV light from sunlight and X-rays.

**Treatments:** Radiotherapy which stops mitosis or Chemotherapy which causes cells to self-destruct.

## Smoking

Cigarettes produce around 4000 different chemicals that are inhaled into the throat, trachea and lungs. **150 of these are linked to disease.**

**Nicotine:** addictive.

**Carbon monoxide:** reduces the ability of red blood cells to carry oxygen for respiration.

**Smoking in pregnancy:** reduces the oxygen available for the foetus can lead to:

- Premature birth
- Low birthweight
- Still birth, when the baby is born dead.

**Cilia damage:** cilia become anaesthetised by some of the cigarette chemicals so dirt and mucus not removed from trachea and bronchi leading to increased risk of infection.

**Carcinogens:** tar can cause cancer of throat, larynx, trachea and lungs.

**Tar:** thick sticky black chemical can increase risk of bronchitis and COPD (chronic obstructive pulmonary disease). Can lead to breathlessness and death.

**Heart:** smokers are more likely to have cardiovascular problems, narrowing of blood vessels also causes you to look older.

## Diet, exercise, obesity

If you eat too much, the excess is stored as **fat**.

Being obese can lead to: **type 2 diabetes, high blood pressure and heart disease.**

**Exercise** increases heart fitness and lung capacity. You also get more muscle which does more respiration using more energy from food.

**Type 2 diabetes** cells stop responding to insulin so blood glucose levels rise too high.

**Causes problems in:**

- Circulation
- Kidney function
- Eyesight

**Type 2 diabetes can often be controlled by low carbohydrate diet and exercise.**

## Alcohol

Alcohol is addictive. After drinking, ethanol is absorbed into the blood and can pass easily into other tissues e.g. the brain.

In small amounts:

- Relaxed, cheerful, reduced inhibitions.

In larger amounts:

- Lack of self-control, lack of judgement.
- Possibly unconsciousness, coma, death.

Longer term addiction:

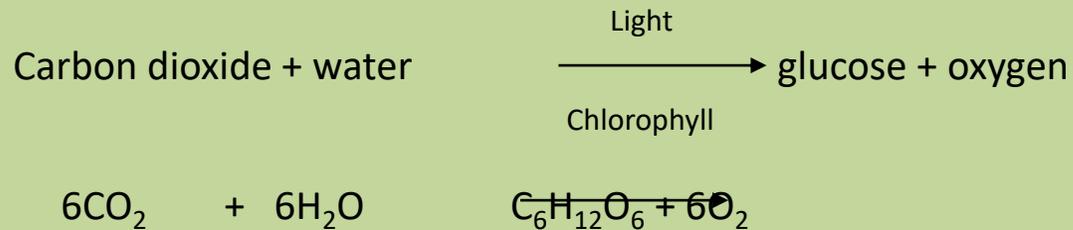
- Cirrhosis of the liver (scarring of the liver tissue).
- Cancer of the liver.
- Brain damage.

In pregnancy:

- Alcohol can pass through the placenta.
- Can cause miscarriage, stillbirth, premature birth, low birthweight, fetal alcohol syndrome (facial deformities and learning difficulties).

## KS4 Biology: B8 Photosynthesis

Keyword	Definition
Active Transport	The movement of particles against a concentration gradient, requires energy.
Chlorophyll	A green pigment found in chloroplasts which absorbs light for photosynthesis.
Chloroplast	Organelle found in plant cells and algae, site where photosynthesis takes place.
Endothermic Reaction	A reaction where energy is transferred from the environment.
Eukaryote Cell	A complex cell such as a plant.
Guard Cell	A cell found on either side of the stoma which controls their size.
Limiting Factors	A factor which prevents a reaction from going any faster.
Nitrate Ions	Absorbed from the soil combined with glucose to make amino acids, building blocks for protein.
Osmosis	The movement of water molecules across a partially permeable membrane from a region of higher water concentration to a region of lower water concentration.

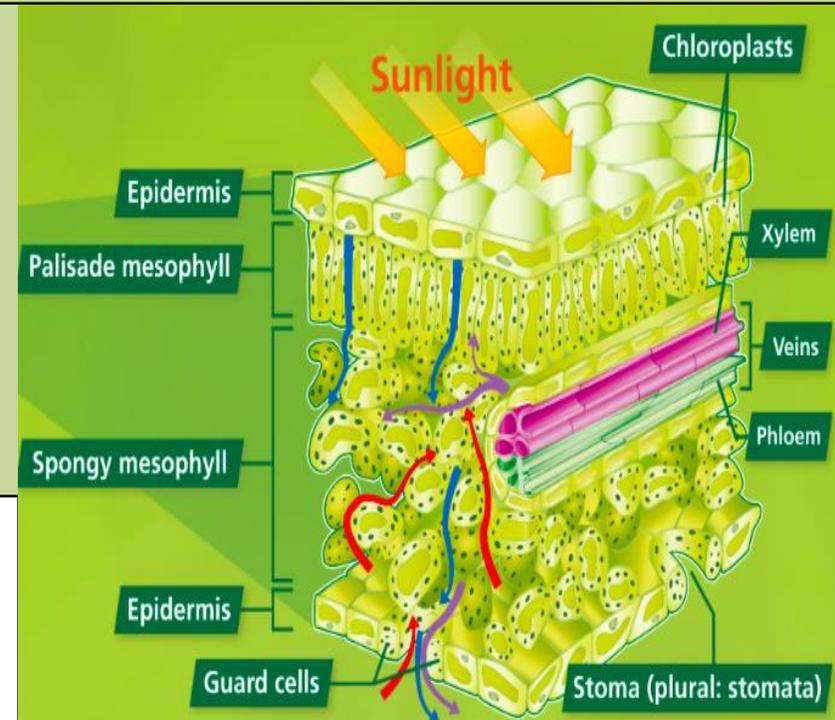


Leaves are specially adapted for photosynthesis.:

- Broad, giving them a large surface area
- Thin, short diffusion distances for the gases.
- Veins, plenty of water in the xylem, removes waste products.
- Air spaces, to allow carbon dioxide to get to the cells and oxygen to leave by diffusion.
- Guard cells, that open and close the stomata to regulate gas exchange.

### Uses of Glucose

- Respiration: to transfer energy from glucose.
- Making cellulose: to make strong cell walls.
- Making amino acids: glucose is combined with nitrate ions to make amino acids which are the building blocks of proteins.
- Stored as oil or fat: glucose is converted into lipids and stored in seeds.
- Stored as starch: stored in roots, stems and leaves as an energy source when the rate of photosynthesis is slow. Storing glucose would cause the cell to absorb water and swell up. Starch is insoluble so does not cause this problem.



### Photosynthesis

- Takes place in chloroplasts in green plant cells they contain pigments like chlorophyll that absorb light.
- Energy is transferred to the chloroplasts from the environment by light – it is an endothermic reaction.

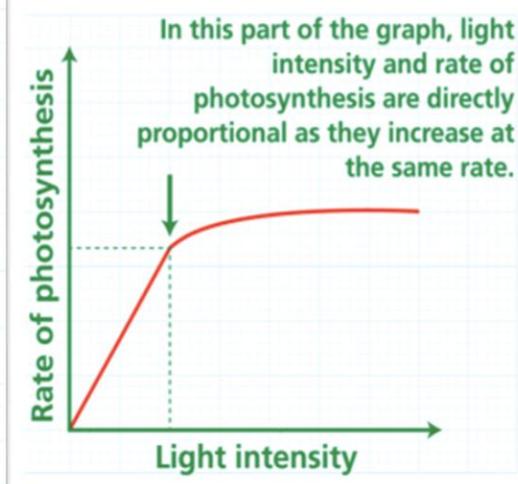
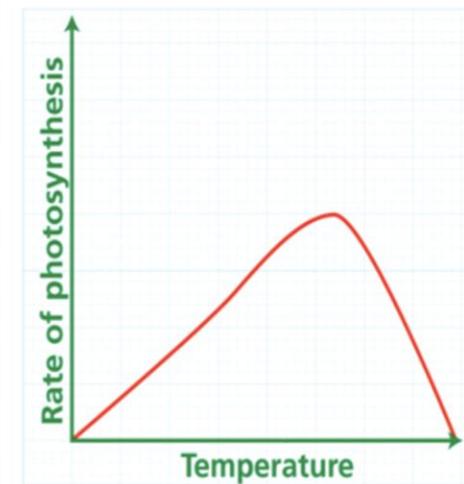
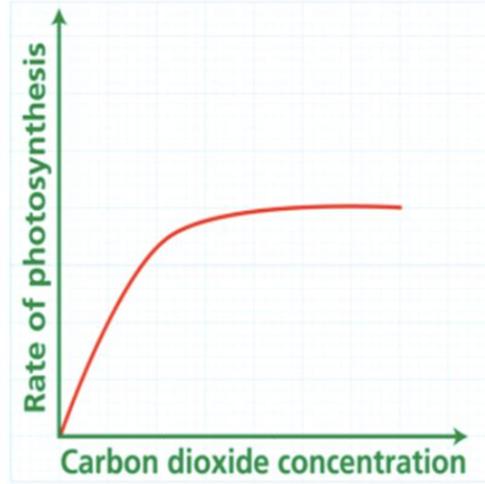
Keyword	Definition
Palisade Mesophyll Cell	Elongated cells, packed closely together with many chloroplasts.
Partially Permeable Membrane	A membrane with tiny holes which lets some molecules through.
Phloem	Type of plant tissue which transports dissolved sugars around the plant.
Photosynthesis	Process by which plants use energy to convert carbon dioxide and water into glucose and oxygen.
Protein	Large biological molecule made up of long chains of amino acids.
Root Hair Cell	Cell on the surface of a plant root which absorbs water and mineral ions. Specially adapted.
Starch	Insoluble carbohydrate used as a store of glucose in plants
Stoma	Tiny hole in the under surface of a leaf where gaseous exchange occurs.
Transpiration	Movement of water from a plant's roots through xylem and out of the leaves.
Xylem	Type of plant tissue which transports water and mineral ions around the plant.

### Interpreting Limiting Factor Graphs

- Initially the rate of photosynthesis increases.
- When the scale on the x axis increases but the scale on the y axis plateaus (levels off) the x axis is no longer the limiting factor.

### Limiting Factors

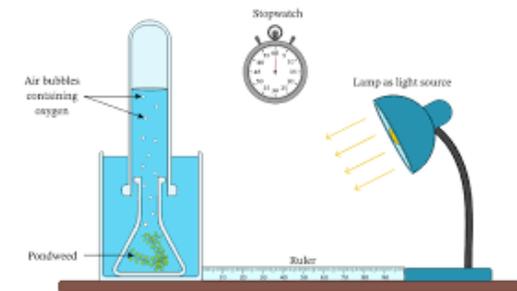
- These three factors can prevent the rate of photosynthesis happening faster:



### Required Practical

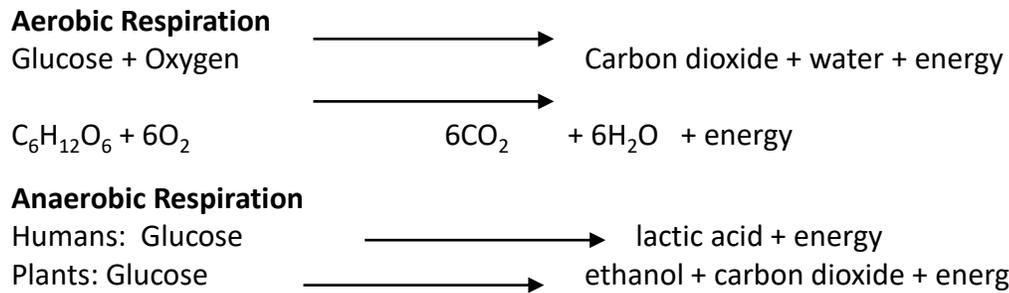
- The effect of light intensity on the rate of photosynthesis.
- Count the number of oxygen bubbles produced by the plant, in a minute.
- Move the plant further away from the lamp.
- Types of plants mentioned in exams:
  - Elodea
  - Immobilised algae balls
- How to improve:
  - Record practical and slow down the bubbles.
  - Use gas syringe and collect volume of oxygen.
- Risk assessment:
  - Keep electrical equipment dry.
  - Lamp bulb will get hot.

Tip: don't worry about the type of plant



**KS4 Biology: B9  
Respiration**

Keyword	Definition
Aerobic Respiration	The reaction involved in breaking down glucose using oxygen to transfer energy.
Alveoli	Tiny air sac in the lungs where gas exchange occurs.
Anaerobic Respiration	The incomplete breakdown of glucose which produces lactic acid in humans and ethanol in plants and yeast.
Breathing	Moving air in and out of the lungs.
Enzymes	A protein that acts as a biological catalyst.  Eg) Protease, lipase, amylase
Eukaryote Cell	Complex cell such as a plant or animal cell.
Exothermic Reaction	Reaction that transfers energy to the environment.
Fermentation	Process of anaerobic respiration in yeast cells.
Glycogen	A molecule that acts as a store of glucose in liver and muscle cells.
Haemoglobin	Red pigment found in red blood cells which carries oxygen.



**Aerobic Respiration**

- Chemical reaction that occurs inside cells in all living organisms.
- Process of transferring energy from the breakdown of glucose.
- Exothermic reaction.
- Aerobic respiration is with oxygen.
- Anaerobic respiration is without oxygen.
- Occurs in mitochondria.

**Energy from Respiration**

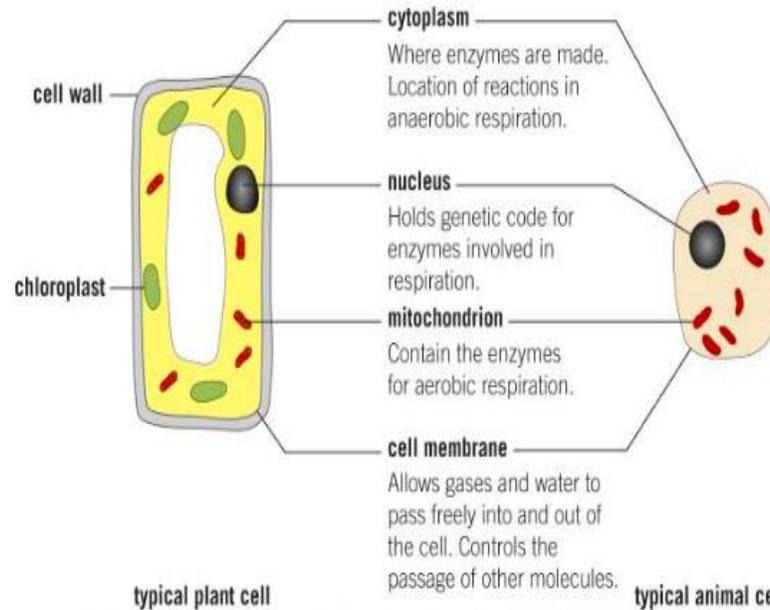
- Chemical reaction that occurs inside cells in all living organisms.
- Process of transferring energy from the breakdown of glucose.
- Exothermic reaction.
- Aerobic respiration is with oxygen.
- Anaerobic respiration is without oxygen.
- Occurs in mitochondria.

**Anaerobic Respiration**

- Without oxygen.
- Useful in emergencies as transfers less energy as glucose is not fully oxidised.

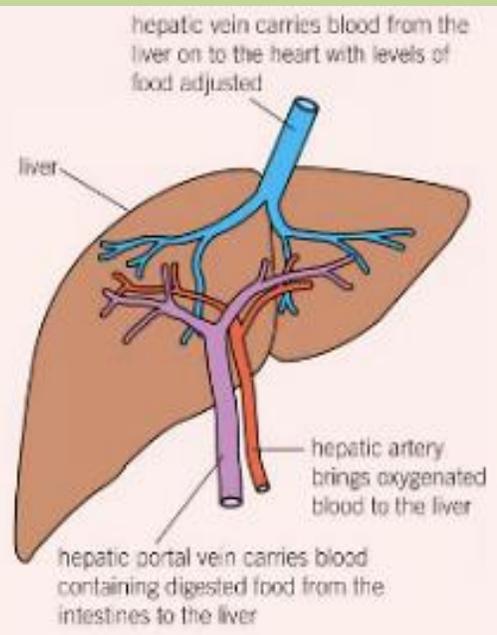
**Oxygen Debt**

- Is the amount of extra oxygen the body needs after exercise to react with the build up of lactic acid and remove it from the cells.
- The pulse and breathing rate stay high whilst there are high levels of lactic acid and carbon dioxide to deliver more oxygen to the cells.
- Lactic acid is also transported to the liver where it is converted back to glucose.



**Figure 1** Aerobic respiration takes place in the mitochondria, but other parts of the cell play vital roles

Keyword	Definition
Lactic Acid	Product of anaerobic respiration that builds up in muscle cells.
Metabolism	All the chemical reactions that happen in a cell or the body.
Mitochondria	Organelle in a cell, site of most of the reactions for aerobic respiration.
Oxygen Debt	The amount of extra oxygen the body needs after exercise to react with the build up of lactic acid and remove it from cells.
Recovery Period	After anaerobic exercise when the heart rate and breathing rate stay higher than normal to repay the oxygen debt.
Red Blood Cell	Transports oxygen around the body and removes carbon dioxide as a waste product.
Respiration	The process of transferring energy from glucose, which goes on in every cell.

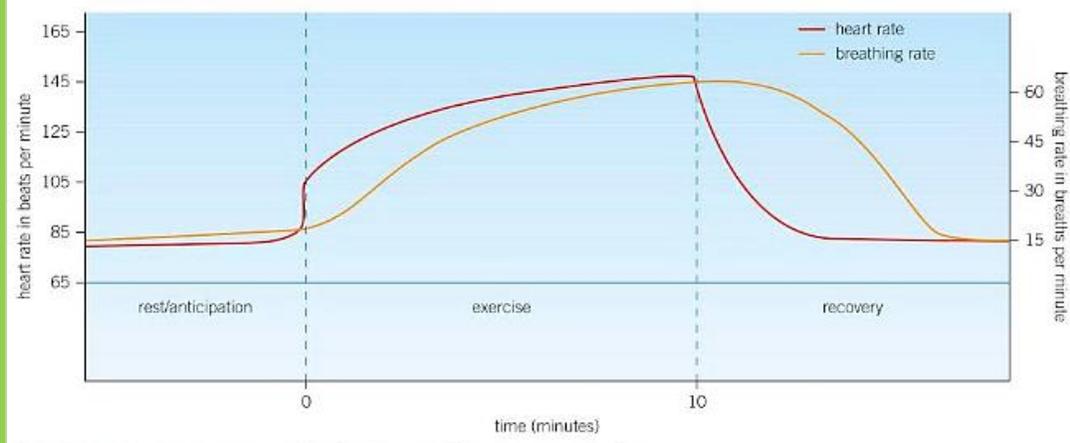


**Exercise**

- When we exercise we need to get more glucose and oxygen to our muscles for respiration.
- The energy that is transferred during respiration is used to enable muscles to contract.
- During exercise the human body responds to the increased demand for energy.
- Body responses to exercise include:
  - An increase in the heart rate, in the breathing rate and in the breath volume.
  - Glycogen stores in the muscles are converted to glucose for cellular respiration.
  - The flow of oxygenated blood to the muscles increases.
- These responses act to increase the rate of supply of glucose and oxygen to the muscles and the rate of removal of carbon dioxide the muscles.

**The role of the liver**

- Detoxifying poisonous substances such as ethanol from alcoholic drinks
- Passing the breakdown products into the blood so they can be excreted in the urine
- Breaking down old, worn out blood cells and storing the iron until it is needed to make more blood cells
- Removing lactic acid, converting it back to glucose



**Figure 2** The changes measured in the heart and breathing rate before, during, and after a period of exercise

**Metabolism**

- Is the sum of all the reactions in the body.
- The energy transferred by respiration in cells is used by the organism for the continual enzyme-controlled processes of metabolism that synthesise new molecules.
- Metabolism includes the conversion of glucose to starch, glycogen and cellulose. Metabolism also includes the formation of lipid molecules, and the use of glucose and nitrate ions to form amino acids, which are used to synthesise proteins and breakdown excess proteins to form urea.

# KS4 Chemistry C6 - Electrolysis

## Electrolysis

When an ionic compound is melted or dissolved in water, the ions are free to move about within the liquid or solution (electrolyte). Electrolytes can conduct electricity.

If an electric current is passed through this solution the ions will move to the electrodes.

**Opposites attract.**

Positive ions (cations) will go to the negative electrode (cathode)

Negative ions (anions) go to the positive electrode (anode).

For example in the electrolysis of lead bromide, Lead ( $\text{Pb}^{2+}$ ) goes to the negative electrode and bromine ( $\text{Br}^-$ ) goes to the positive electrode.

### Links to Further Reading:

<https://www.youtube.com/watch?v=AhTRiL6xjBA&safe=active>

<https://www.bbc.co.uk/bitesize/guides/zpxn82p/revision/1>

Key Term	Definition
Electrolysis	The breaking down of a substance using electricity
Electrolyte	The solution which is being broken down during electrolysis
Oxidation	The loss of electrons
Reduction	The gain of electrons
Anode	The positive electrode
Cathode	The negative electrode
Half Equation	An equation that shows the reaction at each electrode

## Electrolysis of Copper Sulphate

Which elements form at which electrode depends on the **reactivity** of the elements involved. For example, in the electrolysis of aqueous copper sulphate is the electrolysis of copper sulphate, however there are also  $\text{H}^+$  and  $\text{OH}^-$  ions from the water which is used as the solvent. This means there is more than one possible ion that can go to each electrode.

**Positive ions:** sodium ( $\text{Cu}^{2+}$ ) and hydrogen ( $\text{H}^+$ )

**Negative ions:** sulphate ( $\text{SO}_4^{2-}$ ) and hydroxide ( $\text{OH}^-$ )

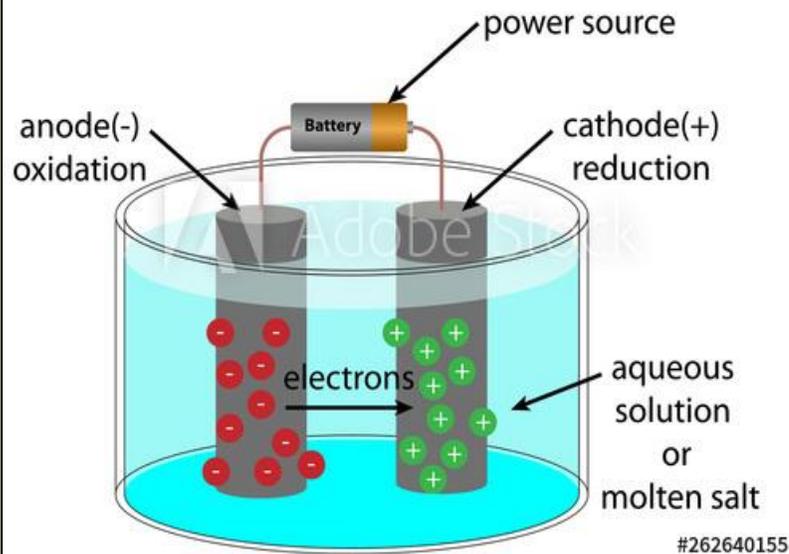
Copper is **less reactive** than hydrogen, so copper ( $\text{Cu}$ ) is produced at the negative electrode.

The half equation is:  $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$

The hydroxide ion is more reactive than the sulphate ion, therefore this **forms water ( $\text{H}_2\text{O}$ ) and oxygen** at the positive electrode.

The half equation is:  $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$

## Electrolysis



### Remember OILRIG – Oxidation is Losing, Reduction Is Gaining (electrons)

When a positive ion reaches the negative electrode, it gains electrons. This is a reduction reaction.

When the negative ion reaches the positive electrode, it loses electrons, this is an oxidation reaction.

**We can represent these using half equations** A half equation can represent the reaction at each electrode. Half equations show how electrons are transferred and an electron is represented in an equation by an  $\text{e}^-$  symbol

Half equations show electrons ( $\text{e}^-$ ) and how ions become atoms. For example  $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ .

1. Write down the ion and atom:  $\text{Cl}^- \rightarrow \text{Cl}_2$
2. Adjust the number of ions (if needed) and add electrons to balance the charges if required  $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$

**Remember that non-metal ions will typically form diatomic molecules.**

### Extracting Aluminium from bauxite

Aluminium oxide is dissolved in molten cryolite .

Cryolite reduces the melting point of aluminium oxide so the process requires less energy.

Aluminium ions ( $\text{Al}^{3+}$ ) are attracted to the negative electrode.

Aluminium atoms are formed at the negative electrode (gain 1 electron)

Oxide ions are attracted to the positive electrode

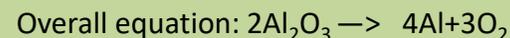
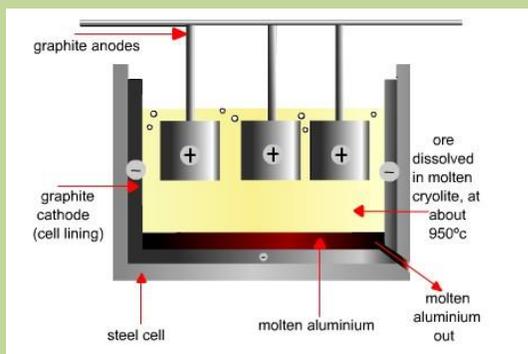
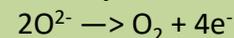
Oxygen is formed at the positive electrode (each ion loses 2 electrons)

Oxygen reacts with carbon to make carbon dioxide. This electrode needs to be replaced constantly.

#### At the negative electrode:



#### At the positive electrode



### Electrolysis of Brine – required practical

Which elements form at which electrode depends on the **reactivity** of the elements involved.

The electrolysis of brine is the electrolysis of a solution of sodium chloride so there are also  $\text{H}^+$  and  $\text{OH}^-$  ions from the water which is used as the solvent. This means there is more than one possible ion that can go to each electrode.

- **Positive ions:** sodium ( $\text{Na}^+$ ) and hydrogen ( $\text{H}^+$ )
- **Negative ions:** chlorine ( $\text{Cl}^-$ ) and hydroxide ( $\text{OH}^-$ )

When there is a mixture of ions, the products formed depend on the reactivity of the elements involved.

Hydrogen is less reactive than sodium, so hydrogen gas ( $\text{H}_2$ ) is produced at the negative electrode.

Chlorine gas ( $\text{Cl}_2$ ) is produced at the positive electrode.

Sodium hydroxide is produced from the ions that remain in solution.

### Rules if there is more than one positive or negative ion present

If there are 2 positive ions present, the least reactive element gets discharged

If there are 2 negative ions present the halogen (if present) will be discharged first.

### Types of ions

Metals and hydrogen form positive ions e.g.  $\text{H}^+$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$

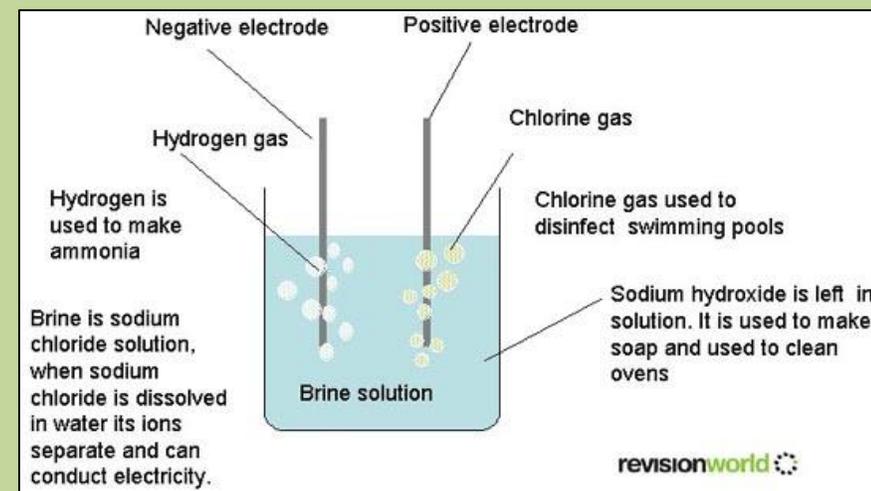
Non-metals form negative ions e.g.  $\text{O}^{2-}$ ,  $\text{Cl}^-$ ,  $\text{OH}^-$

The formula of the compound formed depends on the charges on the ions and the number of positive and negative ions needed to form a neutral compound.

### Gas Tests

During electrolysis the products made are often gases. Below are the tests for three common gases you need to know

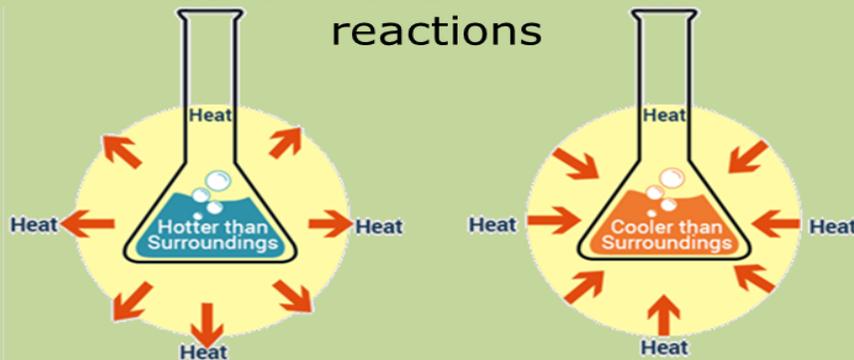
Gas	Test	Result
Hydrogen	Place a lit splint into the gas	If a squeaky pop is heard hydrogen is present
Oxygen	Place glowing splint into gas	If splint is relighted then oxygen is present
Chlorine	Damp litmus paper placed in gas	If paper bleaches chlorine is present
Carbon Dioxide	Bubble the gas through limewater	If the limewater goes cloudy carbon dioxide is present



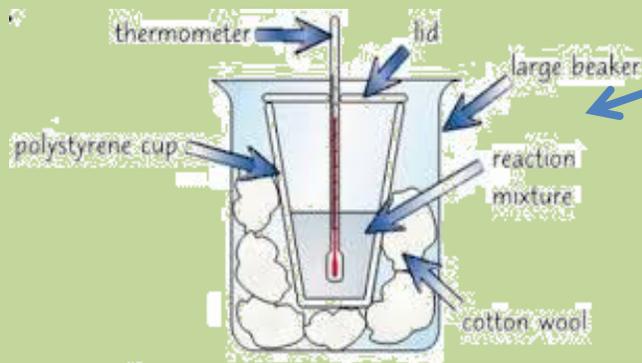
# KS4 Chemistry: C7 Energy changes

Keyword	Definition
Activation energy	The amount of energy required for reactants to react successfully
Bond energy	the amount of energy needed to break one mole of a particular bond.
Endothermic	A reaction that takes in more energy from the surroundings than it gives out
Exothermic	A reaction that gives out more energy to the surroundings than it takes in
$\Delta H$	The change in energy between reactants and products
Electrical cell	
Fuel cell	A device that produces voltage when supplied with fuel and oxygen
Reaction profile	Graph showing the energy in both reactants and products- including the difference between them

## Exothermic vs Endothermic reactions



Energy can not be created or destroyed- only transferred from one form to another. Heat is an example of energy, in Exothermic reactions heat is transferred to the surroundings from the reaction and in Endothermic reactions heat is transferred from the surroundings to the reactions



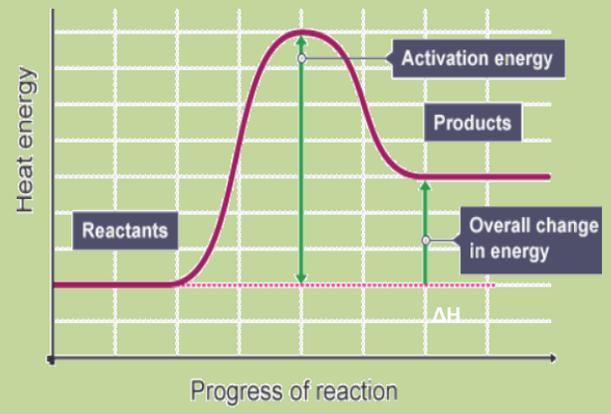
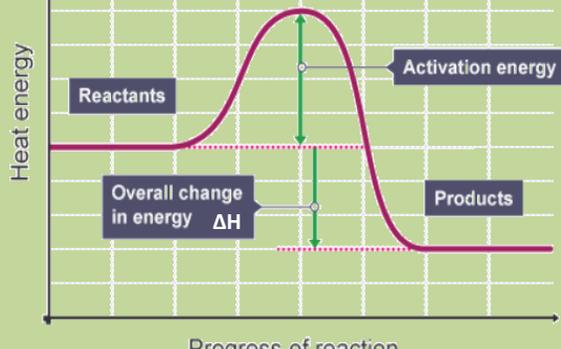
### Examples

Exothermic	Endothermic
Respiration	Photosynthesis
Neutralisation	Instant ice packs
Self heating cans	Thermal decomposition

When investigating exothermic and endothermic reactions- be sure to insulate the container and add a lid to prevent energy transfer to or from the outside of the container (giving you more accurate results)

Endothermic  
Products higher than reactants

Exothermic  
Reactants higher than products



<b>Bond breaking</b>	Bonds need to be broken between the <u>reactants</u> before bonds can be made to form the products. Energy has to be taken in to break a bond, so <u>bond breaking is always endothermic.</u>
<b>Bond making</b>	To form bonds between the <u>product</u> molecules, energy is released, so <u>bond making is always exothermic.</u>

## Bond energy calculations (Higher)

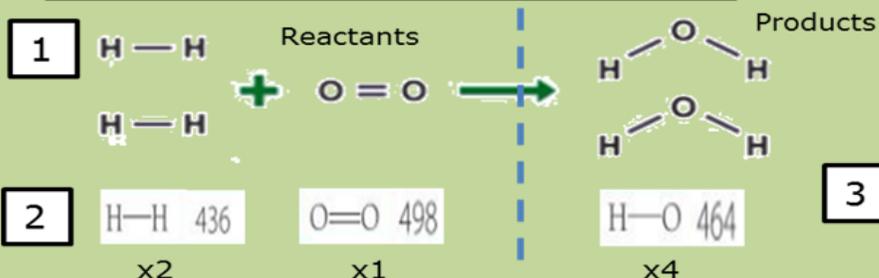
Bond energy calculations tell us the energy changes in a reaction. This ultimately determines if it is endothermic or exothermic.

We do this by working out the energy released from a bond and the energy required to break a bond

Bond	Bond energy in kJ/mol	Bond	Bond energy in kJ/mol
C—C	347	H—Cl	432
C—O	358	H—O	464
C—H	413	H—N	391
C—N	286	H—H	436
C—Cl	346	O=O	498
Cl—Cl	243	N≡N	945

1. Draw displayed formula for all molecules in the reaction.
2. Add up energy values for all bonds in reactants. (Bond breaking)
3. Add up energy values for all bonds in products. (Bond making)
4. Use the formula to calculate the energy change.

$$\text{Energy change} = \text{Energy of bond breaking (Reactants)} - \text{Energy of bond making (Products)}$$



$$872\text{kJ/mol} + 498\text{kJ/mol} = 1370\text{kJ/mol} \quad 1856\text{kJ/mol}$$

$$\text{Energy change} = \text{Energy of bond breaking (Reactants)} - \text{Energy of bond making (Products)}$$

**4**

$$1370\text{kJ/mol} - 1856\text{kJ/mol} = -486\text{kJ/mol}$$

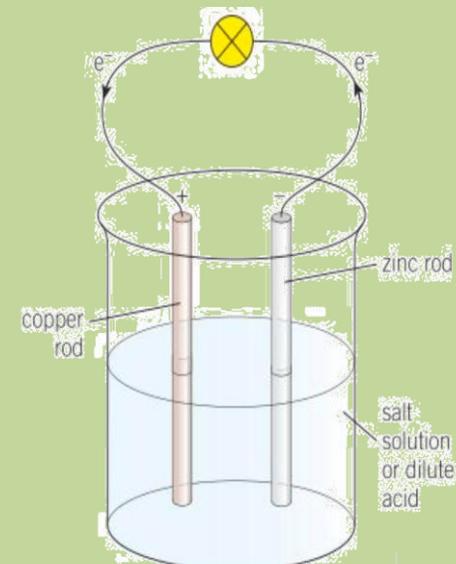
## Chemical and fuel cells (Chem only)

A chemical cell can be made by connecting 2 metals of different reactivity in an electrolyte solution.

The more reactive metal will lose its electrons and form a positive ion.

The potential difference in charge between the two metals creates voltage.

**The larger the gap in reactivity between the metals- the larger the voltage of the cell**



Oxygen gas is supplied to the positive electrode.

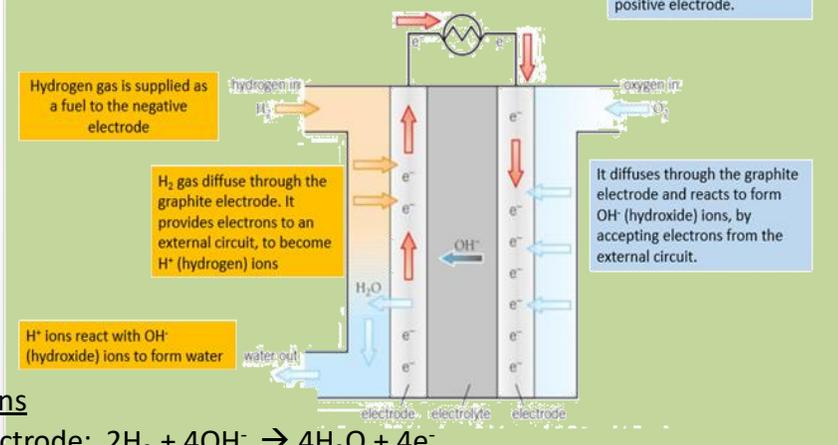
You can also make a cell by reacting hydrogen and oxygen to make water

### Pros

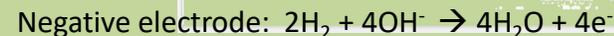
- Does not need to be electrically recharged
- No pollutants produced

### Cons

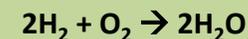
- Hydrogen is difficult to store
- Is highly flammable
- Is sometimes produced using finite resources



### Half equations



Full equation once spectator ions and water has been balanced out is



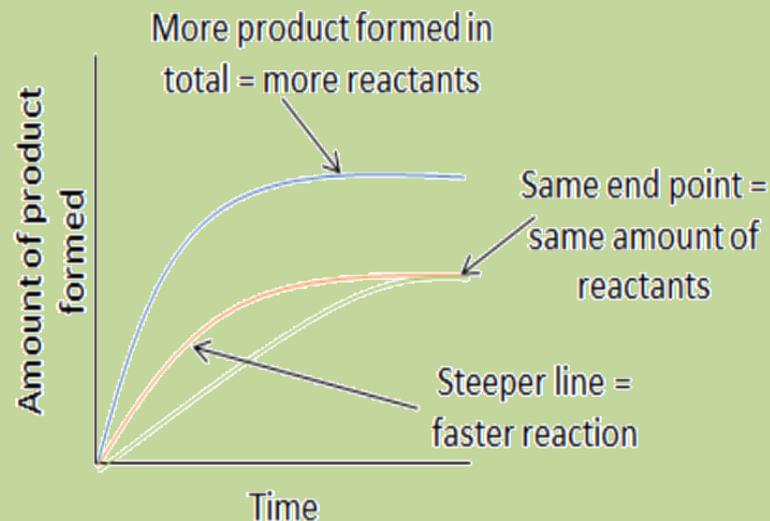
### Further reading

- <https://www.bbc.co.uk/bitesize/guides/zsxn82p/revision/1>
- <https://www.youtube.com/watch?reload=9&v=L7829UGifpM>
- <https://www.bbc.co.uk/bitesize/guides/z2396yc/revision/1>

## KS4 Chemistry: Rates of reaction

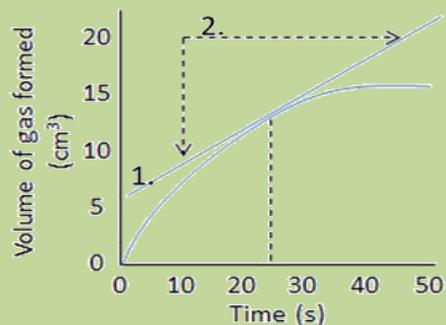
Key word	Definition
Reactant	What is used in a chemical reaction
Product	What is produced during a reaction
Catalyst	A chemical that increases the rate of reaction without being used up in the reaction
tangent	A straight line that touches the curve on a graph at one point
Activation energy	The minimum energy required for a chemical reaction to take place
Collision theory	The theory that states for a chemical reaction to happen, particles must collide with sufficient energy
Le Chatelier's principle	A principle which states, "If a system is at equilibrium and a change is made to any of the conditions, then the system responds to counteract the change"
Reversible reaction	A reaction that can form both products and reactants
Dynamic Equilibrium	An equilibrium where the forward and backward reactions are happening at the same rate
Rate of reaction	The speed at which products are formed
Closed system	A reaction that no reactants or products can escape, only heat can be exchanged freely

During chemical reactions- it is often important that we know the rate at which the reaction occurring- This is the "speed" at which reactants are turning into products. This can be shown on a graph



You can calculate the rate of reaction using two main methods which are either the amount of reactant used or product formed  $\div$  time. OR you can take the gradient of a tangent using a graph- example shown below

To calculate the rate of reaction at 20 seconds:



$$\begin{aligned} \text{Rate of reaction} &= \text{change in } y \div \text{change in } x \\ &= (20 - 10) \div (45 - 10) \\ &= 0.29 \text{ cm}^3/\text{s} \end{aligned}$$

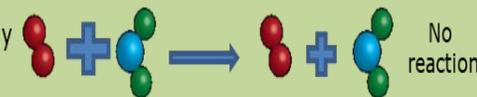
OR

## Collision theory

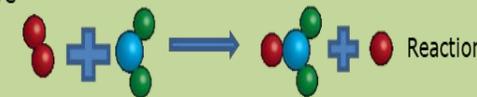
For a chemical reaction to happen:

- reactant particles must collide with each other
- the particles must have enough energy for them to react (this is called the activation energy)

Reactants do not have enough energy on collision



Reactants have or exceed activation energy on collision



Mean rate of reaction

$$\begin{aligned} &\text{amount of product formed} \\ &\text{or} \\ &= \frac{\text{amount of reactant used}}{\text{time (s)}} \end{aligned}$$

1. Draw a tangent at the point you want to calculate rate.

2. Pick any two points along the tangent. Chose points that give easy to work with numbers.

3. Calculate the change in x and y.

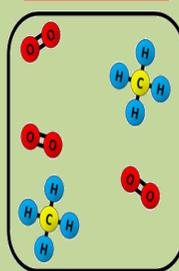
There are 4 main factors you can change to affect the rate of reaction

- Temperature
- Pressure/concentration
- Surface area
- Using a catalyst

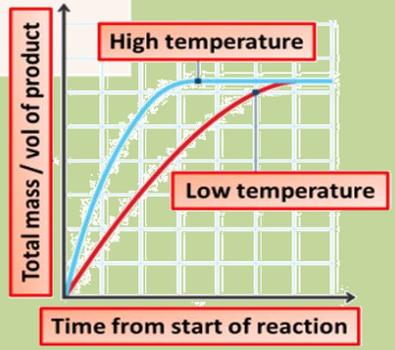
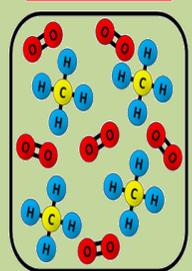
How these factors affect the rate is shown below

Effect of conditions on rate of reaction		
Temperature	Increase	Decrease
Effect on rate of reaction	Increase—more kinetic energy, more chance of collisions	Decrease—less kinetic energy, less chance of collisions
Pressure/concentration	Increase	Decrease
Effect on rate of reaction	Increases, more particles to collide in a smaller space	Decrease, less particles to collide in a larger space
Surface area of reactants	Increase	Decrease
effect on rate of reaction	More particles available to react	Less particles available to react
Catalyst	Present	Not Present
effect on rate of reaction	Faster, provides an alternative route with a lower activation energy	Slower

Low concentration



High concentration

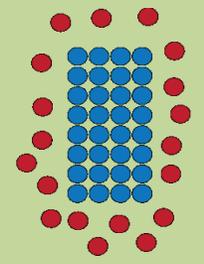


**Reversible reactions**

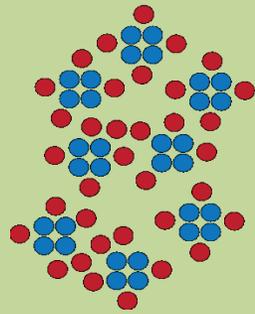
A reversible reaction is where the products can react together to form the reactants



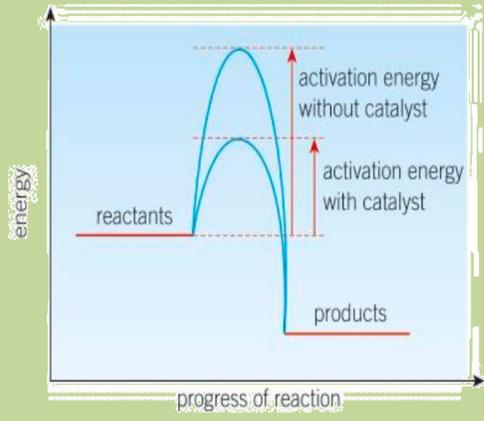
We use this symbol to show the reaction is reversible



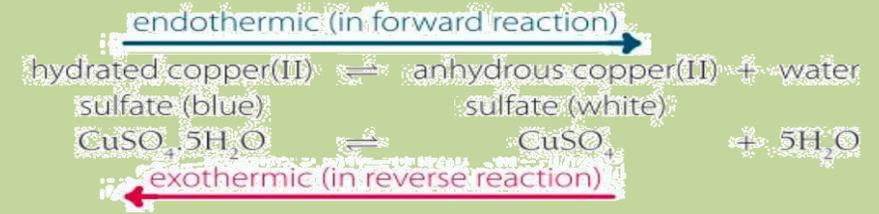
Smaller surface area - red reactants can't react with central blue atoms



Larger surface area - red reactants can react with all the blue atoms



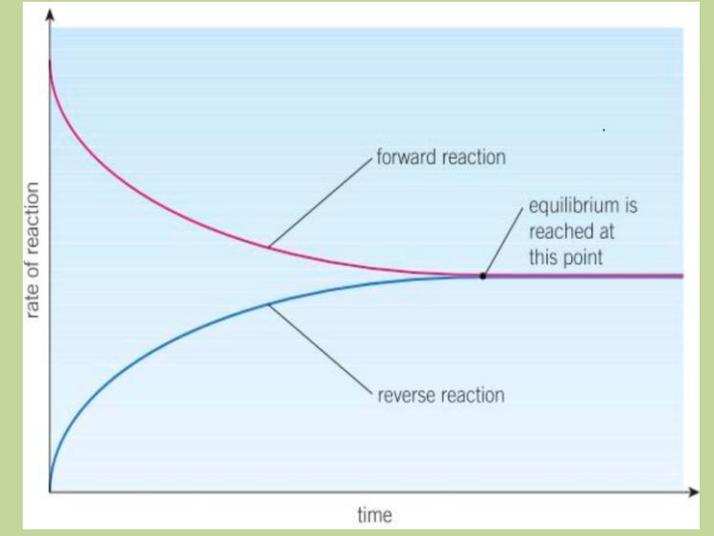
An example of a reversible reaction is shown below



Reactions will always have an exothermic reaction in one direction and an endothermic in the other (shown in example above). This energy transferred to or from the environment in either direction of the reaction is always equal

**Dynamic equilibrium**

In a reversible reaction, dynamic equilibrium happens once the forward reaction (making products) is equal in rate to the reverse reaction (forming reactants) an example is shown on the graph below



## Le Chatelier's principle (Chemistry higher)

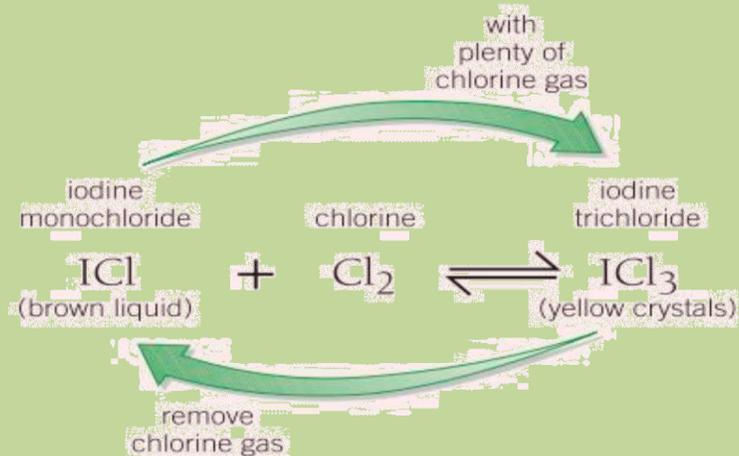
Le Chatelier's principle is a principle that a reversible reaction will "work against" any changes made to the reaction so that it is cancelled out. The changes made can be either

- Temperature
- Concentration
- Pressure

An example can be seen below with iodine monochloride and its reaction with chlorine gas

If you add a large concentration of chlorine gas then the forward reaction (producing iodine trichloride and no chlorine) is favoured due to Le Chatelier's principle. However, if the concentration of chlorine gas is lowered then the reverse reaction is favoured- producing more chlorine gas

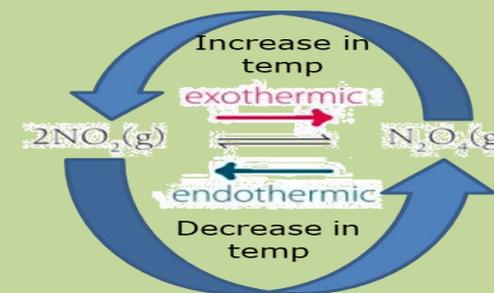
Le Chatelier's principle is important as we can use it in industry to change the conditions of a reaction to favour a product we wish to make



## Le Chatelier's principle- the effects of temperature and pressure on a reaction (Chemistry higher)

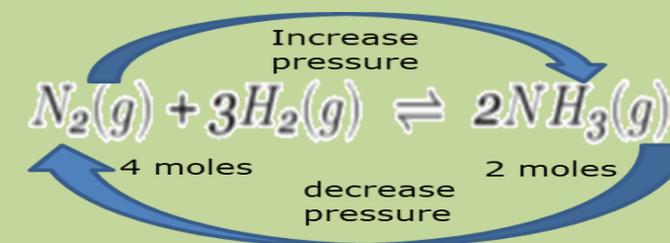
### Temperature

In a closed system- the effect of temperature on a reversible reaction depends on which reaction is exothermic or endothermic. if the forward reaction is endothermic then increasing the temperature will decrease the amount of product formed and increase the amount of reactants formed. The opposite is true if the forward reaction is endothermic



### Pressure

If a balanced gaseous reaction has more moles of gas on one side than another then increasing the pressure will favour the reaction producing fewer moles



### Summary

If the forward reaction produces *more* molecules of gas ...

... an increase in pressure decreases the amount of products formed.

... a decrease in pressure increases the amount of products formed.

If the forward reaction produces *fewer* molecules of gas ...

... an increase in pressure increases the amount of products formed.

... a decrease in pressure decreases the amount of products formed.

If the forward reaction is exothermic ...

... an increase in temperature decreases the amount of products formed.

... a decrease in temperature increases the amount of products formed.

If the forward reaction is endothermic ...

... an increase in temperature increases the amount of products formed.

... a decrease in temperature decreases the amount of products formed.

### Further reading

<https://www.bbc.co.uk/bitesize/guides/z3nbqhv/revision/1>

<https://www.bbc.co.uk/bitesize/guides/zyhvw6f/revision/2>

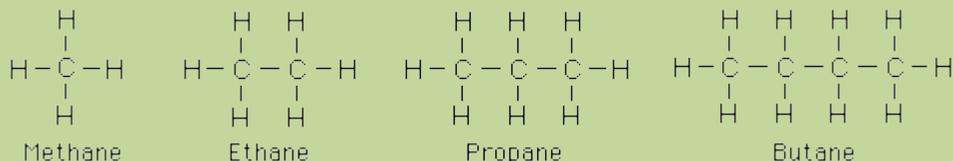
<https://www.physicsandmathstutor.com/chemistry-revision/gcse-aqa/rate-and-extent-of-chemical-change/>

<https://www.youtube.com/watch?v=7i90fiz9SmY>

## KS4 Science – C9 Crude Oil and Fuels

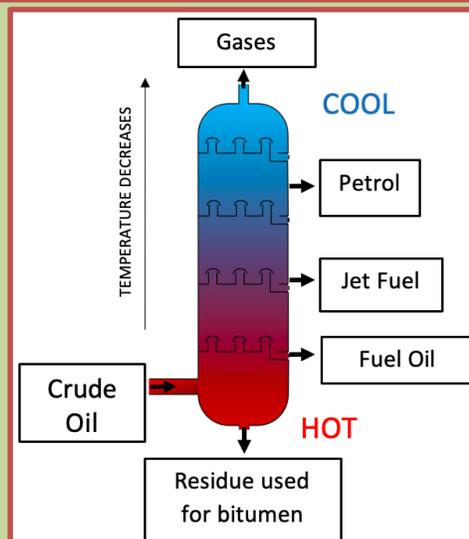
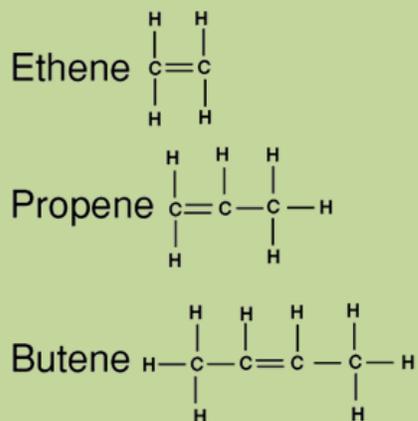
Crude oil is a mixture of hydrocarbon fractions with different boiling points.

The first 4 alkanes look like this:



You need to learn their names..

The alkenes all have a double bond between 2 carbon atoms.



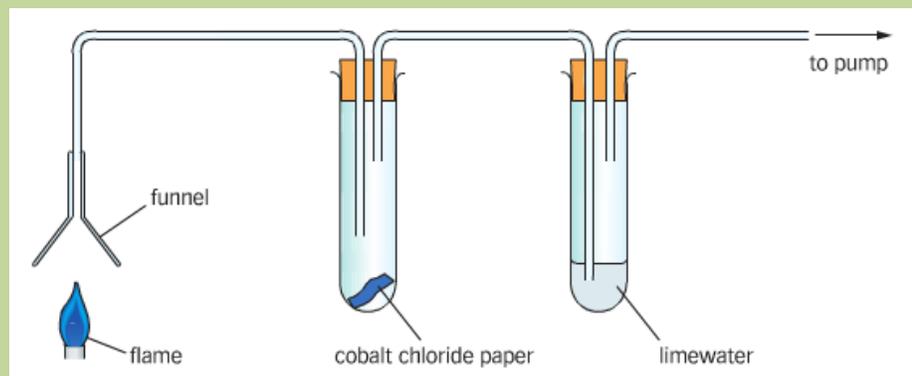
The fractions are separated using the process of **FRACTIONAL DISTILLATION**. Each fraction has a different boiling point. The crude oil is **HEATED** until all the fractions are vaporised. Then each fraction **CONDENSES** at its boiling point. It is cooler at the top of the column.

The smaller molecules are **MORE VOLATILE** and have lower boiling points: they condense at the top of the column or come out as gases. The larger molecules are **MORE VISCOUS** and have higher boiling points. They condense at the bottom of the column.

Key Word	Definition
Mixture	Made of two or more substances not chemically bonded together
hydrocarbon	A compound containing only hydrogen and carbon
Fraction	Hydrocarbons with similar boiling points separated from crude oil
Distillation	Separation of 2 or more liquids with different boiling points
Fractional Distillation	Using evaporation and condensation to separate liquids from a mixture
Alkane	Saturated hydrocarbon with the general formula $C_nH_{2n+2}$
Alkene	Unsaturated hydrocarbon containing a double $C=C$ bond with the general formula $C_nH_{2n}$
Flammable	Easily ignited and capable of burning rapidly
Viscous	A liquid resistant to flow or pouring (or "thick") is called viscous
volatile	A liquid with a low boiling point is called volatile
Oxidised	Describes a substance that has had oxygen added to it, or has lost electrons
Complete combustion	The reaction that occurs when fuels are burnt in plenty of air, producing carbon dioxide and water as products
Incomplete combustion	The reaction that occurs when fuels are burnt in not enough oxygen, producing carbon monoxide and water as products
Cracking	The reaction that breaks down long hydrocarbons into smaller, more useful ones
Saturated	A hydrocarbon with only single bonds between its carbon atoms
Unsaturated	A hydrocarbon whose molecules contain at least one carbon-carbon double bond
Thermal decomposition	The breakdown of a compound by heating it
Bromine Water	An orange liquid that turns colourless in the presence of alkenes

Fraction	BOILING POINT	VISCOSITY	FLAMMABILITY	CHAIN LENGTH
Refinery Gas	INCREASE	INCREASE	DECREASE	INCREASE
Petrol				
Naphtha				
Kerosine				
Diesel				
Lubricating Oil				
Fuel Oil				
Residue				

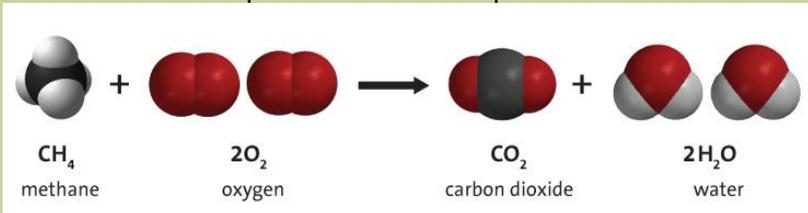
You can test for the products of combustion using the apparatus below:



Limewater changes colour from colourless to milky in the presence of carbon dioxide. Blue cobalt chloride paper turns pink in the presence of water. You can also use white anhydrous copper sulphate powder to test for water; it turns bright blue when it is hydrated.

### Complete Combustion

When there is sufficient oxygen, hydrocarbons burn to release water and carbon DIOXIDE. The carbon and water are completely oxidised. This is the balanced equation for the complete combustion of methane.



### Incomplete Combustion

When there is not enough oxygen, carbon monoxide (CO) is produced instead of CO<sub>2</sub>. CO is a toxic, colourless and odourless gas. This is the balanced equation for the incomplete combustion of methane



### Cracking

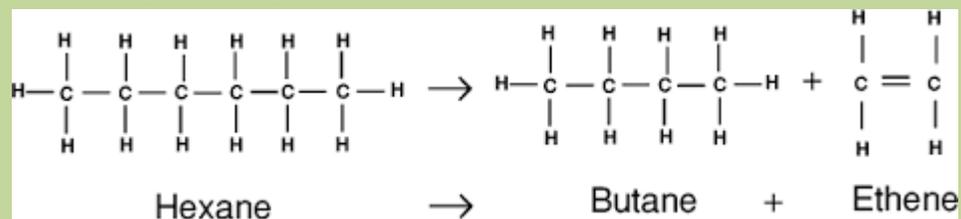
This is the process used to break large hydrocarbon molecules into smaller, more useful ones. Thermal decomposition is used in an oil refinery to split the large molecules into smaller ones. A heavy fraction is heated and vaporised. It is then either:

- 1 – Passed over a hot catalyst OR
- 2 – mixed with steam and heated to a very high temperature

Cracking produces saturated hydrocarbons, used as fuels, and unsaturated hydrocarbons (alkenes)

For example hexane could be cracked to produce butane and ethene.

TIP: The total number of Carbon and Hydrogen atoms on each side of the arrow must be the same!



An orange liquid called bromine water turns colourless in the presence of ALKENES



Other Useful Links:

<https://www.youtube.com/watch?v=CX21YVWggEBC>  
<https://www.bbc.co.uk/bitesize/guides/zshw6f/test>  
<https://www.bbc.co.uk/bitesize/guides/zvvc6fr/revision/1>

## KS4 Chemistry: C13 Our Atmosphere

Keyword	Definition
Atmosphere	The relatively thin layer of gases that surround planet Earth
Carbon capture and storage	A technique that involves capturing carbon dioxide produced by burning fossil fuels and pumping it underground to be absorbed by porous rocks so that it is not released into the atmosphere
Carbon footprint	The total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event
Global dimming	a process that reduces the amount of sunlight reaching the Earth's surface. It is caused by particulates in the atmosphere reflecting light back into space before it can reach Earth
Incomplete combustion	when a fuel burns in insufficient oxygen, producing carbon monoxide as a toxic product
Nitrogen oxides	Chemical compounds produced when high temperatures cause nitrogen gas in the air to react with oxygen. Nitrogen oxides are toxic and can cause acid rain
Particulate	small solid particle given off from motor vehicles as a result of incomplete combustion of its fuel

**The Earth's Early Atmosphere.** Theories about the composition of the earth's early atmosphere and how it's formed has changed over time. Evidence is limited since it is thought this occurred 4.6 billion years ago.

One theory suggests that intense volcanic activity first released the gases that formed the Earth's early atmosphere.

At that time, the Earth's atmosphere resembled that of Mars and Venus today, consisting mainly of carbon dioxide with little or no oxygen.

Volcanoes produced nitrogen that gradually built up in the atmosphere, along with methane and ammonia.

Water vapour in Earth's early atmosphere would have condensed to create the seas and oceans.

### How did the levels of oxygen increase?

2.7 billion years ago, algae first produced oxygen. Gradually over time, the levels of oxygen in our atmosphere increased as plants evolved. This was followed by animals as the levels of oxygen increased to a level that would sustain more complex life.

Oxygen is produced by plants in the process of photosynthesis.

**How did the levels of carbon dioxide decrease?** Algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis. Carbon dioxide was also decreased by the formation of **sedimentary rocks** (limestone) linked to ocean formation and fossil fuels (coal, oil, natural gas) that contain carbon.



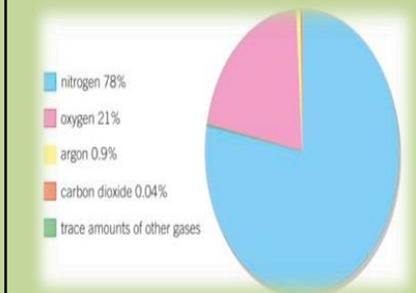
The carbon footprint is the **total amount of carbon dioxide and**

**other greenhouse gases emitted over the full life cycle** of a product, service or event. The carbon footprint can be reduced by **reducing emissions of carbon dioxide and methane.**

### The Atmosphere

By 200 million years ago the proportions of gasses had stabilised. These remain the same as they are today:

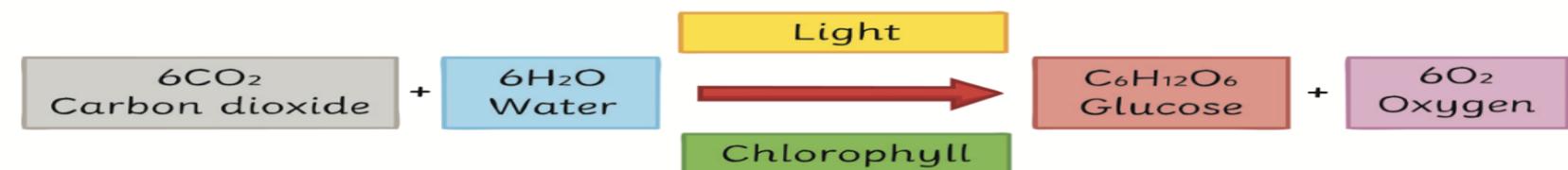
- 78% nitrogen
- 21% oxygen
- 0.9% Argon
- 0.04% Carbon Dioxide (The atmosphere also contains trace proportions of other gases.)



Further reading

<https://www.bbc.co.uk/bitesize/guide/zg4qfcw/revision/1>

<https://www.bbc.co.uk/bitesize/guide/zxy4xfr/revision/1>

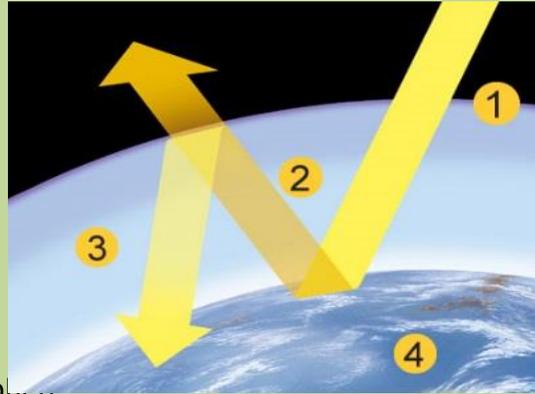


## The greenhouse effect

The earth and its atmosphere are very similar to that of a greenhouse. The greenhouse gases (CO<sub>2</sub>, water vapour and methane) in the atmosphere trap the heat and keep the earth warm. 1. The electromagnetic radiation at most wavelengths from the Sun **passes** through the Earth's atmosphere.

2. The Earth **absorbs** electromagnetic radiation with short wavelengths and so warms up. Heat is **then radiated** from the Earth as longer wavelength infrared radiation.

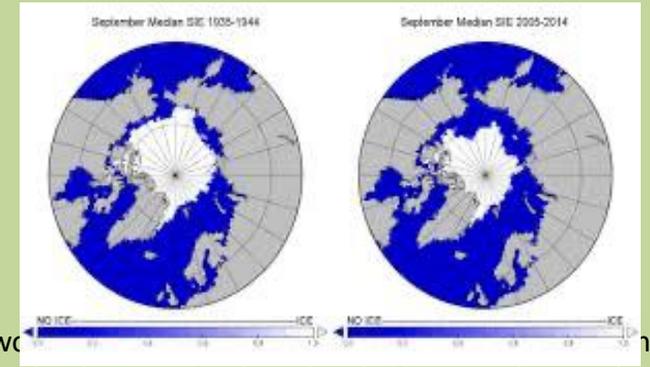
3. Some of this infrared radiation is absorbed by greenhouse gases in the atmosphere.  
4. The atmosphere warms up



## Global climate change

Based on peer-reviewed evidence, many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change.

### Arctic sea ice levels



A rise of just a few degrees in water temperature, **melting of polar ice caps** leading to **raised sea levels, increased coastal destruction.**

**Human activities** can increase the amounts of greenhouse gases in the atmosphere.

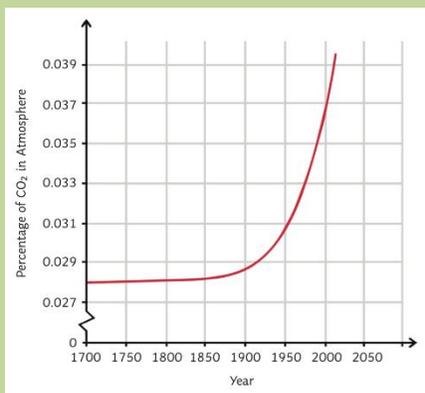
- More farming: Increased farming of crops (rice, for example) and farm animals such as cattle are leading to an increase in levels of methane.
- More landfills: Garbage in landfills undergoes decay (decomposition) and releases methane (and some carbon dioxide).
- Energy consumption: Fossil fuels are being burnt to keep up with energy demands, leading to increase in levels of carbon dioxide and methane.
- Deforestation: Forests are cleared for agriculture or development, so most of the carbon in the burned trees escapes to the atmosphere

Scientists believe that human activities have resulted in the increased amount of greenhouse gases in the atmosphere. Activities such as farming cattle and farming rice release huge amounts of methane into the atmosphere. Burning fossil fuels in cars and power stations releases large amounts of carbon dioxide. With large areas of the rainforest being cut down through deforestation, the excess carbon dioxide is not being absorbed by photosynthesis.

However, not everyone believes that humans are causing the rise in greenhouse gases. Some believe that the rise in global temperatures is associated with cycles of climate change and natural factors.

### What is the link between carbon dioxide and global warming?

There is a strong correlation between the percentage concentration of carbon dioxide in the atmosphere and increased global temperatures.



The impact of this is that the polar ice caps are melting, sea levels are rising and habitats and rainfall patterns are changing. The impact of which is already being felt around the globe. The consequences of human activity will affect us all.

### Sulphur dioxide

Sulphur dioxide is an atmospheric pollutant. It is a gas that is produced from the burning of fossil fuels. Sulphur dioxide is able to dissolve in rainwater and produces acid rain. Acid rain causes damage to forests, kills plants and animals that live in aquatic environments and damages buildings.



### Nitrogen

Nitrogen and oxygen react together to make oxides of nitrogen. This occurs inside a car engine where there is a high temperature and pressure. Nitrogen compounds are grouped together with the general formula NO<sub>x</sub>. Nitrogen compounds, along with sulphur dioxide, are also responsible for acid rain. Compounds of nitrogen oxides react in the atmosphere with ultraviolet light from the sun to produce photochemical smog. The smog is most noticeable during the morning and afternoon and occurs mainly in densely populated cities.



### Combustion

The **combustion (burning)** of fuels, including coal, contain carbon and/or hydrogen and may also contain some sulphur. When burnt, these fuels release gases (carbon dioxide, water vapour, carbon monoxide, sulphur dioxide and oxides of nitrogen) into the atmosphere.

**Complete combustion** occurs when there is enough oxygen for a fuel to burn.

A hydrocarbon will react with oxygen to produce carbon dioxide and water.

propane + oxygen carbon dioxide + water



**Incomplete combustion** occurs when there isn't enough oxygen for a fuel to burn. The products in this reaction are water and poisonous carbon monoxide. Carbon particles (soot) may also be seen.

ethane + oxygen carbon monoxide + water



Carbon monoxide is a poisonous gas. It is often called the silent killer due to it being colourless and odourless. Carbon monoxide works by binding to the haemoglobin in your red blood cells. This prevents them from carrying oxygen to the cells around your body. Carbon monoxide detectors are used to detect levels of the gas in the surrounding air and are often placed near gas-powered boilers to detect gas leaks. Particulate carbon irritates the lining of the lungs making asthma worse and could cause cancer. Global dimming is caused by particulates of carbon blocking out the Sun's rays and may reduce rainfall.

# KS4 Physics: P7 Radioactivity

## Atomic structure

Subatomic particle	Mass	Charge
Neutron	1	0
Proton	1 $\frac{1}{2000}$ th	+1
electron	Very small	-1

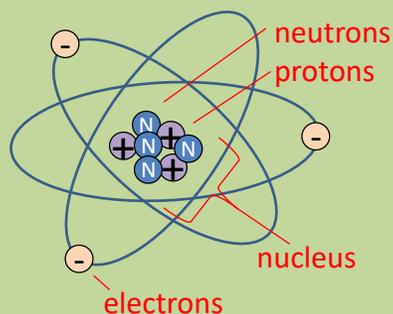
**Relative atomic mass** = number of protons and neutrons in the nucleus



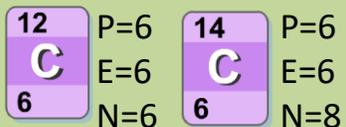
**Atomic number** = number of protons (number of electrons also)

P = 3  
E = 3  
N = 4 (7-3)

To work out the **number of neutrons** = **atomic mass – atomic number**



**Isotope:** an element containing the same number of protons but a different number of neutrons



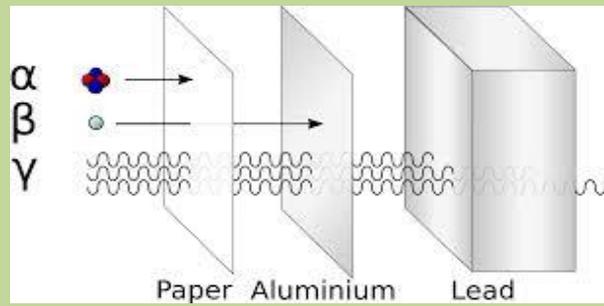
Some isotopes are more stable than others. Some isotopes are unstable and undergo radioactive decay.

## The history of the atom

Name	Date	Discovery	Diagram	Explanation
J J Thomson	1897	The electron – Plum pudding Model		Discovered the electron, proposed the plum pudding model that there were negatively charged electrons embedded in a sphere of positive charge
Rutherford Geiger and Marsden	1911	The Nucleus  Nuclear model of the atom – gold leaf exp.		Positively charged alpha particles were fired at very thin gold foil, with Thomson's model they would have passed through but some were deflected and some reflected back. This could only be explained by a concentrated mass and charge at the centre of the atom. The charge must have been positive to deflect the alpha particles. Most of the atom must be empty space for the majority to pass straight through.
Niels Bohr	1922	Electron shells		He discovered that elements emitted light of only specific wavelengths leading to the idea that electrons exist in specific energy levels or shells. Electrons move closer to the nucleus when they emit EM radiation and further from the nucleus when they absorb EM radiation.
James Chadwick	1932	The neutron		Noticed that the mass of protons in an atom did not add up to the total mass of the atom, he later experimentally discovered the charge-less neutron.

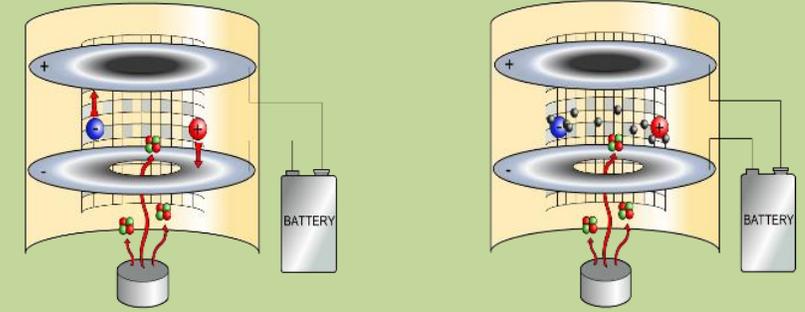
Some isotopes **decay**, radioactive substances give out nuclear radiation in the form of **alpha particles** ( $\alpha$ ), **beta particles** ( $\beta$ ), and **gamma rays** ( $\gamma$ ).

When this nuclear radiation interacts with other atoms or molecules, they may break them up into **ions**. This is known as **ionization**.



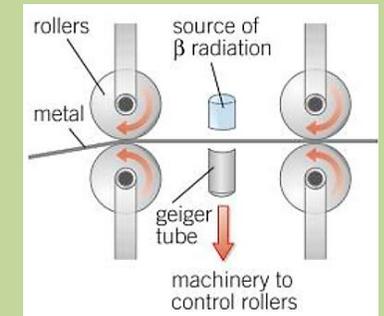
Radiation	Symbol	What is it?	Ionisation strength	Penetrating power	Range in air
Alpha $\alpha$	${}^4_2\text{He}$ ${}^4_2\alpha$	A Helium nucleus	Strongly ionising	Stopped by paper	A few cm (~10cm)
Beta $\beta$	${}^{-1}_0\text{e}$ ${}^{-1}_0\beta$	An electron	Moderately ionising	Stopped by aluminium	Several metres
Gamma $\gamma$	${}^0_0\gamma$	An electro magnetic wave	Very weakly ionising	Stopped by thick lead	Many, many meters

### Uses of radioactive decay



**Alpha** particles are used in smoke detectors. The alpha particles ionise air between two plates in a circuit. This allows a current to flow. If smoke is present, this interacts with the alpha particles resulting in a drop in the current and the alarm sounds.

**Beta** particles are used to detect the thickness of paper. If the detector detects too much beta radiation the paper has become too thin and the rollers are adjusted. If too little radiation passes through it means the paper is too thick.

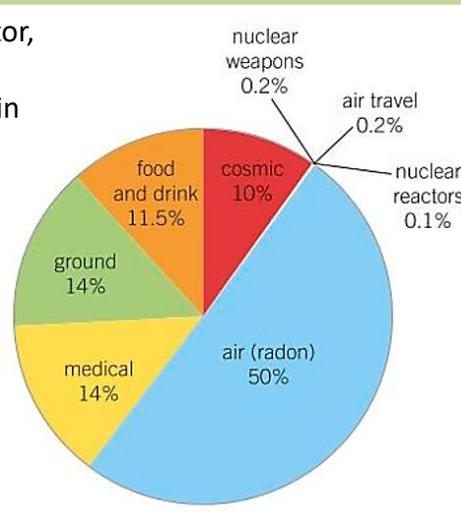


### Measuring radiation:

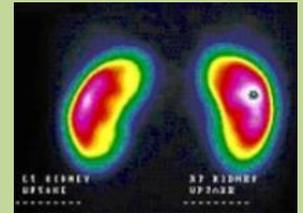
- **Count-rate** is the number of decays recorded each second by a detector, such as the Geiger-Muller tube.
- **Activity:** the number of decays per second from a sample (measured in Becquerel's Bq).
- Sieverts: this is a unit for dose (Sv) usually given in milli Sieverts, mSv

We are exposed to **background radiation** every day and it poses an extremely low risk. Most of this occurs naturally.

People who work with ionising radiation have to monitor their exposure time to ensure they do not go above the safe limits of exposure.



**Gamma** Radiation has many uses. It can be used to sterilise medical equipment. It can be fired in narrow beams at cancerous cells as it can pass through the skin and body tissue.



It is used for radioactive tracers, for example to check for blockages in the kidneys. A solution containing a gamma source is ingested and gamma radiation will be emitted more strongly from an area that may be blocked as there will be a greater concentration of the gamma source. The source must have a long enough half-life to get readings but short enough not to cause harm to the body.

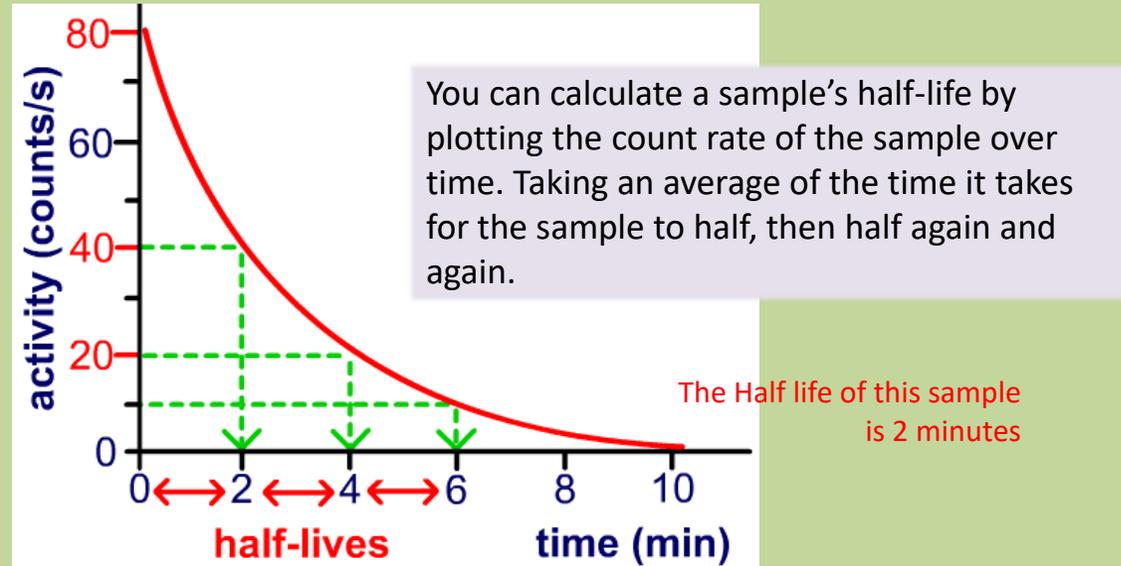
**Half-life** The half-life of a radioactive isotope is the average time that it takes for **half** the nuclei in a sample to decay.

There are three ways to consider half-life:

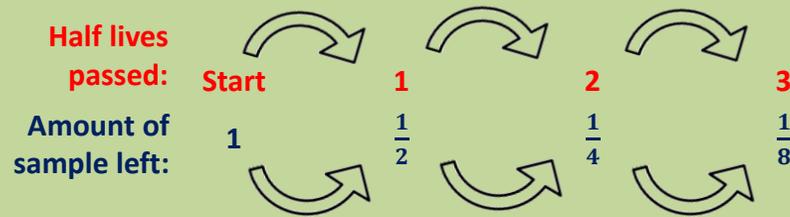
**Half-life is the time it takes for half of nuclei in a sample to decay**

**Half-life is the time taken for the activity of the sample to halve**

**Half-life is the time taken for the count rate to halve**



You may be asked to work out how much of a sample is remaining after a particular time. To do this work out how many **Half-lives** have passed. If 3 half-lives have passed you will have  $\frac{1}{8}^{th}$  the original sample left.



**Example. A sample of 12g of iodine has a half-life of 8 days. How much of the sample will remain after 24 days?**

*Answer: 24 days = 3 x half-lives. So the sample will have halved 3 times. There will be  $\frac{1}{8}^{th}$  remaining so  $\frac{1}{8}^{th}$  of 12g = 1.5g remaining*

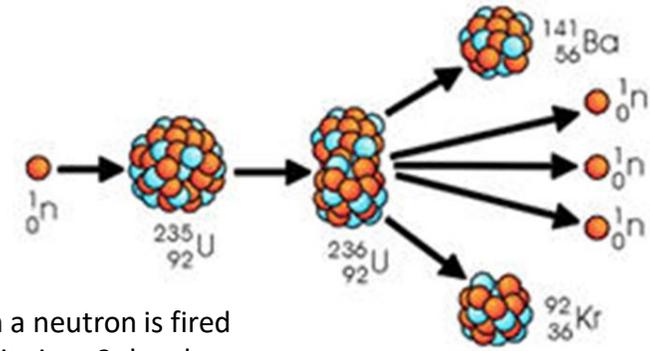
## Physics Separates only

### Fission and fusion

Fission : splitting atoms

Fusion : joining atoms

Nuclear fission occurs when a stable isotope is struck by a **neutron**. The isotope absorbs the neutron, becomes unstable and then **splits** apart, releasing large amounts of energy.



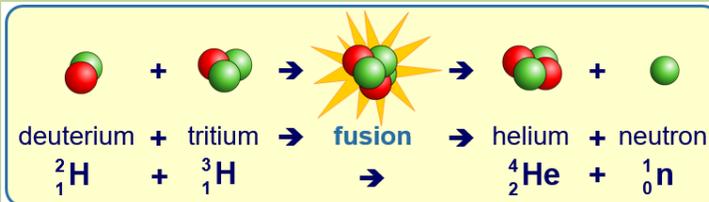
In a fission chain reaction a neutron is fired at a  $^{235}\text{U}$  nucleus. This splits into 2 daughter nuclei and releases 3 more neutrons. These in turn collide with other  $^{235}\text{U}$  nuclei and the process repeats. Lots of energy is released in the form of kinetic energy and gamma rays.

Nuclear Power stations control the chain reaction to harness the energy and heat water (creating steam to spin a turbine and generator)

**Benefits:** The fission of 1 kilogram of **uranium-235** releases more energy than burning 2 million kilograms of coal and there is no  $\text{CO}_2$  output from Nuclear fission.

**Drawbacks:** Nuclear power stations produce nuclear waste that remains radioactive for 1000s of years. Accidents at nuclear power plants can result in harmful substances entering the environment.

Nuclear fusion occurs in under extremely high temperatures and pressures like that found in the sun and other stars. Small Nuclei are fused together to form larger atoms and energy is released.

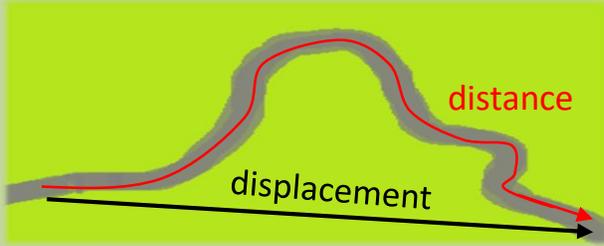


The Torus fusion reactor can achieve this on earth but at the moment we put in more energy in than we get out so can not use it to generate electricity

Nuclear weapons involve uncontrolled fission chain reactions that trigger further fusion reactions releasing extraordinary amounts of energy.



## KS4 Physics: P8 Forces in balance



**Distance** is a scalar quantity, and is a measure of the total distance travelled e.g. along this path.

**Displacement** is a distance in a particular direction and is a vector quantity

<b>scalar</b>	A physical quantity, such as mass, speed or energy, that has magnitude only (unlike a vector which has magnitude and direction)
<b>vector</b>	A vector is a physical quantity, such as displacement or velocity, that has a magnitude and a direction (unlike a scalar which has magnitude only)
<b>contact force</b>	A force that only acts on an object when in contact with it
<b>non-contact force</b>	A force that can act on an object without making contact, for example the force due to gravity (weight), electrostatic forces or magnetic forces
<b>resultant force</b>	A single force that has the same effect as all the forces acting on the object
<b>magnitude</b>	the size or amount of a physical quantity

### Calculating resultant force

To work out the resultant force, if two forces are acting in opposite directions, subtract them from each other. If they act in the same direction add them together.

## Newton's Laws

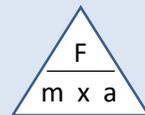
### Newton's first law of motion

If the resultant force on an object is zero, the object stays at rest if it is stationary, or it keeps moving with the same speed in the same direction

### Newton's second law of motion

The acceleration of an object depends on the force applied to the object and mass of the object.

(Force (N) = Mass (Kg) x acceleration (m/s<sup>2</sup>))



### Newton's third law of motion

When two objects interact with each other, they exert equal and opposite forces on each other

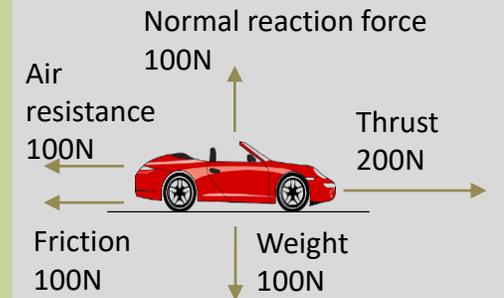
The resultant force on the red ball is **400N downwards** (500N – 100N)

The resultant force on the red car below is 50N ←  
 (← 100N + 150N = 250N ←)    250N – 200N = **50N ←**



## HT: Free body force diagrams

A free body force diagram is a diagram drawn with vector arrows drawn to represent the size and direction of each force acting on an object. The **length** of the arrow represents the magnitude of a force. You always need a scale on your diagrams e.g. 100N = 1cm

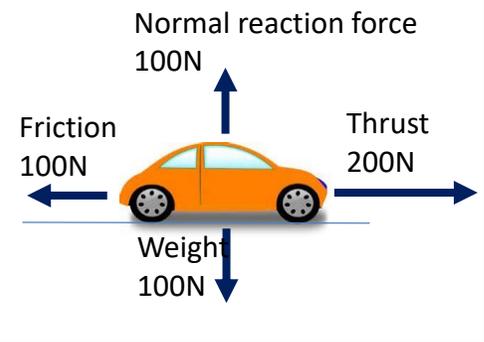


Scale: 100N = 1cm

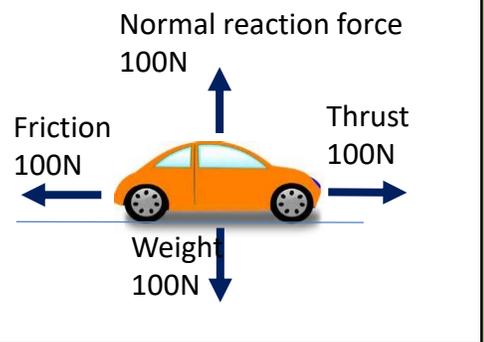
**Rules for forces and motion**

Balanced forces = The object is stationary or object moving at a constant speed  
 Unbalanced forces = The object is changing speed or changing direction or changing shape  
 (Accelerating or decelerating)

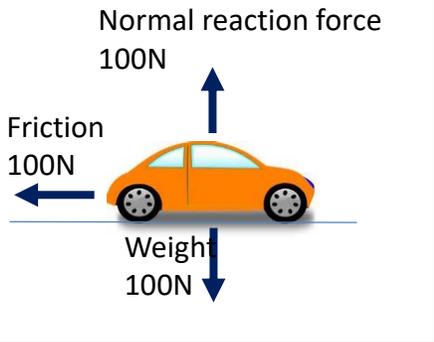
<b>Drag</b>	Drag forces oppose the motion of an object. They include air resistance and friction
<b>Normal reaction force</b>	Normal reaction force is the force exerted by a surface on an object, it acts at right angles to the surface



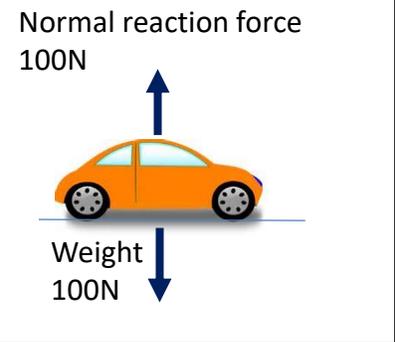
This car is accelerating as it has a larger thrust force than friction force (The resultant force is 100N →)



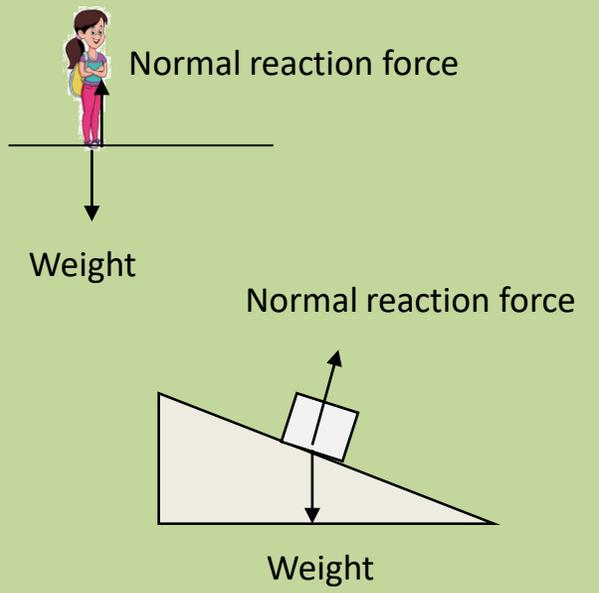
This car is travelling at a constant speed as it has an equal thrust force and friction force (The resultant force is zero)



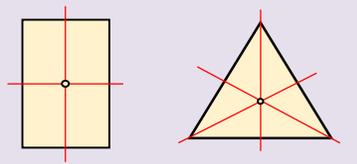
This car is decelerating as it has a larger friction force than thrust force (The resultant force is 100N ←)



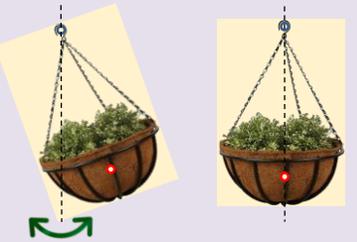
This car is stationary as there is no friction or thrust forces (the resultant force is zero)



**Centre of mass**  
 For a symmetrical flat shape, the centre of mass will always be along its line of symmetry.

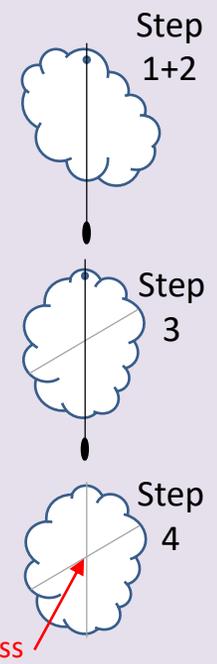


A swinging object will always come to rest with its centre of mass below the pivot.



This idea can be used to find the centre of mass of an irregular flat shape.

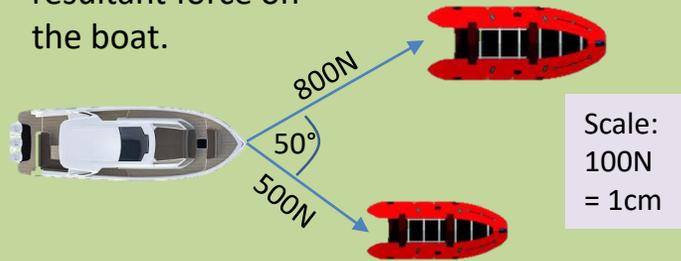
1. Suspend your irregular flat shape from a pin.
2. Use a plumb line (string with a mass on the end) to draw a vertical line on the shape.
3. Repeat putting the pin in a different location.
4. The point at which the two lines meet is the centre of mass.



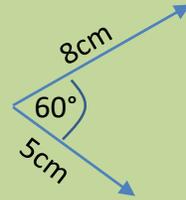
Centre of mass

## HT: Parallelogram of forces: [working out the resultant force from two forces at an angle](#)

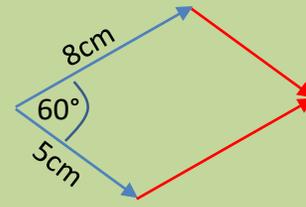
1. Look at the problem.  
Calculate the resultant force on the boat.



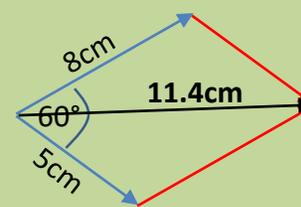
2. Draw a vector for each force at the correct angles



3. Turn into a parallelogram



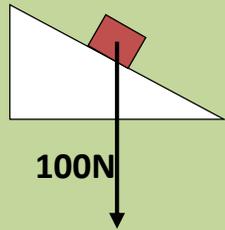
4. Draw a line across the parallelogram and measure its length



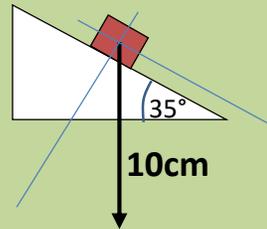
5. Use the scale to turn the length back into a force.  
You may need to give the angle of the resultant force relative to one of the other force vectors.

**Resultant force = 1140N** at an angle of **23°** to the **800N** force.

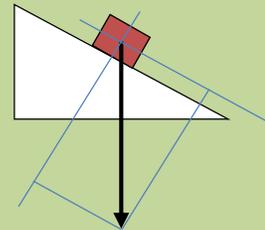
## HT: Resolving forces: [working out the 2 components of a force](#)



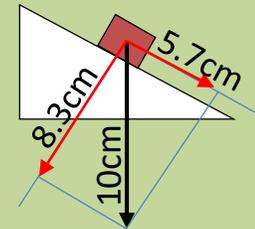
1. A 100N weight is stationary on a 35° slope. What is the friction force?



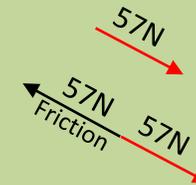
2. Draw the problem as a vector diagram. E.g. 1cm = 10N. Add faint lines perpendicular and parallel to the slope.



3. Draw faint lines at 90° connecting the lines to the vector arrow head.



4. Draw vector arrows to the correct length. The length of each arrow represents the components of the force.



5. The force down the slope is 57N, because the block is stationary the forces are balanced so the force down the slope = the friction force acting up the slope. So the friction force is 57N

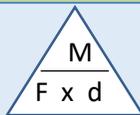
## Physics: Separate science only

**Moments:** The moment is the turning effect of a force. You know from experience it is easier to undo a bolt with a long spanner than with your hands. The longer the spanner the greater the turning effect of the force.

### Calculating moments

**Moment (Nm) = Force (N) x perpendicular distance from pivot (m)**

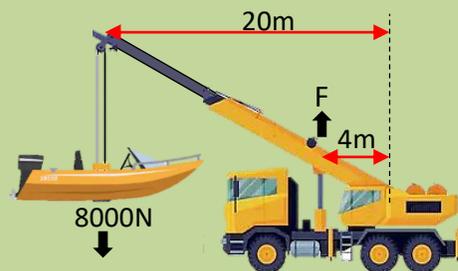
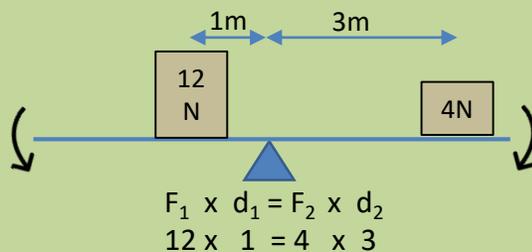
$$M = F \times d$$



Levers are force multipliers because they can multiply the effect of the force. When looking at levers there is always a pivot, effort and load. Levers reduce the force required to lift or move objects

### Balancing moments – equilibrium

If a lever is in balance the clockwise moment must equal the anticlockwise moment.



( Anticlockwise moment = Clockwise moment )

$$F_1 \times d_1 = F_2 \times d_2$$

$$8000 \times 20 = F \times 4$$

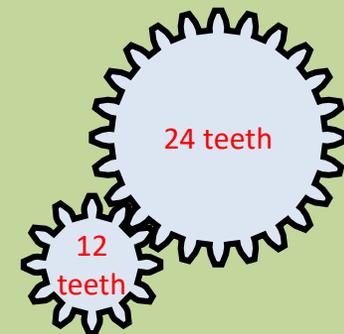
$$\frac{(8000 \times 20)}{4} = F = 40000\text{N}$$

## Gears

Gears are force multipliers

A wheel with more teeth turns slower. Here, the bigger wheel turns at *half* the speed

But the *moment of the turning force* will be *twice* as big (since the radius is twice the size)

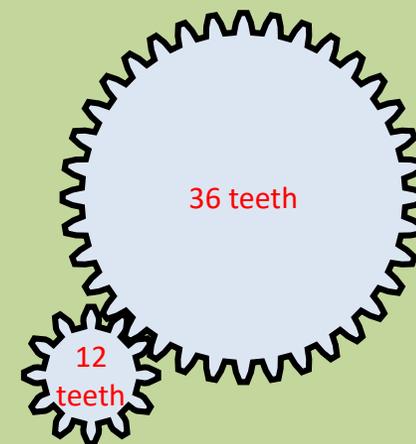


### Ratio of moments

= ratio of teeth

= ratio of radii

In this example, the bigger wheel will turn a third of the speed of the smaller but the moment of the turning force will be three times the size of the smaller wheel



- The larger wheel has a radius of 30cm, and has a moment of 120Nm applied

- What's the moment about the 20cm wheel?
- (Remember ratio of moments = ratio of radii)

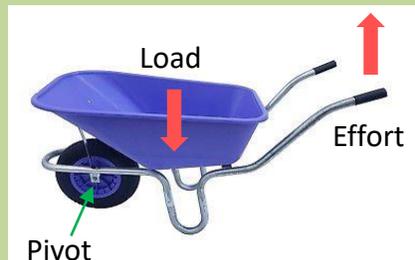
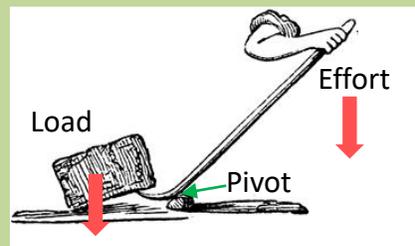
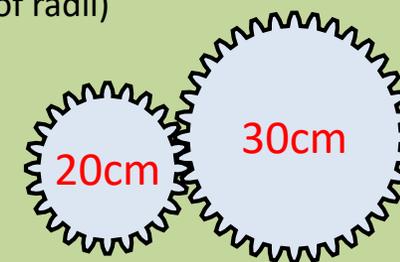
$$20 : 30 = M : 120$$

$$\text{or, } \frac{20}{30} = \frac{M}{120}$$

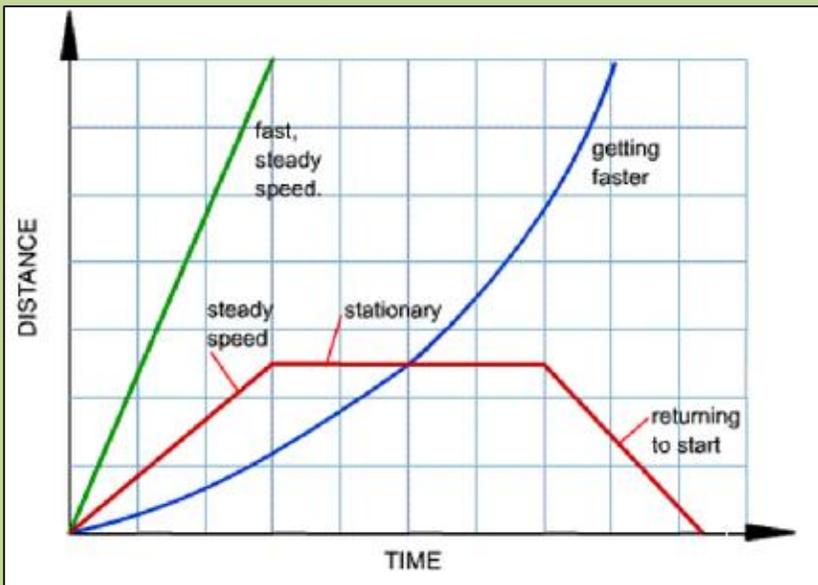
$$\therefore \frac{20 \times 120}{30} = M$$

$$\therefore M = 80\text{Nm}$$

The same calculation can be performed if you were given the number of teeth instead of the gear radii



Distance time graphs



Shape	description
—	stationary
/	Constant speed
\	Constant speed
⤵	Slowing down - deceleration
⤴	Speeding up - acceleration
gradient	The gradient at any point is the speed. You can measure the gradient at any point on a curve by taking a tangent.

Equations

$$\text{Acceleration} = \frac{\text{change in speed}}{\text{time}}$$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$a = \frac{\Delta v}{t} \quad \text{or} \quad a = \frac{v - u}{t}$$

$$S = \frac{d}{t}$$

$$\text{final velocity} - \text{initial velocity} = 2 \times \text{acceleration} \times \text{displacement}$$

$$v^2 - u^2 = 2as$$

a = acceleration (m/s<sup>2</sup> or ms<sup>-2</sup>)  
 v = final velocity (m/s)  
 u = initial velocity (m/s)  
 t = time (s)  
 s = displacement (m)  
 Δ = change in

HT: Gradients and tangents

The gradient on a distance time graphs is the speed. The gradient on a velocity time graph is the acceleration.

If the line is curved you can calculate the **gradient** at a certain point by taking a **tangent**. For example:

What is the acceleration of the object at 10s?

Take a tangent to the curve at the 10s point

(a tangent is a line that runs parallel to that exact part of the curve, it should just touch the curve but not cut through any other part)

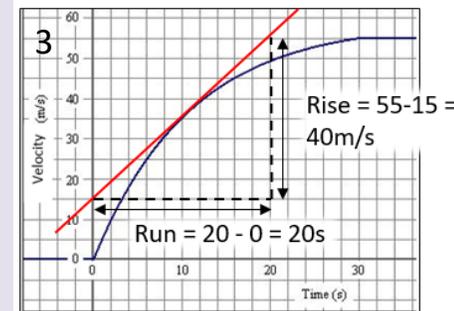
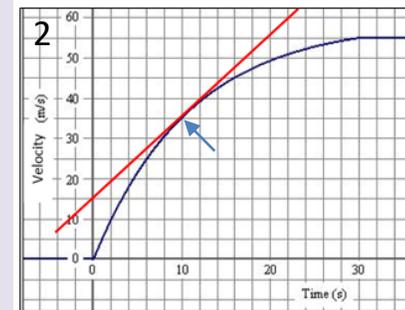
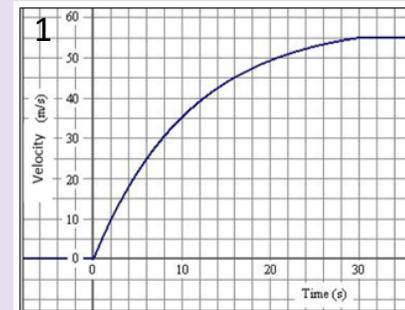
$$\text{gradient} = \frac{\text{change in } y}{\text{change in } x}$$

or

$$\text{gradient} = \frac{\text{rise}}{\text{run}}$$

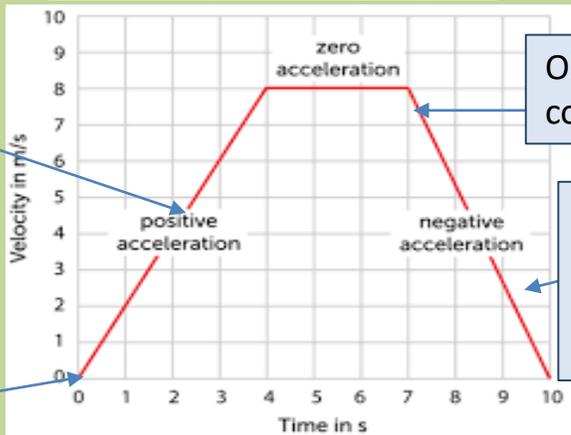
Calculate the gradient of the tangent, draw vertical and horizontal lines to the tangent. Measure rise and run.

$$\text{gradient} = \frac{\text{rise}}{\text{run}} = \frac{40}{20} = 2\text{m/s}^2$$



# Velocity time graphs

constant acceleration / speeding up

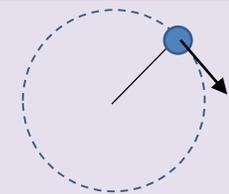


Object at a constant velocity

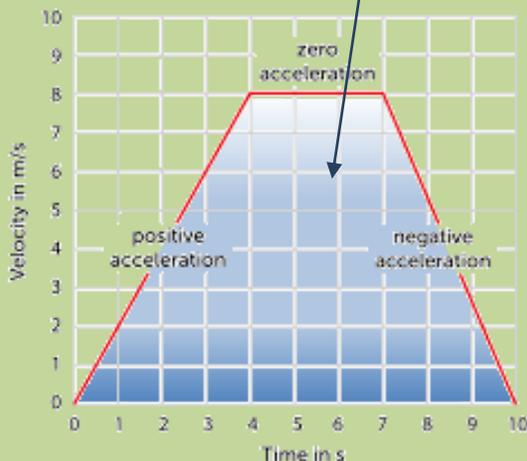
Constant deceleration / slowing down

Object stationary

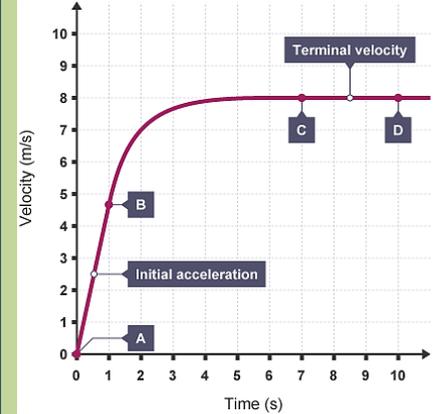
**HT: Circular motion** – an object moving in a circular motion can have a constant speed but its velocity is constantly changing as it changes direction (remember velocity is a vector quantity with a magnitude and direction)



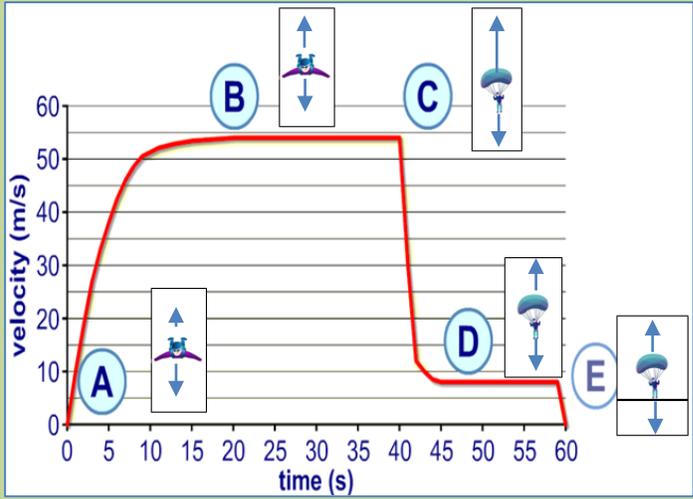
**HT:** The area under a velocity time graph = displacement



Falling objects start with an initial acceleration (A-B). Acceleration decreases due to increasing air resistance (B-C). They reach a terminal velocity as weight and air resistance become balanced (C-D).



Shape	description
—	Constant speed
/	acceleration
\	deceleration
⤵	Increasing deceleration
⤴	Decreasing acceleration
gradient	Acceleration or deceleration



- A) The weight force is greater than the air resistance force therefore the sky diver is accelerating. The sky diver is accelerating, but at a decreasing rate due to the increasing air resistance.
- B) The weight force and the force of air resistance is the same (resultant force = zero) so the sky diver travels at a constant speed. The Sky diver reaches terminal velocity, travelling at a constant velocity.
- C) On opening the parachute the air resistance becomes greater than the weight force. The skydiver opens the parachute and the sky diver decelerates.
- D) As the skydiver slows, the air resistance decreases until it becomes the same as the weight force. The sky diver reaches a new terminal velocity (constant velocity)
- E) The skydiver reaches the ground. The weight force is balanced by the normal reaction force exerted by the ground. Their velocity drops to zero.

## KS4 Science – P10 Force and Motion

Newtons Second Law states that the acceleration of an object is:

- Proportional to the resultant force on the object
- Inversely proportional to the mass of the object

The formula  $F = ma$  gives the resultant force on an object

Inertia is the tendency of an object to stay at rest or continue moving at the same speed and direction.

$$\text{Inertial mass} = \frac{\text{Force}}{\text{Acceleration}}$$

If you know the mass of an object in kg, you can calculate the force due to gravity that acts on it (i.e. its weight) using the equation:

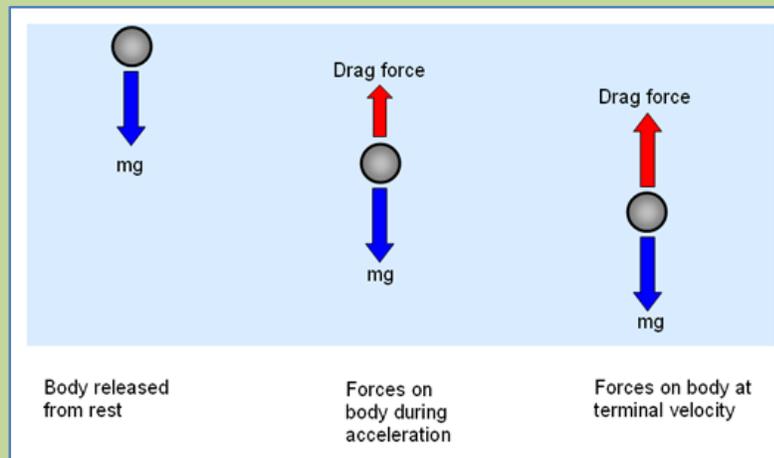
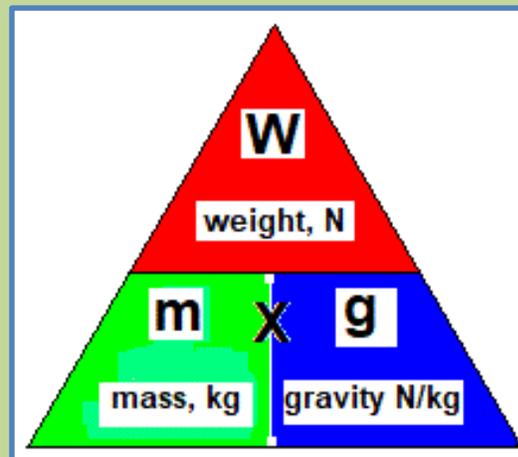
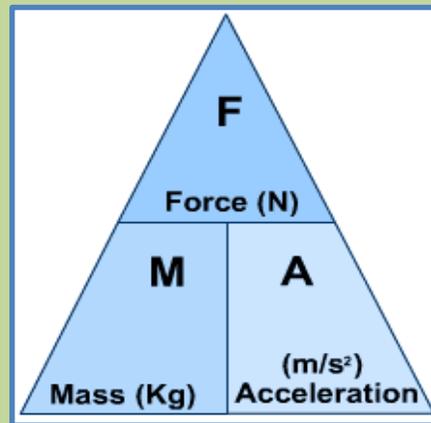
Weight,  $W = \text{mass, } m \times \text{gravitational field strength, } g$

***The weight of an object is the force on it due to gravity. The mass of an object depends on the amount of matter in it.***

The acceleration due to gravity on Earth is  $10 \text{ m/s}^2$

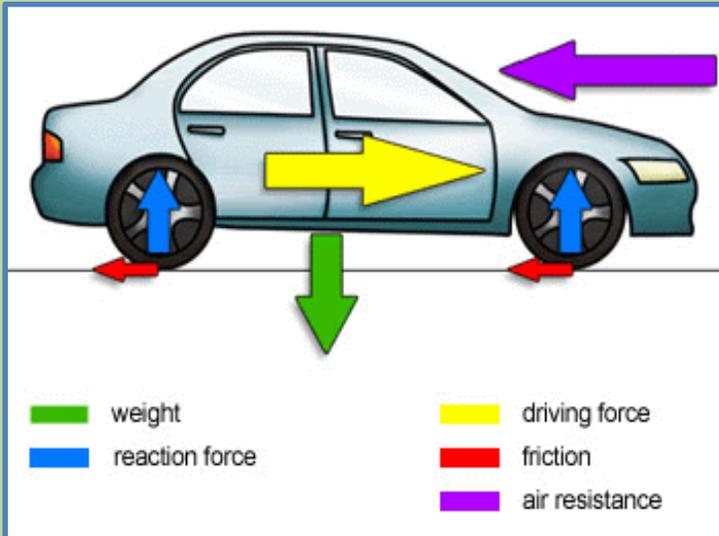
Terminal Velocity is eventually reached by a falling object when the weight of the object (acting down) is equal to the frictional force acting on an object.

When an object is moving at terminal velocity, the resultant force on it is zero.



Key Word	Definition
Force (F)	A force can change the motion of an object Units are Newtons, N
Weight	The force of gravity pulling on an object. The units are Newtons, N
Mass	The quantity of matter in an object – a measure of the difficulty of changing the motion of an object. Units are kilograms, kg
Inertia	The tendency of an object to stay at rest or in uniform motion
Gravitational Field Strength (g)	The force of gravity on an object of mass 1kg. Units are N/kg
Terminal Velocity	The velocity reached by an object when the drag force on it is equal and opposite to the force making it move
Stopping distance	The distance travelled by a vehicle in the time it takes the driver to think and brake
Thinking distance	The distance travelled by the vehicle in the time it takes the driver to react
Braking distance	The distance travelled by the a vehicle during the time it takes for the brakes to act
Momentum	This equals mass (in kg) x Velocity (in m/s)
Elastic	Elastic materials regain their shape after being squashed or stretched
Extension	The increase in the length of a spring (or strip of material) ( from its original material
Directly proportional	A graph will show this if the line of best fit is a straight line through the origin

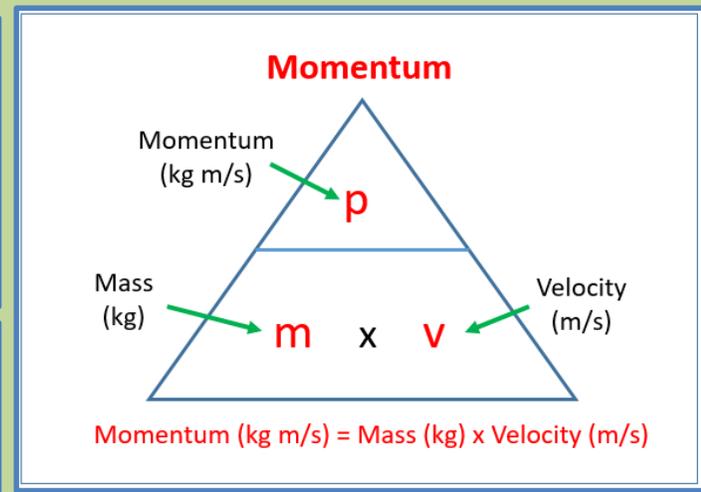
Friction and air resistance oppose the driving force of a vehicle



The stopping distance depends on the thinking distance and the braking distance.  
 Braking distance is increased by high speed, poor weather and poor vehicle maintenance  
 Thinking distance is increased by poor reaction time (due to tiredness, drug, alcohol or using a mobile phone) and high speed

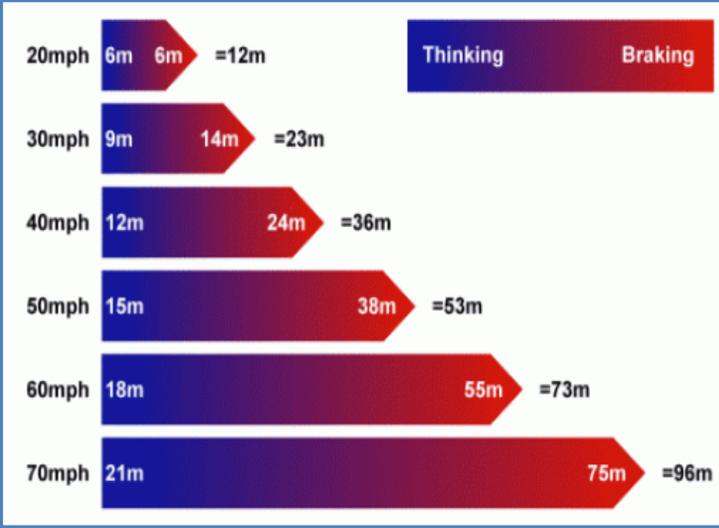
Deceleration can be calculated using  $v^2 = us + 2as$   
 Where  $s$  = distance travelled  
 $U$  = initial speed  
 $V$  = final speed

When vehicles collide, the force of the impact depends on the mass, change of velocity, and the length of the impact time.  
 The longer the impact time, the more the impact force is reduced.



Because momentum = mass x velocity it has both **SIZE AND DIRECTION**

The momentum of a moving object makes it harder to stop that body from moving or change its direction

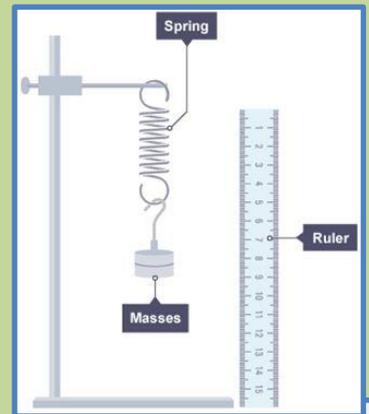


Stopping distance = thinking distance + braking distance

$$\text{Impact Force, } F = \frac{\text{mass, } m \text{ (kg)} \times \text{change in velocity, } \Delta v \left(\frac{m}{s}\right)}{\text{time taken, } t \text{ (s)}}$$

The time of impact is important; to create a large force the time of impact should be as short as possible.

Impact forces are reduced by cycle helmets and cushioned surfaces which increase impact time. Seat belts and side impact bars also increase impact time.



However if you stretch the object too far you will reach its **ELASTIC limit**, and the object won't return to its original shape. You will have reached the **LIMIT OF PROPORTIONALITY**.

A closed system is a system where the total momentum before an event (e.g. collision) is the same as the total momentum after the event. This is called **conservation of momentum**.

The idea of conservation of momentum can be used to find the velocity of an object after a collision with another object. If no other external forces apply you can use this equation:  
 $m_A v_A + m_B v_B = 0$

Hooke's Law states that if you stretch an elastic object (e.g. spring), the extension is proportional to the force applied. Force applied,  $F$  = spring constant,  $k$  x extension,  $e$  (newtons, N) (newtons per metre, N/m) (metres, m)

Other Useful Links  
<https://www.bbc.co.uk/bitesize/topics/zgtnm6f>  
<https://www.bbc.co.uk/bitesize/topics/zcw22nb>  
<https://www.youtube.com/watch?v=W3VbonFNcw>

## Y10 CT Term 5 – Ethics and cultural issues

The impact of technology on a society can be examined in these ways:

<p>Ethical issues</p>	<p>What would be considered right and wrong by society. These values may be shared across many countries.</p>	<p>For example, is it ethical for Amazon to pay only £290m in tax when it earns £14b from the UK (about 2% tax) when the average UK citizen pays 20% tax on their earnings?</p> <p>For example, is it ethical for Governments to read all of your emails, know what websites you visit and listen to your phone calls? All in the name of keeping you safe?</p>
<p>Legal issues</p>	<p>What is actually right and wrong in the eyes of the law. These values are specific to individual countries.</p>	<p>For example, should you be able to buy alcohol or tobacco products online? Should you be able to buy drugs or weapons online? Different countries have different legal views on these issues.</p> <p>For example, it is now a criminal offence to upload messages onto the internet that are considered 'hate speech'.</p>
<p>Cultural issues</p>	<p>How groups of people with particular values, beliefs, languages or practices are affected by technology.</p>	<p>For example, should remote communities become connected to the Internet and therefore be exposed to alien beliefs and potentially be exploited by other cultures?</p> <p>For example, we are using technology more and more now to communicate which is reducing our time spent physically with other people. Is this causing anxiety, social separation or impacting on personal well-being?</p>
<p>Environmental issues</p>	<p>How technology impacts the natural world.</p>	<p>For example, the average UK person keeps their mobile phone for 22 months. This is an example of the waste of rare natural materials that take huge amounts of energy to extract and use.</p> <p>For example, by using online communication tools like Zoom we can reduce the number of times we need to travel to meetings, thus reducing carbon emissions.</p>

## Y10 CT Term 5 – Common algorithms

An algorithm is a set of instructions that when followed precisely, solve a given problem

### Bubble sort

Starts at one end of the list, compares the current item with its neighbour. If it is larger then they swap. The current item moves onto the next list item and the process repeats until the last item. Then the process is repeated from the end of the list again.

Deterministic version: This algorithm will blindly repeat  $n^2$  times.

Non-deterministic version: This algorithm will stop iterating when there have been no swaps.

- Worst complexity:  $O(n^2)$
- Best complexity:  $O(n)$
- Average complexity:  $O(n^2)$

### Insertion sort

Split the list into x2 lists: sorted and unsorted. The sorted list contains just one number, the unsorted list contains all others. Take each number in the unsorted list in turn, then track back through each number in the sorted list until the number can be inserted in its sorted position. Repeat this process until the unsorted list is empty.

- Worst complexity:  $O(n^2)$
- Best complexity:  $O(n)$
- Average complexity:  $O(n^2)$

### Merge sort

Continually divide the list until you get to individual items. Then 'merge' neighbouring items back together, sorting them as you merge. Once items are merged, repeat the process between neighbouring pairs. Then neighbouring sets and so forth until the list is reconstructed sorted.

- Worst complexity:  $O(n \cdot \log(n))$
- Best complexity:  $O(n \cdot \log(n))$
- Average complexity:  $O(n \cdot \log(n))$

## The common algorithms you need for GCSE

- **Searching**
  - Binary search
  - Linear search
- **Sorting**
  - Merge sort
  - Insertion sort
  - Bubble sort

### Linear search

This algorithm does not assume a sorted list.

Searches each list item in turn until the required item is found.

- Worst case performance:  $O(n)$
- Best case performance:  $O(1)$
- Average performance:  $O(n)$

### Binary chop/search

This algorithm assumes a sorted list.

Divides the search space into x2 equal sets then compares the required item with each set. It discards the set that cannot contain the required item and repeats the process with the resultant set.

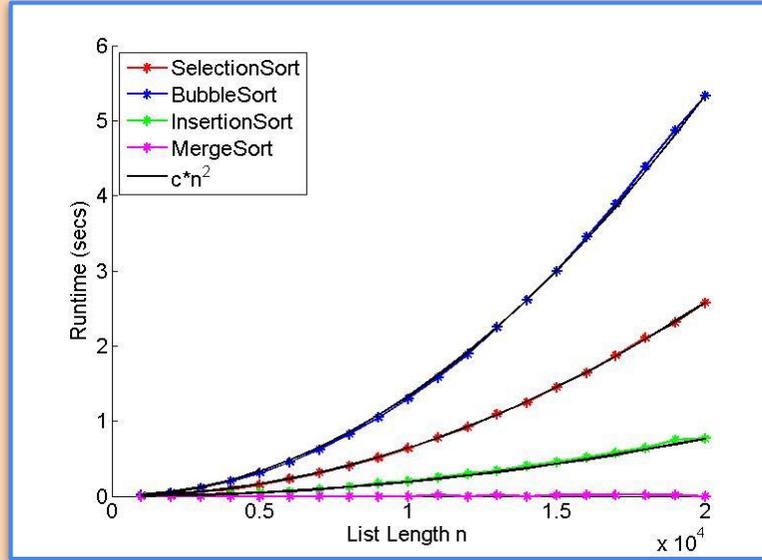
- Worst complexity:  $O(\log n)$
- Best complexity:  $O(1)$
- Average complexity:  $O(\log n)$

# Y10 CT Term 5 – Common algorithms

An algorithm is a set of instructions that when followed precisely, solve a given problem

Algorithms are written down in one of three ways:

- Structured English
- Pseudocode - great for detail
- Flowcharts - quickly read and understood but not good for details



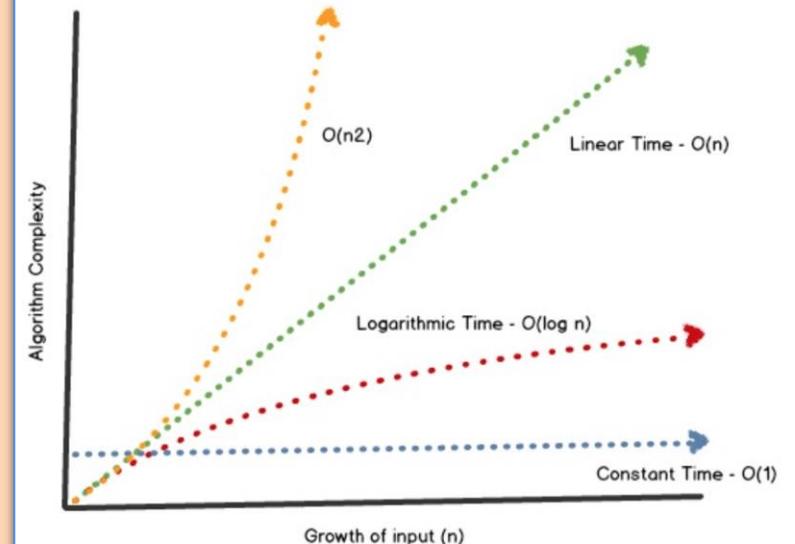
## The common algorithms you need for GCSE

- **Searching**
  - Binary search
  - Linear search
- **Sorting**
  - Merge sort
  - Insertion sort
  - Bubble sort

### BIG O

Why have different algorithms that do the same job? Because some are faster than others due to their design. Algorithms are judged by:

- Space complexity (how much memory they take to run)
- Time complexity (how much time they take to complete given a number (n) of items)



The user inputs their name	Name = INPUT "Enter your name"	
Display the users name	OUTPUT "Your name is" + Name	
If the age is greater than 10 then	IF age > 10 THEN	
<b>Structured English</b>	<b>Pseudocode</b>	<b>Flowchart</b>

Practical coding skills to develop readable, maintainable code.

### Code Kata 1

#### Kata 1

```
1 print("Hello World")
```

#### Kata 2

```
1 name = input("What is your name?")
2 print("Your name is", name)
```

#### Kata 3

```
1 myAge = int(input("What is your age?"))
2 print("You are ", myAge, " years old")
```

#### Kata 4

```
1 myAge = int(input("What is my age?"))
2 yourAge = int(input("What is your age?"))
3 print("I am", myAge, "and you are", yourAge)
```

### Code Kata - Bonus

#### Kata 1

```
1 total = 0
2
3 for i in range(1, 10):
4     val = int(input("Enter a number"))
5     total = total + val
6
7 print("The total is", total)
```

#### Kata 2

```
1 import random
2 randNum = random.randint(1, 10)
3
4 guessed = False
5 while guessed == False:
6     val = int(input("Enter a number (1-10)"))
7     if val == randNum:
8         guessed = True
9     elif val < randNum:
10        print("Guess higher")
11    else:
12        print("Guess lower")
13
14 print("Guessed correctly")
```

#### The x4 Principles of Coding (levels 1-4)

- Variables
- Input / Output
- Loops (FOR / WHILE)
- Decisions (IF)

#### The x4 Pro-Coder Rules (levels 5-9)

- Use variable/subroutine names that describe what they store/do
- Convert repeated instructions to loops
- Convert repeated functionality to subroutines
- Comment code

## Code Kata 2

### Kata 1

```
1 costOfItem = int(input("Enter the cost of the item (£)"))
2 priceOfItem = int(input("Enter the price of item (£)"))
3 profitOfItem = priceOfItem - costOfItem
4 print("You will make £", profitOfItem, "profit on item")
```

### Kata 2

```
1 firstname = input("What is your firstname?")
2 surname = input("What is your surname?")
3 fullname = firstname + " " + surname
4 print("Your full name is", fullname)
```

### Kata 3

```
1 myAge = int(input("What is my age?"))
2 yourAge = int(input("What is your age?"))
3 if myAge > yourAge:
4     print("I am older")
5 else:
6     print("You are older or the same age")
```

## Code Kata 2

```
1 def getNumber(message, minVal, maxVal):
2     while True:
3         try:
4             val = int(input(message))
5
6             if val < minVal:
7                 raise Exception
8             if val > maxVal:
9                 raise Exception
10
11            return val
12        except:
13            print("Invalid number")
14
15 def getString(message):
16     while True:
17         try:
18             val = input(message)
19
20             if val == "":
21                 raise Exception
22
23            return val
24        except:
25            print("Invalid string")
26
27 #main
28 yourName = getString("What is your name?")
29 yourAge = getNumber("What is your age?", 1, 100)
30 print(yourName, "your age is", yourAge)
```

## iMedia - Digital Graphics – Key Terms

Key Term	Explanation
<b>Assets</b>	These are the component parts that are used in the creation of the digital graphic. Examples would be photographs, images, graphics, text, logos.
<b>Design and layout of graphics</b>	This refers to the use of colour, composition, white space and styles in the digital graphic in the context of a given <b>target audience</b> . For example, choices of colour can be very different depending on the age group of the <b>target audience</b> . The colours should also contrast and complement each other. Composition refers to the layout of the different elements on the overall graphic, using suitable sizes and positions of different images and assets. White space is not necessarily a white colour – it is any blank space and can be used effectively to emphasise key parts of the graphic. The styles are associated with different <b>genres</b> of graphic products. Examples would include themed magazine covers, gaming covers, film posters, advertisements. These concepts of design and layout can be applied in the development of the <b>visualisation diagram</b> .
<b>File formats</b>	This refers to the type of image file and file extension that is being used or considered. Typical examples of file formats are <b>.tif, .jpg, .png, .bmp, .gif and .pdf</b> .
<b>Image editing software</b>	This is the type of software required for the unit. It is not the same as desktop publishing software, which does not have the required range of image editing tools and techniques.
<b>Legislation</b>	In the context of <b>digital graphics</b> , this refers to the differences between copyright protected, copyright free, royalty free and use of trademarks. For example, a final graphic may be considered as an orphan work but the copyright on component images and assets remains with the original author/owner. Google images should not be accepted as a copyright free source.

Key Term	Explanation
<b>Properties</b>	The properties of digital graphics refer primarily to the pixel dimensions and dpi resolution. Final work that is 595 x 842 pixels will be the correct aspect ratio for an A4 page but since this would only be at 72dpi it is not suitable for print purposes. Furthermore, a graphic that is saved using pixel dimensions of 2480 x 3508 (i.e. A4 at 300dpi) using jpeg low quality settings might reduce the file size but that does not mean it is suitable for web use. The fitness for purpose of the final graphics is fundamental to the unit. This means it must have an appropriate number of pixels – whether for print or web use
<b>Resources</b>	This refers to the hardware and software used to create the graphics. Examples would include both the computer equipment, image capture hardware and the image editing software application
<b>Technical compatibility of assets</b>	Component images that are to be used in a digital graphic should be technically compatible with each other. This primarily refers to the pixel dimensions and dpi resolution. For example, a 300 x 200 pixel image at 72 dpi would be unsuitable for use as the background image to a full size A4 print poster. If for print, this should be converted for typically 300dpi and the pixel dimensions taken into consideration for the print size of this component image rather than the overall finished product. Alternatively, high resolution photographs may not be suitable as a component part of a web graphic. The file formats would also be part of the technical compatibility consideration
<b>Visualisation diagram</b>	This is a preconceived sketch or diagram of what is to be created as the digital graphic. It can be hand drawn or produced using a software application. The intention is such that any other person or the client can get an idea of what the final product will look like. It can include annotations in addition to a draft layout of the content.

# iMedia - Digital Graphics Term 5

## Image Editing

Image editing software is used to create and edit images. Often images can be edited or combined to create a new composition. They can also be created from scratch to create logos or illustrations.



## Photoshop

Available for both Windows and Mac, Adobe Photoshop is an extremely powerful application that's used by many professional photographers and designers. You can use Photoshop for almost any type of image editing, from touching up photos to creating high-quality graphics.



## Technical Compatibility

Compatibility is the capacity for two systems to work together without having to be altered to do so. Compatible software applications use the same data formats. For example, if word processor applications are compatible, the user should be able to open their document files in either product.

## DPI Resolution

DPI, or dots per inch, is a measure of the resolution of a printed document or digital scan. The higher the dot density, the higher the resolution of the print or scan. Typically, DPI is the measure of the number of dots that can be placed in a line across one inch, or 2.54 centimetres.

## Pixel

The term "pixel" is actually short for "Picture Element." These small little dots are what make up the images on computer displays, whether they are flat-screen (LCD) or tube (CRT) monitors.

## Key Words

Image Editing Photoshop Technical Compatibility DPI Resolution Pixel Pixel Dimensions Use of Layers

## Pixel Dimensions

The total pixel dimensions of an image will tell you how many total pixels (dots) the image is made up of. For example, let's say we have a digital image that is 1200x1800 pixels (dots). That means our digital image is 1200 dots high by 1800 dots wide.

## Use of Layers

Transparent areas on a layer let you see layers below. You use layers to perform tasks such as compositing multiple images, adding text to an image, or adding vector graphic shapes. You can apply a layer style to add a special effect such as a drop shadow or a glow. A new image has a single layer.

## Editing Techniques

Cropping	Cropping is the removal of unwanted outer areas from a photographic or illustrated image.
Rotating	Rotating the view of an image can make it easier to edit or retouch certain areas.
Brightness/ Contrast	<ul style="list-style-type: none"><li>- Brightness refers to the absolute value of colours (tones) lightness/darkness.</li><li>- Contrast is the distinction between lighter and darker areas of an image, and it refers to making more obvious the objects or details within an image.</li></ul>
Levels	Levels is a tool in Photoshop and other image editing programs which can move and stretch the brightness levels of an image
Colour Adjustment	In graphics and image-editing programs, colour adjustment(s) can be used to change the overall tone of your image and also to remove unwanted colours from your image.
Cloning	To copy pixels to new locations in an image. To paint with the Clone Stamp tool.
Retouching	Basic retouching means up to 10 minutes of work on an image – removing blemishes, brightening teeth, smoothing skin, or even removing an unsightly wire.
Selections	With selections, define an area that you can further edit to enhance your images and composites.

# iMedia - Digital Graphics Term 6

## Version Control

The naming conventions of files should include the use of relevant words and phrases that describe the content of the digital graphic file. The renaming of a photograph from a digital camera would be a good starting point e.g. 'DSCN1056.jpg' being renamed to 'school\_entrance.jpg'

## File Types and Formats

Depending on the pre-production document that you are creating, the content of it, and the software you are using, a digital file will be created when a project is saved or exported. It is important that the file type and format used is compatible with the document type otherwise it may be unreadable or inaccessible. Some file types are designed to only be used by specific software packages e.g. Photoshop .psd whereas others are designed to be widely compatible and accessible.

## Examples of File Formats

Image	.jpg	.png	.tiff	.psd	.bmp
	.pdf				
Video	.wmv	.mp4	.mov	.fiv	
	.avi				
Audio	.mp3	.wav	.ogg	.aac	
	.m4a				
Document	.doc	.pdf	.ppt	.pub	.html
Animation	.gif	.swf			

## Key Words

Version Control  
File Types  
Formats  
File Compression  
Lossy  
Lossless  
Asset Table  
Master File  
Review

## File Compression

This is how files are made smaller so that they take up less storage space or can be easily transferred, transmitted or downloaded. There are two types:

- Lossy – Discards some of the original information to reduce file size. Quality is usually reduced. Useful for use on the web.
- Lossless – No information is discarded, file size is usually greater but so is the quality.

## Asset Tables

An Asset table is a table where images and items are kept that will be used within the project.

They require information on the potential use of the image and the location the image has been found (website) as well as any alterations that have been made to it.

## Master File

Master files are the original file which are used to store all the original data as you make changes.

These files can be used in the case you lost your current work or if you have made irreversible changes and need to back track.

These are always useful for your projects.

## Reviewing a Digital Graphic

There are a number of steps that need to be taken when reviewing a Digital Graphic:

- Make sure both of the final digital graphic formats are fit for purpose.
- Check that the digital graphic meets the client requirements initially specified.
- Review the final digital graphic in terms of composition, colours and overall quality.

## Reviewing a Digital Graphic – Positives and Negatives

When reviewing Digital Graphics both the positives and the negatives need to be taken into account:

- Positives: Looking at what was done well in the project will allow you to identify those techniques which can be used again in the future.
- Negatives: Understanding what went wrong within the project helps you avoid techniques when looking at certain projects.

These help you create your “toolkit” which you will rely on for your future projects.

# iMedia - Digital Graphics Legislation

## Legislation

Legislation are laws passed by government to control, restrict, protect and prevent various aspects of media production.

There are three main pieces of legislation that affect media production:

- Data Protection Act 1998
- Health and Safety Act 1990
- Copyright, Designs and Patents Act 1988

## Health and Safety Act 1990

The Health and Safety Act is the main law that deals with the health and safety of employees.

The law ensures that employers look after the rights of their workers by keeping the conditions to an acceptable and legal standard.

Two areas covered by H&S are:

1. General Working Conditions
2. Employer Regulations

## Data protection Act 1998

The Data Protection Act 1998 (DPA) is a law designed to protect personal and sensitive data that has been collected about people from being misused. There are 8 Principles:

1. Data is processed fairly and lawfully.
2. Data is used for specified legal purposes.
3. Data stored is adequate, relevant and not excessive.
4. Data is accurate and up to date.
5. Data is not kept longer than necessary.
6. Data is processed in accordance with data subjects' rights.
7. Data is kept safe from accidental damage and secure from unauthorised access.
8. Data is not transferred to another country outside the EU.

## Copyright

Copy right is a law designed to help protect peoples work and ideas.

If you:

- **Take peoples work (download films /music)**
- **Use people's work ( copy text/ images from the internet**
- **Steal people's ideas ( create a new product using someone else's technology)**

Without permission and without acknowledging them, then you are breaking copyright law. Typical punishments range from 6 months to 10 years imprisonment and also £5000 fine.



## Location Recce

Location Recce is a production term used in the UK, Europe, India, Australia, New Zealand, South Africa, and Malaysia which refers to a pre-filming visit to a location to determine its suitability for shooting (commonly carried out by the Director of Photography), including access to necessary facilities and assessment of any potential lighting or sound issues, and is closely related to location scouting. In the US, the term "site survey" or "tech scout" is commonly used with the same meaning.

## Trademark

A Trademark is a type of intellectual property consisting of a recognizable sign, design, or expression which identifies products or services of a particular source from those of others, although trademarks used to identify services are usually called service marks. The trademark owner can be an individual, business organization, or any legal entity. A trademark may be located on a package, a label, a voucher, or on the product itself. For the sake of corporate identity, trademarks are often displayed on company buildings. It is legally recognized as a type of intellectual property.

## Key Words

Legislation Data Protection Health & Safety  
Copyright Location Recce Trademark  
Intellectual Property Royalty Free

## Intellectual Property

This is a piece of work, idea or an invention which may then be protected by copyright, patent or trademark.

The concept of copyrighting an idea is increasingly becoming a bigger issue with the development of the internet and the ease of access to people's intellectual property.

## Royalty Free

Normally, copyrighted material is protected and cannot be used without permission and payment of royalties. Royalties are usually a percentage of earnings or recurring payment made to a creator or intellectual property owner.

Royalty free is a term that is used to describe certain types of intellectual property that you're allowed to use without having to pay royalties. The intellectual property owner must specifically put this label on their content in order for anyone to use it in this way.

# Knowledge Organiser - Medieval Medicine 1250-1500

## Medieval Britain

Medieval Britain is the period between **1250-1500** also known as the **13<sup>th</sup>-16<sup>th</sup> century**. It is also known as the **Middle Ages**.

### Key Events

1123	Britain's first hospital, St. Bartholomew's was set up in London
1348-49	The Black Death (Bubonic Plague) hits England, killing 40% of population.
1350	Average life expectancy is 35 years of age
1370	12 rakers (cleaners) are employed to clean the streets of London
1388	The government passes the first law requiring streets and rivers to be cleaned
1400	There were 500 hospitals in Britain

### Key Concepts

The Medieval Church	Britain was Christian (Roman Catholic) with all the population being religious. Ideas and power was dominated by the Church, they controlled education and the church played a central part in daily life.
Medieval Power	The emphasis in Medieval Britain was on authority, the King had absolute power but the Church has considerable control. People followed authority and would not question the views of King/Church at risk to their own lives.
The Four Humours	<p>First suggested by Greek doctor Hippocrates. He believed the body was made up of Four Humours, Black Bile, Yellow Bile, Blood and Phlegm. These humours linked to the four elements/ seasons.</p> <p>Hippocrates believed if your humours became unbalanced you would get ill, so you would need to rebalance the four by removing the excess humour.</p> <p>Galen, another Greek doctor, used the Four Humours Theory to create the 'Theory of Opposites'. Galen said that to heal illness, you should use the opposites to cure the unbalanced humour, e.g. using heat (like spices) to cure a cold (Phlegm).</p>
Public Health	The health of the population as a whole and the efforts made by the King or Government to improve this e.g. cleaning streets



## Ideas on the Cause of Disease

Superstition	Beliefs based on the supernatural like witchcraft or astrology.
Sins	Idea that God caused to punish for peoples sins
Miasma	'Bad air' which was blamed for spreading disease
Astrology	Study of the planets/stars and its affect on humans
Urine Chart	A chart used by physicians to help diagnose an illness using urine
Amulet	A charm that brought 'protection' from disease
Purging	To rid the body of a 'excess' humours like blood or phlegm
Leeching	The use of leeches for drawing 'bad blood' from patients
Cupping	Using glass cups to draw blood to the surface, removing the humour (bad blood)
Herbal Remedy	Medicine made from plants with natural cures e.g. honey/mint
Trepanning	Cutting hole in the skull to release 'bad spirits' causing pain
Pilgrimage	A journey to a religious shrine and relics to show your love of God and to cure an illness
Fasting	Going without food, as a punishment to please God
Regimin Sanitatis	Idea promoted by physicians to the rich. Encouraged to eat healthy, exercise, bath and relax to avoid getting ill
Apothecary	A medieval pharmacists or chemist
Monastery	A building where monks live, eat and pray
Physician	A doctor, completed 7 years of university training, expensive
Vademecum	A medieval 'medical' book carried by doctors
Barber Surgeon	Untrained surgeon, who practiced basic cheap surgery
Wound Man	Visual guide to help surgeons treat injuries
Wise woman	A female healer and midwife, who used herbal remedies as cure
Epidemic	A widespread outbreak of a disease
Flagellant	People who whipped themselves to show god they repented their sins and wanted mercy. They hoped to avoid getting sick

# Medieval Medicine 1250-1500: The Essentials

## Impact of Medieval Society on Medicine

**Church:** Church controlled everything and people afraid of God, they limited change as no one challenged. They controlled education and training of doctors, they support Hippocrates/Galen's ideas so no one dared or wanted to challenge ideas as if you challenged Church, you were challenging God.

**Tradition:** Many simply respected traditional ideas, e.g. Hippocrates/Galen and saw ideas as rational and respected. Galen wrote 300 books, so why bother looking for change?

**Government:** King and government most powerful but spent nothing on improving public health, it was only during the Black Death of 1348/9 that killed 40% that King Edward did something.

**As a result, there was little progress (continuity) in medicine in the Middle Ages**



## Hippocrates and Galen

The ideas of Galen and Hippocrates were well respected as they were over 1000 years old, and the four humors made sense to people at the time. Galen had written over 300 medical books, it was assumed he was right.

All medieval training (from the church) focused on the work of Hippocrates and Galen, it was never challenged.

	Description	Was there progress?
Ideas on cause of disease	<p><b>Four Humours:</b> Idea that body contained 4 humours (blood, black bile, yellow bile, phlegm) that when imbalanced, made you ill, for example nosebleed = too much blood, that needed to be got rid of. Physicians also used Urine Charts, linked to humours to diagnose illness</p> <p><b>Miasma:</b> Bad air called Miasma causes disease, caused by dirt/waste</p> <p><b>God:</b> Church taught God caused disease to test faith or for punishment, most popular idea</p> <p><b>Supernatural:</b> Astrologists blamed stars &amp; planets for illness for example the movement of Mars/Jupiter caused Black Death. People also superstitious e.g. believed in black magic, and Jews also blamed for the Black Death</p>	There was <b>no progress</b> in ideas on what caused disease during the Middle Ages.
Treatment of Disease	<p><b>Four Humours:</b> Galen's <i>'Theory of Opposites'</i> used to treat humour with opposite, cold/phlegm= have hot/spicy food to remove the humours. Also physicians encouraged the use of Leeching, Cupping, to remove bad blood and purging with herbs, draw out humours like yellow bile.</p> <p><b>Herbal Remedies:</b> Wise women gave homemade remedies that did work e.g. honey for infection, mint for stomach.</p> <p><b>Religious:</b> Prayers, pilgrimage to shrine</p> <p><b>Surgery:</b> Barber surgeons used trepanning to remove demons from skulls, basic antiseptic like wine, experienced in times but high chance of death due to dirty tools, high risk of infection and no anatomical knowledge</p> <p><b>Supernatural:</b> e.g. wearing crushed magpie beak for toothache, trepanning to remove 'bad spirits' or rubbing chickens on plague buboes</p>	<p>The majorities of treatments did not work so there was <b>mostly no progress</b>.</p> <p>Surgery did improve in times of war, but it was <b>VERY basic</b></p>
Prevention of disease	<p><b>Religious:</b> Most people thought ONLY god could prevent disease, so they focussed on prayer, fasting, pilgrimages to religious sites/shrines. During the Black Death, flagellants publically whipped themselves to avoid getting sick by punishing for their own sins</p> <p><b>Regimin sanitis:</b> Rich encouraged to eat and live healthy to avoid sickness</p> <p>Wearing amulets/charms for protection, this linked to supernatural/superstitious ideas. This was common during the Black Death</p> <p><b>Miasma:</b> Fresh Herbs and ringing bells were to remove miasma from the air, again this was common during the Black Death</p>	<p><b>No progress</b> in preventing disease as they did not understand the cause.</p> <p>Regimin Santitis was sensible advice but only for the rich</p>
Care & Hospitals	<p><b>Physicians:</b> trained by church at university, no anatomical knowledge as dissection was banned. Took observation and diagnosed the rich</p> <p><b>Apothecaries:</b> Chemists who made herbal remedies, experienced but no training</p> <p><b>Wise Woman:</b> Local woman with medical skills such as midwifery &amp; making remedies</p> <p><b>Hospitals:</b> First was St Bartholomews in 1123. All hospitals ran by the church in places like monasteries with monks offering 'care not cure', as they believed only God would do it. Rooms were cleaned and patients well fed. Mostly for the old/poor patients, they turned away infectious.</p>	<b>Some progress</b> with development of hospitals, but the care given remained stuck in old ways
Public Health	<p>Poor public health, dirty towns with few fresh water supplies and a lack of waste cleaning. Blamed for Miasma and help spread Black Death</p> <p>No government spending but some cities employed rakers (12 in London) and installed cesspits and water supply (York).</p> <p>Only in Black Death did King Edward order cleaning of streets,</p>	There was <b>very little progress</b> in public health during the Middle Ages.

# Knowledge Organiser - Renaissance Medicine 1500-1700

## Renaissance Britain

The Renaissance is the period between 1500-1700 also known as the **16<sup>th</sup>-18<sup>th</sup> century**. **Renaissance means 'rebirth'**, it was a period when old ideas were questioned and new ideas/discovered, but there was little medical improvement.

### Key Events

<b>1440</b>	The printing press is invented, increased books and knowledge spreading
<b>1536-40</b>	The Dissolution of the Monasteries – Henry VIII shuts down monasteries across England, this includes the closing of church hospitals
<b>1543</b>	Vesalius releases influential book ' <i>Fabric of the Human Body</i> '
<b>1628</b>	William Harvey scientifically proves the circulation of blood through the body, his book marks the end of Galen's influence on the anatomy
<b>1660</b>	Royal Society is set up, aiming to share scientific ideas/knowledge
<b>1665</b>	The Royal society releases its first journal, Philosophical Transactions
<b>1665</b>	First use of the microscope.
<b>1665-66</b>	The Great Plague in London, kills 25% of London's population
<b>1676</b>	Thomas Sydenham publishes ' <i>Observations Medicae</i> '
<b>1683</b>	Van Leeuwenhoek discovers bacteria but does not link it to disease

### Key Individuals

<b>William Harvey</b>	An English doctor, who also challenged Galen on his views about blood. He proved for the first time, blood circulation and the flow of arteries/veins by using dissection and experimentation. Helped improve knowledge and long term impact, but at the time doctors were resistant and slow to follow him.
<b>Thomas Sydenham</b>	A physician, called the 'English Hippocrates'. Released a famous book called ' <i>Observationes Medicae</i> ' where he argued that doctors should visit patients and observe them rather than just reading books. He believed in a <b>scientific method</b> to medicine, by encouraging science and experimentation. He also openly said God or the Four Humours did not cause disease, but did believe disease was caused by 'atmospheres'.
<b>Vesalius</b>	An anatomist who proved Galen wrong in his ideas on the human jaw. Importantly, he said that medical students should perform dissections themselves and he released his book the ' <i>Fabric of the Human Body</i> ' with highly detailed anatomical illustrations, this improving medical knowledge.

## Key Terms

<b>Dissection</b>	The cutting open of a human body to study its anatomy for medical training/research. More common in the Renaissance.
<b>Anatomy</b>	The science of understanding of the human body
<b>Syphilis</b>	A sexually transmitted disease, often caught in bathhouses
<b>Transference</b>	New idea that that an illness could be transferred to an object, like onion or chicken, to treat yourself.
<b>Pox/Plague House</b>	A specialist hospital to focused on one disease such as the plague. These were new in the Renaissance.
<b>Plague Pits</b>	Mass graves where victims of the plague were buried
<b>Direct Observation</b>	The observation of the human body through dissection to improve knowledge and understanding.
<b>Circulation</b>	The movement of blood around the body
<b>Quack Doctors</b>	A doctor who pretends to have medical knowledge or skills, They sold medicine which supposedly cured all illnesses
<b>Alchemy</b>	'Medical Chemistry' A new type of treatment, using minerals and metals to cure illness, such as mercury. They didn't work
<b>Moderation</b>	Idea to prevent illness by avoiding exhaustion, fatty foods, drinking too much or being too lazy.
<b>Quarantined</b>	To separate people from others if they have an illness
<b>Scientific Method</b>	A new process of conducting an experiment, collecting observations, then coming to a conclusion

### Key Changes

<b>Scientific Revolution</b>	The Renaissance became an age of challenge and experimentation which has a significant impact on medical thinking, which developed with the invention of printing press which helped knowledge spread. However, at the time, it had LITTLE impact on ideas on the cause of disease/treatment
<b>The Church in the Renaissance</b>	The Reformation led to changes in religion, especially a decline in the Church's authority (power). As a result, the church had less control, there was freedom of education, challenging of God's teaching, increase in dissection but a decline in the number of hospitals. Majority of people remained religious, and still blamed god for illness and treatment

## Renaissance 16<sup>th</sup> to 18<sup>th</sup> Centuries

### Ideas on cause of disease

**Change:** Fewer people believed in supernatural or religious causes (reducing power of the Church in Reformation).

Scientific thinking spreads, idea seeds in air may spread disease. Less use of Urine Chart

Thomas Sydenham promotes 'direct observation' of patients not using books

**Continuity:** Miasma theory continued and stayed popular whilst Four Humours continued, even used on King Charles II. People believed God caused Plague, 1666

### Treatment of Disease

**Change: Little change over the period**

Alchemy: Over 122 chemical cures like Mercury to cure Smallpox but dangerous

Transference: Idea illness could be transferred to an object like an onion

New Remedies: New World (USA) brought herbs/spices like quinine for dysentery

**Continuity: Large amounts of continuity**

Herbal remedies remained popular

Bleeding and purging the Four Humours, even Charles II was and during Great Plague

Religious: People still believed God cured, 92,000 touched Charles II hand to cure scrofula. Many still prayed in Great Plague

### Care & Hospitals

**Change:** Physicians had better access to medical books due to printing press, impact of Vesalius improved knowledge of anatomy. Dissection now allowed

Surgeons/Apothecaries could join guilds to get training to become masters : Over 122

Hospitals: More hospitals treating sick but Henry VIII closed monastery run hospitals

Pest house for contagious disease & some charity hospitals opened with physicians who focused on treatment not religion

**Continuity:** Large amounts of continuity

Physicians continued to be too expensive, most care done in the home by women

Most hospitals continued, no contagious

### Prevention of Disease

Emphasis on removing Miasma: draining swamps & clearing rubbish. Closing bathhouses to stop Syphilis spread

### The Scientific Revolution

**Royal Society** (1660) set up and given £ by Charles II, encouraged science printed scientific book '*Philosophical transactions*' e.g. Van Leeuwenhoek seeing of bacteria

**Vesalius** Italian professor who carried out dissection, improved understanding of anatomy and proved Galen wrong (Jaw) which encouraged others to challenge Galen/do dissections. Work printed in UK **William Harvey** Royal physicians, did public dissections and recorded symptoms, not using books. Used Vesalius ideas to prove Galen wrong about blood circulation through arteries & veins. Ideas then taught in medical schools and encouraged further challenge of ideas

**Thomas Sydenham** Doctor, published *Observationes Medicae*, challenged four humours and suggested direct observation of patients symptoms. Part of Royal Society

### Great Plague 1666-7

**Causes:** Most people blamed for Miasma, realised could be passed between people

**Treatment:** Similar to Black Death, many visited Quack Doctors & used transference

**Prevention:** Plague Doctors advised herbs

**Public Health:** Govt did much more, closed theatres, killed cats/dogs, burnt tar, carts collected the dead and quarantined houses

### Factors for/against progress

**Church:** Decline of church power in reformation, allowed new ideas/dissection

**Tech:** Printing press allowed spread of ideas to challenge church and new scene ideas

**Government:** King supported scientific revolution, govt. action in Great Plague

**Individuals:** Sydenham, Vesalius, Harvey

**BUT, little short term change as old ideas continued and new ones slow to spread**

# Knowledge Organiser - Industrial Revolution Medicine 1700-1900

## Summary

The Industrial Revolution period was the period between **1750-1900** also known as the **18<sup>th</sup> and 19<sup>th</sup> centuries**. It was an **age of breakthroughs**

## Key Events

1796-98	Jenner develops the Smallpox vaccination
1847	James Simpson discovers chloroform as an anaesthetic
1854	John Snow's discovers the link between the 1854 cholera outbreak and the Broad Street pump.
1854	Florence Nightingale treats wounded solders in the Crimean War
1859	Nightingale publishes her 'Notes on Nursing'
1860	The 'Florence Nightingale School of Nursing' opens
1861	Pasteur discovers the Germ Theory
1866	Joseph Lister begins to use carbolic acid as antiseptic in surgery
1875	The Second Public Health Act
1881	Pasteur develops a vaccination for anthrax
1882	Robert Koch publishes his four hypotheses and discovers bacteria causes tuberculosis
1895	William Rontgen discovers x-rays

## Key Words

Enlightenment	Idea in the 18 <sup>th</sup> century that people should think for themselves and authorities like the church and nobility should not control everyday life
Bacteria	A tiny living organism, only seen by microscope, which causes disease
Antibodies	Parties inside the body that fight and remove germs.
Antiseptics	Chemicals uses to destroy bacteria & prevent infections

## Key Words

Aseptic Surgery	Surgery where microbes are kept out of the wound in the first place, rather than being killed by antiseptic.
Anaesthetics	Drugs given to unconsciousness before and during surgery
Surgery 'Black Period'	Period when anaesthetics were used and the death rate in surgery went up as doctors attempted complex surgery.
Chloroform	A liquid whose vapour is used as an anaesthetic
Germ Theory	The theory that germs cause disease, often by infection through air
Infection	The formation of disease causing germs or bacteria
Inoculation	Infecting the body with a disease in order to help it fight a more serious attack of the disease later
Vaccinations	Injection into the body of weak organisms to give the body resistance against disease
Anthrax	An infectious disease
Smallpox	A dangerous disease, which was a major cause of disease until beaten by vaccination.
Patent Medicines	Medicine sold for profit. In the Industrial Revolution many of these medicines had no medical benefit at all.
Dispensary	Where medicines are given out.
Public Health	The well-being of the whole population
Poor Law Unions	Local organisations set up to take care of the poor and unemployed
Privies	Public toilets outside houses
Cesspit	A pit for storing sewage or waste
Workhouses	Accommodation for the poorest people, they had to work there for rent.. Families were also split up.

# Knowledge Organiser - Modern Medicine 1900-present

The modern period refers to **1900 onwards to the present day.**

## Key Events

1902	1902 – Archibald Garrod, an English doctor theorises that hereditary diseases are caused by missing information in the body’s chemical pathways.
1911	National Insurance Act – workers under a certain wage were entitled to free medical care.
1928	Penicillin identified by Alexander Fleming
1940	Florey and chain successfully treat mice with Penicillin
1942	Diphtheria vaccination introduced
1948	The National Health Service is established
1950	Whooping Cough vaccination introduced
1951	Rosalind Franklin and Maurice Wilkins create images of DNA using X-rays
1953	DNA discovered
1956	First successful kidney transplant carried out between identical twins in the USA
1956	First Clean Air Act introduced to deal with increasing smog and pollution in cities.
1961	Tetanus vaccination introduced
1963	First successful lung transplant
1967	First successful liver and heart transplants
1968	Measles vaccination introduced
1968	Second Clean Air Act introduced
1970	Rubella Vaccination introduced
1990	Human Genome Project Launched

## Key Words & People

Genome	The complete set of DNA containing all the information needed to build a particular organism. .
Compound	A mixture of two or more elements
Penicillin	The first true antibiotic.
Antibiotic	A treatment that destroys or limits the growth of bacteria in the human body.
Hereditary disease	Diseases which are caused by genetics so can be passed on from parents to children or other descendants.
DNA	DNA carries genetic information from one living thing to another. It determines characteristics like hair and eye colour.
Hemophilia	A genetic disease passed from parent to child that stops blood clotting
Fundamental laws of Inheritance	The theory that genes come in pairs and one is inherited from each parent.
Alexander Fleming	Fleming studied soldiers wounds on the WW1 battlefields and then tried to find a way to heal bacterial infection. He discovered that a penicilium mould produced an excellent antibiotic.
Howard Florey & Ernst Chain	They continued Fleming’s research on penicillin and won a Nobel prize for medicine in 1945. .

# The Big Picture of 'Ideas on the Cause of Disease' Over Time

Medieval	Renaissance		Industrial	Modern
<p><b>God</b></p> <p>The Church taught God caused disease to test faith or as a punishment e.g. the 1348 Great Plague</p>	<p><b>Traditional ideas</b></p> <p>Traditional ideas remained popular with people at a time, especially during the Great Plague. when they were no closer to the real cause</p> <p><b>God:</b> Although less people believed in God, during the plague, it was blamed on Gods punishment</p> <p><b>Astrology:</b> the alignment of Jupiter and Saturn blamed for the 1665 Plague</p> <p><b>Four Humours:</b> Less people believed it, Sydenham challenged but used with Charles II</p>		<p><b>Miasma</b></p> <p>Miasma theory remained popular until the late 1800s, even with Florence Nightingale. Some link linked to Spontaneous Generation. Great Stink of 1858 <b>made people still think caused disease.</b> Declined after Germ Theory</p>	<p><b>Genetics/DNA</b></p> <p>DNA identified by Crick/Watson in 1953, and then Human Genome Project allowed doctors to identify genetics (hereditary) diseases like Parkinson's and Alzheimer's.</p> <p>Mapping DNA allows to look for future illness, like spotting genes that may cause breast cancer, better prediction!</p> <p>However, no treatment available for genetic illness yet but can test/prevent Downs Syndrome in embryo</p>
<p><b>Miasma</b></p> <p>Bad air called Miasma causes disease, caused by dirt/waste</p> <p>People believed the Great Plague was caused by miasma that came from the movement of planets of volcanic eruptions</p>	<p><b>Direct Observation</b></p> <p>Thomas Sydenham encouraged direct observation of the sick (in his book <i>observationes medicae</i>), alongside making notes on symptoms rather than using textbooks to diagnose patients. He believed that disease were 'species' e.g. measles and must be categorised to help treatment.</p>		<p><b>Spontaneous Generation</b></p> <p>In early <b>1700s</b>, doctors using microscopes came up the theory of <b>Spontaneous Generation</b>. Idea that bacteria was <i>caused</i> by decay and spread.</p>	<p><b>Germ Theory</b></p> <p>Continued use, but now improved science allowed to specific germ using technology</p>
<p><b>Four Humours</b></p> <p>Idea by Hippocrates that body contained 4 humours (blood, black bile, yellow bile, phlegm). When humours imbalanced, it made you ill, for example nosebleed = too much blood.</p> <p>To medieval people, it made sense (rational) and as it was over 1000 years old, this traditional idea was respected. Idea also supported by the church, who taught it to physicians at university, so never challenged.</p> <p>Physicians also used Urine Charts, linked to humours to diagnose illness</p>	<p><b>Urine Charts</b></p> <p>Discoveries into the digestive system meant that physicians no longer believed urine charts</p>	<p>This was popular up to the 1870s, with doctors like Henry Bastion <b>still believing it, despite</b> the Germ Theory proving it wrong. Eventually declined by 1900</p>	<p><b>Lifestyle</b></p> <p>Doctors and scientists have now linked impact of lifestyle on health e.g. STD/Drugs</p> <p><b>Smoking:</b> Link to Lung Cancer found, alongside high blood pressure and asthma</p> <p><b>Diet:</b> High sugar causing Type 2 diabetes</p>	
<p><b>Supernatural</b></p> <p>Astrologists blamed stars &amp; planets for illness, for example the movement of Mars/Jupiter caused Black Death in 1348. People also superstitious, e.g. witches</p>	<p><b>Miasma</b></p> <p>The most common idea in the period.</p> <p>Summer heat, waste and dunghills caused 'vapours' blamed for the Great Plague, 1665.</p> <p>Even Thomas Sydenham believed it, calling it 'atmospheres</p>	<p><b>Contact</b></p> <p>The use of 'Bills of Mortality' during the plague allowed people to identify that the Plague could spread between people, and their efforts to quarantine and ban meetings suggest they understood it was contagious, but could not yet explain it.</p>	<p><b>Traditional Ideas</b></p> <p><b>By 1700</b>, God the four humours, and supernatural are <b>no longer believed</b></p>	<p><b>Diagnosis</b></p> <p>Biggest change in the 20<sup>th</sup> century was that treatment was now based on medical testing, using science/technology e.g. electron microscopes from 1931, 10m zoom</p> <p>Idea more than one cause of disease</p> <p>This means that diagnosis is incredibly accurate, and means treatment can be improve.</p> <p><b>Blood Tests</b> From the 1930s, used to test for conditions anaemia or deficiencies</p> <p><b>Biopsy's:</b> A sample of human tissue can be used to identify disease e.g. cancer</p> <p><b>Ultrasound:</b> Using sound waves to look at children in women or kidney stones</p> <p><b>X Ray:</b> From 1890s to spot broken bones</p> <p><b>MRI Scans:</b> Magnets &amp; radio wave</p> <p><b>CT Scans:</b> Advanced X-Rays which can be used to diagnose tumours and cancer</p>
			<p><b>The Germ Theory</b></p> <p>In <b>1861</b>, Louis Pasteur came up with the <b>Germ Theory and proved</b> that bacteria in the air caused decay (rotting), this proved Spontaneous Generation wrong. However, Pasteur cant prove it causes disease. At first Germ Theory not believed and many like Henry Bastion rejected the theory.</p> <p>In the 1870s, the Germ Theory was developed by Robert Koch, who's experiments (growing and dying bacteria) <b>proved that specific bacteria caused disease</b>, for example he discovered TB (1882) and Cholera (1883). This was a huge breakthrough, and became the basis for identifying bacterial disease we use today.</p> <p>Germ Theory took over 30 years to be accepted, and was at the end of the Industrial period.</p>	

# The Big Picture of 'Key Individuals' Over Time

Medieval	Renaissance	Industrial	Modern
<p><b>Hippocrates and Galen</b></p> <ul style="list-style-type: none"> <li>The ideas of Galen and Hippocrates (the Four Humours) were well respected as they were over 1000 years old and logical.</li> <li>Galen had written over 300 medical books, they were detailed and illustrated, so doctors believed everything to be correct.</li> <li>To medieval doctors, the Four Humours theory worked and you could see evidence.</li> <li>When someone was sneezing, they had too much Phlegm. The sneezing was the body rebalancing its humours – this made sense to them, so they continued to follow it.</li> <li>All medieval training (from the church) focused on the work of Hippocrates and Galen</li> <li>They were taught that all they wrote was correct and not to challenge it, instead to prove how Galen was right. This meant these ideas were NEVER challenged.</li> </ul>	<p><b>Thomas Sydenham:</b> the 'English Hippocrates'.</p> <ul style="list-style-type: none"> <li>English doctor working in London during 1660s</li> <li>Book called <i>Observationes Medicae</i> – which was used for by doctors for over 200 years.</li> <li>Direct Observation: Doctors shouldn't use books (like Galens) but should observe the sick and make detailed notes on symptoms to make diagnosis.</li> <li>Argued that the the Four Humours was completely wrong and that diseases were like 'species' with different treatment, but did still believe in Miasma</li> <li>Pioneered use of Quinine for malaria</li> </ul>	<p><b>James Simpson</b></p> <p>Developed Chloroform in 1847, tested various chemicals on himself and friends until found chloroform useful Simpson promoted it and even Queen Victoria gave it her blessing after the birth of her son in 1853. Knighted for his work = chloroform respected</p>	<p><b>Paul Ehrlich</b></p> <ul style="list-style-type: none"> <li>Ehrlich set up a private laboratory and a team of scientists and by 1914 they had Salvarsan 606, the first 'magic bullet' – A chemical mixtures that would target and kill specific bacteria, e.g. syphilis</li> </ul>
	<p><b>Andreas Vesalius</b></p> <ul style="list-style-type: none"> <li>Italian doctor, taught surgery at Padua university</li> <li>Carried out dissection, "graverobber"</li> <li>Huge impact on improved understanding of anatomy and proved Galen wrong 300 times e.g. The human jaw. Book translated in 4 languages</li> <li>Fabric of the Human Body (1543) detailed drawings of human body, used in medical training</li> <li>He encouraged others to challenge Galen/do dissections, first UK in 1565, inspired Harvey</li> </ul>	<p><b>Edward Jenner</b></p> <ul style="list-style-type: none"> <li>Created first vaccine in 1798 to prevent Smallpox using experimentation using cowpox to inoculate 23 diff people.</li> <li>Took over 50 years to be accepted, government finally supported due to Smallpox outbreak and Germ Theory</li> </ul>	<p><b>Alexander Fleming</b></p> <ul style="list-style-type: none"> <li>Accidentally discovered Penicillin in 1928, the first organic antibiotic after leaving petri-dishes with bacteria on and then noticed the mould that grew killed the bacteria, he tested a diluted version outside of the body and it worked.</li> <li>He wrote a paper on it, but little attention paid as Fleming abandoned work on it from 1931</li> </ul>
	<p><b>William Harvey</b></p> <ul style="list-style-type: none"> <li>James I's doctor, Interested in anatomy &amp; blood</li> <li>Wrote leading book on blood circulation</li> <li>Proved Galen was wrong in saying blood 'burnt up' in the body, it was circulated and reused</li> <li>Proved heart pumped bloody around the body through veins and arteries in one connected system, used human dissection and experiments</li> <li>Ideas took 50 years to be accepted and made <b>no impact</b> on medicine at the time</li> <li>Eventually work taught in university, long term impact on surgery and blood transfusions</li> <li>Did public dissections, encouraged others</li> </ul>	<p><b>Florence Nightingale:</b></p> <ul style="list-style-type: none"> <li>Trained as nurse, helped in Crimean war, death rate dropped 40% to 2%</li> <li>Promoted hospital design changes; sanitation, ventilation, set up wards, tiled floors for cleaning. Used in Birmingham</li> <li>Wrote books &amp; opened Nightingale School of Nursing (1860) to train nurses/midwives, made it a respected</li> </ul>	<p><b>Florey and Chain</b></p> <ul style="list-style-type: none"> <li>In 1938, two oxford scientists <b>Florey and Chain</b> developed penicillin and managed to create a pure penicillin which could kill bacteria inside the body like septicemia.</li> <li>They tested it on mice and a man, but struggled to 'grow' enough penicillin, but luckily in 1941 American companies agreed to mass produce it and the US government provided funding.</li> <li>Led to the development of penicillin we use now</li> </ul>
	<p><b>The Royal Society</b></p> <ul style="list-style-type: none"> <li>Set up in 1660 and given Royal Charter by Charles II, encouraged science &amp; printed scientific journal '<i>Philosophical transactions</i>'. Contained breakthroughs like e.g. Van Leeuwenhoek seeing of bacteria and Lovers first experimental blood transfusion.</li> <li>Translated and printed foreign books e.g. Vesalius</li> </ul>	<p><b>Joseph Lister</b></p> <p>Developed first antiseptic in 1865 after reading about the Germ Theory and believed it, so used scientific methods to create and test it in 11 different cases, using carbolic acid soaked bandages. Reduced death rate by by 30% in surgery, published results but faced criticism, he even stopped using in 1890</p>	<p><b>Crick and Watson</b></p> <ul style="list-style-type: none"> <li>In 1953, two scientists Francis Crick and James Watson discovered the structure of DNA. They also proved DNA was in every human cell and was passed down from parents to children through their genes, and with Rosalind Franklin they manages to photograph DNA.</li> <li>Huge breakthrough that led to understanding of genetics (mapping of genomes) and genetic cause of disease</li> </ul>
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# The Big Picture of 'Treatment and Surgery' Over Time

Medieval	Renaissance	Industrial	Modern
<p><b>Religious:</b> Many felt only god could cure Prayers, fasting and pilgrimage to shrines and tombs to touch holy relics and pray</p>	<p><b>Herbal Remedies</b> Exploration of the New World brought new herbs/spices like quinine which Sydenham used to cure malaria. However, herbs like tobacco did nothing but used for all illnesses. Books used to spread ideas on herbal remedies, many such as Mary Doggett's curvy cure worked as it contained orange and horse radish. Herbal remedies remained inconsistent.</p>	<p><b>New Medicines</b> New alternative cures began to include electrical shocks, injection with animal hormones, and a range of <b>harmful substances</b> including cocaine, mercury, and treosote. Quack remedies remained popular for example <i>Lily the Pink's medicinal compound</i> 'Cure all' medicines, made in pill form were popular but they did nothing to cure illness</p>	<p><b>Antibiotics</b> Paul Ehrlich develops first <b>Magic Bullet (Salvarsan 606)</b> in 1914 to attack infections in body, used to treat Syphilis. It was a chemical cure made from arsenic, so it actually poisoned patients, but he didn't know! <b>Prontosil</b>, the 2<sup>nd</sup> Magic Bullet developed in 1932, it was tested on mice and humans to cure blood poisoning. Helped post-natal (after giving birth) infection drop from 20% to 5%. Unpopular <b>Penicillin</b>: first organic antibiotic, wonder drug! In 1928, Fleming accidentally discovers penicillin (mouldy petri dishes) and that it kills bacteria but only on the outside of the body. In 1938, Florey and Chain create pure penicillin. America funded production during WW2 and use on the army (2.3 million doses!). NHS then made it free for all to treat most bacteria infections like pneumonia - huge impact on postnatal infection. Led to new antibiotics. But, growth of penicillin resistant bugs e.g. MRSA. Deaths from infectious diseases drop from 25% to 1%.</p>
<p><b>Four Humours</b> Galen's <i>Theory of Opposites</i> used to treat humour with opposite, phlegm = have hot/spicy food. Leeching, Cupping (warm glass cups on cuts) and bleeding to remove bad blood. Purging with herbs/animal fat to make you sick or empty your bowels to cleanse yourself. Cold baths used for Black Death.</p>	<p><b>Alchemy (atrochemistry)</b> was became a new treatment. The College of Physicians suggested over 122 chemicals to treat 140 illness. Antimony and Mercury used to purge illness by encouraging sweating and sickness, however they did not understand it was poisonous!</p>	<p><b>Surgery</b> In 1700s surgery remained similar, the problems of infection, pain or blood loss remained. Most surgery was completed in dirty conditions, with the tools and clothing never being cleaned. This spread infection. Attempts made to use alcohol or opium as an anaesthetic had been unsuccessful.</p>	<p><b>Drug Treatment</b> New mass produced medicines such as Aspirin which was now used as pain killer and fevers. Pills that dissolve in stomach, insulin pumps and injections of medicine. New custom drugs.</p>
<p><b>Herbal Remedies</b> Wise women gave homemade remedies that did work e.g. honey for infection, mint for stomach. However, drinking vinegar, eating crushed minerals, arsenic, mercury or even ten-year-old treacle was used for the Black Death.</p>	<p><b>Transference</b> Idea that an illness could be transferred to something else if you rubbed an object on it e.g. Rubbing an onion on warts to transfer the wart.</p>	<p>Considerable progress from mid 1800s <b>Anaesthetics</b> • Ether trailed but is risky and highly flammable • In 1847 <b>James Simpson</b> discovered <b>Chloroform</b>. It could make patients unconscious in surgery, even Queen Victoria used it in labour. • Chloroform now allowed doctors to perform deeper and more complex surgery (e.g. first heart surgery 1896) and solved the issues of pain. • However, Chloroform had risks, overdoses were common, 1850-1870 called the <b>Surgery Black Period</b> as many patients died e.g. Hannah Greener <b>Antiseptics</b> • In 1865 <b>Joseph Lister</b>, an English surgeon who studied the germ theory developed <b>Carbolic Acid</b> spray as an antiseptic. A huge breakthrough. • In trials, antiseptics helped reduce deaths in amputations by 15%. • However, Carbolic Acid damaged hands of doctors and others didn't believe in it so didn't use. • Led to <b>Aseptic Surgery</b>: clean equipment and operating theatres. From 1887 all instruments were steam cleaned and sterilised.</p>	<p><b>Modern Treatment</b> Science &amp; technology huge improved treatment. Blood transfusions from 1900, using the WW1 Machines: dialysis for kidneys, pacemakers <b>X-Rays</b>: Radiotherapy to target cancer tumours <b>Robotics</b>: 3D printed prosthetic limbs</p>
<p><b>Supernatural</b> Rubbing onions, herbs or chopped up snakes on the oils or rubbing chickens bottom on the buboes for the Black Death. Barber surgeons repanned skulls to remove demons.</p>	<p><b>Religious</b> People still believed God cured disease, 2,000 touched Charles II and to cure scrofula. Many still prayed in Great Plague.</p>	<p><b>Antiseptics</b> • In 1865 <b>Joseph Lister</b>, an English surgeon who studied the germ theory developed <b>Carbolic Acid</b> spray as an antiseptic. A huge breakthrough. • In trials, antiseptics helped reduce deaths in amputations by 15%. • However, Carbolic Acid damaged hands of doctors and others didn't believe in it so didn't use. • Led to <b>Aseptic Surgery</b>: clean equipment and operating theatres. From 1887 all instruments were steam cleaned and sterilised.</p>	<p><b>Surgery</b> <b>Anaesthetics</b>: From the 1930s, injected into the blood stream with precise doses - safer surgery. <b>Keyhole Surgery</b>: Tiny cameras and minute instruments to operate - quicker healing and less impact on the human body. <b>Microsurgery</b>: Allows tiny nerve endings and blood vessels to be reattached after surgery. Led to first kidney transplant was in 1956, and heart transplant in 1967.</p>
<p><b>Surgery</b> Barber surgeons used repanning to remove demons from skulls, basic antiseptic like honey, experienced in times but high chance of death due to dirty tools, high risk of infection and no anatomical knowledge.</p>	<p><b>Supernatural</b> The New London Dispensary suggested magic to cure malaria 'cut off hair, feed to birds in an egg and put inside tree'. During the Great Plague, magical charms continued to be used.</p>	<p>• <b>Blood loss remained the key issue by 1900</b></p>	
	<p><b>Surgery</b> Little change, surgery remained dangerous with high rates and no way to stop infection, pain or blood loss. Only improvement was in anatomical knowledge, but little impact on key issues. Surgeons began to train themselves and get more experience.</p>		

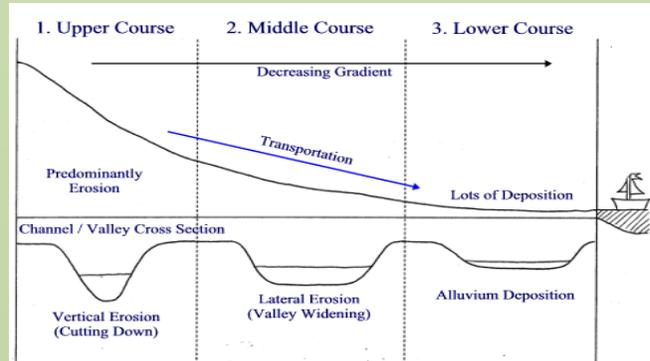
# The Big Picture of 'Prevention and Public Health' Over Time

Medieval	Renaissance	Industrial	Modern
<p><b>Supernatural</b></p> <ul style="list-style-type: none"> <li>To prevent diseases some wore amulets charms) and bought incantations ( to provide protection from spirits.</li> <li>People also based their treatments on the zodiac charts</li> </ul>	<p><b>'Regimin Sanitis' and Moderation</b></p> <ul style="list-style-type: none"> <li>This idea continued, and combined with new he idea of <b>moderation</b> spread, avoiding exhaustion, fatty foods, drinking too much or being too lazy.</li> </ul>	<p><b>Vaccinations</b></p> <p>In the 18<sup>th</sup> century smallpox was a serious epidemic As a result, doctors like Thomas Dimsdale began to <b>inoculate</b> people who would pay (making inoculators rich!) This risky method involved rubbing put from a smallpox scab into an open cut. Results were mixed, some died</p> <p><b>The work of Edward Jenner</b></p> <p>Jenner, a doctor in Gloucester, noticed that milkmaids who caught cowpox did not get smallpox, so trailed infecting James Phipps with cowpox, he did not get smallpox! He tried it a futher20 times, each time his vaccination worked. In 1798 he wrote up his findings but he did now know how to explain it, but little support, so he set up Royal Jennerian Society to do himself</p> <p><b>Short Term Impact</b></p> <ul style="list-style-type: none"> <li>Smallpox vaccine saved many, 100,000 people by 1800</li> <li>Slow use at first due to opposition from inoculators, church and slow government support, not compulsory in 1840s</li> </ul> <p><b>Long Term</b></p> <ul style="list-style-type: none"> <li>Jenner inspired Pasteur and Koch to search for more vaccines <b>but</b> no new vaccines until 1900s</li> <li>Led to eventual government enforcement of vaccinations from 1871 after a smallpox epidemic in 1860s and smallpox was wiped out smallpox by the 1970s!</li> </ul>	<p><b>NHS</b></p> <p>The NHS encouraged healthy living, administers vaccinations and uses check-ups and modern technology to hep prevent or catch diseases like cancer early. NHS provides free health check over 40 and they communicate risks like Ebola in 2014</p>
<p><b>Religious</b></p> <ul style="list-style-type: none"> <li>Many people thought <b>ONLY</b> God could cure diseases so they aimed to <b>prevent</b> it first.</li> <li>Flagellants whipped themselves to beg God for forgiveness during the Black Death</li> <li>People fasted, made offerings to God and lit candles to show they were sorry for their sins</li> <li>Many people simply followed a Christian lifestyle; praying, going to church and following the commandments. The King ordered religious service during the Black Death</li> </ul>	<p><b>Avoidance</b></p> <ul style="list-style-type: none"> <li>To many, avoiding disease like the Great Plague remained a popular opinion and many began to identify that the Plague was contagious (but could not explain why!)</li> <li>People can to avoid bath houses as they linked it with the spread of syphilis</li> </ul>	<p><b>Cholera, 1854</b></p> <p><b>Cholera epidemics common in 1830s-50s</b> : blamed on Miasma/Spontaneous Gen but John Snow identified it was contaminated water through testing around Broad Street pump</p> <p><b>Impact</b> Helped reduce deaths in Soho but little immediate impact as before the Germ Theory, so not believed but long term changes: sewage system built by John Bazalegte in late 1850s, and helped lead to 2<sup>nd</sup> Public Health Act</p>	<p><b>DNA</b></p> <ul style="list-style-type: none"> <li>Doctors can now screen for genetic diseases and or those with hereditary traits such as breast cancer. They can then be offered a mastectomy to remove the tissue to prevent cancer</li> <li>Simply, parents can be offered an abortion for embryos which highlight early signs of Downs Syndrome.</li> </ul>
<p><b>'Regimin Sanitis'</b></p> <ul style="list-style-type: none"> <li>Rich could pay physicians health regime to prevent disease</li> <li>This included; avoiding stress, exercising, eating a healthy diet and bathing regularly</li> </ul>	<p><b>Preventing Miasma</b></p> <p>As this was the most common idea on the cause, more was done to prevent it:</p> <ul style="list-style-type: none"> <li>Removing sewage, draining bogs and cleaning up rubbish from the streets.</li> <li>During the Great Plague Tar and herbs were burnt in the streets</li> <li>During the Great Plague smoking tobacco was encouraged to ward off miasma and</li> <li>Carrying a pomander (a ball of stuffed perfumed items) to ward away the miasma</li> </ul>	<p><b>Public Health</b></p> <p><b>Public Health in the 1700s</b></p> <p>Government was Laissez Faire, felt not their concern to improve public health, so towns and cities were filthy sand overcrowded, causing epidemics like Smallpox and Cholera to spread</p> <p>In 1842, official Edwin Chadwick completes a report that states the living conditions in British cities is causing sickness</p> <p><b>1948 Public Health Act</b></p> <p>The aim was to improve sanitary condition within towns however as it was not compulsory an pre germ theory, many local councils did nothing and public health did not improve.</p> <p><b>1875, 2<sup>nd</sup> Public Health Act</b></p> <ul style="list-style-type: none"> <li>Work of John Snow, Germ Theory, Cholera outbreaks and Great Stink of 1858 helped government end Laissez Faire view</li> <li>Local government had to improve public health; sewers (1,3000 miles built in London), clean water, public toilers, public health officers. Biggest government act ever</li> </ul>	<p><b>Vaccinations</b></p> <p>Government support for vaccinations grew in 100s with new vaccines, led to first national vaccination campaign for Diphtheria 1942 and Polio eradicated by 1984 due to compulsory vaccinations.</p> <p>Key vaccinations have been introduced ever since, such as:</p> <ul style="list-style-type: none"> <li>Tetanus, 1961</li> <li>Measles, 1968</li> <li>Rubella , 1970 (targets unborn children)</li> </ul> <p>The government has also introduce vaccines like HPV, which protects women against an STI than can cause cervical cancer</p> <p>Concern in 2000 over anti vaccine movements</p>
<p><b>Preventing Miasma</b></p> <p>People attempted to solve miasma by removing the bad air.</p> <ul style="list-style-type: none"> <li>People carried sweet smelling herbs and lit fires to overpower the bad air</li> <li>Others rang bells to keep the air moving away from them.</li> <li>The rich could visit bath houses and hung sweet herbs in their houses</li> </ul>	<p><b>Superstition</b></p> <ul style="list-style-type: none"> <li>Your birth was blamed for later issues</li> <li>The idea of avoiding areas with disease and checking the weather to do this</li> </ul>	<p><b>Public Health</b></p> <p>Government remained reactive not proactive to public health but did more during the Great Plague</p> <ul style="list-style-type: none"> <li>Public meetings, fairs and large funerals were banned whilst theatres were closed</li> <li>Barrels of tar or sweet smelling herbs were burnt on newly cleaned streets to drive away the miasma</li> <li>Over 40,000 dogs and 20,000 cats were slaughtered as they were blamed for spreading the disease</li> <li>The mayor appointed searchers and wardens looking for those with the disease. Households with it were marked with a red cross and '<i>Lord have mercy upon us</i>' written on it. They were quarantined for 28 days, and the dead were collected daily</li> </ul>	<p><b>Lifestyle Campaigns</b></p> <p>Understanding of causes led to specific campaigns,</p> <ul style="list-style-type: none"> <li><b>Advertising campaigns</b> which warned against the dangers or smoking, binge drinking, drug use and unprotected sex.</li> <li>'<b>Stoptober</b>' to encourage people to not smoke for a month</li> <li>'<b>Sugar Smart</b>' and '<b>5 a day</b>' aims to encourage eating well and moving more.</li> </ul>
<p><b>Public Health</b></p> <ul style="list-style-type: none"> <li>Government was reactive not proactive to public health, the king/government only spent during the Black Death.</li> <li>The government introduced 'quarantine' to stop people moving around so much, whilst victims were stopped from leaving their houses. The hospitals would not accept sufferers either</li> <li>King Edward ordered the cleaning of the streets, to remove Miasma and by 1370 there were 12 rakers on the streets of London</li> <li>Some cities like London made few improvements, but overall cities were filthy and helped spread disease.</li> </ul>	<p><b>Public Health</b></p> <p>Government remained reactive not proactive to public health but did more during the Great Plague</p> <ul style="list-style-type: none"> <li>Public meetings, fairs and large funerals were banned whilst theatres were closed</li> <li>Barrels of tar or sweet smelling herbs were burnt on newly cleaned streets to drive away the miasma</li> <li>Over 40,000 dogs and 20,000 cats were slaughtered as they were blamed for spreading the disease</li> <li>The mayor appointed searchers and wardens looking for those with the disease. Households with it were marked with a red cross and '<i>Lord have mercy upon us</i>' written on it. They were quarantined for 28 days, and the dead were collected daily</li> </ul>		<p><b>Government Acts</b></p> <p>More laws to improve public health</p> <ul style="list-style-type: none"> <li><b>Clean Air Act of 1956 and 1968</b> This was passed due to bad smog (heavy fog pollution) In London caused by burning coal. Reducing pollution</li> <li>The law aimed to reduce air pollution</li> <li><b>Smoking ban</b> inside all public buildings, 2007, Tax on Tobacco, no advertisement on cigarettes</li> <li><b>Limiting car emissions</b> (taxing cars that cause more pollution)</li> </ul>

# British Medicine Through Time: Care and Hospitals

Medieval	Renaissance	Industrial	Modern
<p style="text-align: center;"><b>Hospitals</b></p> <ul style="list-style-type: none"> <li>• First hospital called St Bartholomews in 1123 and over 500 hospitals by 1400</li> <li>• Almost all ran by the church, connecting to monasteries and ran by monks/nuns but had no training, relied on God</li> <li>• Treatment: offered 'care not cure' as thought God would cure your instead they prayed for you</li> <li>• Hospitals were clean, provided good food and you had to share a bed with a fellow patient</li> <li>• Only accepted old, poor and travellers and turned away those with diseases.</li> </ul>	<p style="text-align: center;"><b>Hospitals</b></p> <p><b>Early Renaissance</b> A patient could expect:</p> <ol style="list-style-type: none"> <li>1. A good diet of healthy foods</li> <li>2. A visit from a physician who would observe and suggest treatment</li> <li>3. Medication, from the hospital apothecary</li> </ol> <p><b>Dissolution of the Monasteries</b></p> <ul style="list-style-type: none"> <li>• Henry VIII closed monasteries from 1536-40, with it taking away almost all hospitals</li> <li>• By 1700 only 5 hospitals left in England, including St Bartholomew's</li> </ul> <p><b>Changes</b> Specialist hospitals grew that focused on one disease such as the plague and smallpox e.g. Pest and Pox houses</p>	<p style="text-align: center;"><b>Hospitals</b></p> <p><b>Early 1700s</b> Still few hospitals, but they did provide treatment Hospitals were poor designed and remained unhygienic as they still did not understand germs cause disease</p> <p><b>Work of Florence Nightingale</b> Nurse who trialled methods in Crimean war and made impact on deaths (-31% in the hospital) and brought back ideas to England, wrote 'Notes on Hospitals' Nightingale felt hospital conditions needed improving, and made the following suggestions</p> <ul style="list-style-type: none"> <li>• <b>Ventilation:</b> Fresh clean air in wards, as she still believed in miasma</li> <li>• <b>Sanitation:</b> Clean water, sewage systems and toilets</li> <li>• <b>Supplies:</b> Fresh food &amp; clean clothing</li> </ul> <p>She promoted <b>pavilion plan hospitals</b> with large rooms, more windows, tiled floors for easy cleaning and isolation wards for infectious patients, the first was a hospital in Birmingham</p> <p><b>Development of Hospitals</b> New hospitals opened by charities, small Cottage hospitals with nurses &amp; doctors from 1859. hospitals cleaner (Aseptic) due to Germ Theory. Old, Sick or Poor still had to visit workhouses but eventually infirmaries opened for the poor. Specialist hospitals for mentally sick (Asylums) Rich could pay doctors to visit at home.</p>	<p style="text-align: center;"><b>Care &amp; Hospitals</b></p> <ul style="list-style-type: none"> <li>• The 1911, <b>National Insurance Act</b> did provide help for workers who fell ill but it was a long way from including all the population such as the elderly, families or unemployed</li> <li>• 1942 Beveridge Report that said treatment should be available to the rich and the poor.</li> <li>• The NHS set up 1948 huge change, essentially free health care for all people regardless of background, paid for by taxes</li> <li>• At first, lack of money, hospitals and GP quality and waiting times but improvements GP's Charter 1966 to improve GPs and encourage research, Quality Care Commission to monitor hospitals and more hospitals built, even specialists like Alder Hey for children. NHS played huge part in life expectancy growing to 83 due to free care and medical developments</li> <li>• The NHS is now responsible for over 2500 hospitals and GPs surgeries in the UK</li> <li>• Issues today: Rising costs, waiting times, increasing lifestyle problems</li> </ul>
<p style="text-align: center;"><b>Care</b></p> <p>Majority of people care for at home by women</p>	<p style="text-align: center;"><b>Care</b></p> <p>Most sick people continued to be cared for at home or in the local community as physicians remained too expensive</p>	<p style="text-align: center;"><b>Care</b></p> <p>Rich continued pay doctors to visit at home whilst poor still struggled to get free healthcare</p>	<p style="text-align: center;"><b>Care</b></p> <p>NHS now provides free healthcare to all regardless of background, paid for by taxes</p>
<p style="text-align: center;"><b>Carers &amp; Doctors</b></p> <p><b>Physicians:</b> trained by church at university, no anatomical knowledge as dissection was banned. Took observation and diagnosed</p> <p><b>Apothecaries:</b> Chemists who made herbal remedies, experienced but no training</p> <p><b>Wise Woman:</b> Local woman with medical skills such as midwifery &amp; making remedies</p> <p><b>Hospitals:</b> First in 1123, ran by the church. Offered 'care not cure', thought God would do it. Turned away those with diseases. Barber Surgeons:</p>	<p style="text-align: center;"><b>Carers &amp; Doctors</b></p> <p>Women continued to play an important role in the care of the sick</p> <p><b>Apothecaries and Surgeons:</b> still not given any university training and considered inferior to physicians. They remained a cheaper alternative to doctors.</p> <p><b>Physicians:</b> Continued to be trained at university's but new subjects such as anatomy due to discoveries by Vesalius, Harvey and Sydenham. Slowly dissections allowed from late 1500s in England, which led to improvements.</p> <p><b>Surgeons:</b> Remained filthy, untrained but skilled.</p>	<p style="text-align: center;"><b>Carers &amp; Doctors</b></p> <p><b>Florence Nightingale:</b> Wrote 'Notes on Nursing' and opened Royal College of Nursing to train nurses/midwives. This was significant as previously nurses were untrained working class women, whereas it became a respected profession</p> <p><b>Apothecaries</b> were now known as Pharmacies, the most famous being Boots opening in 1849, whilst quack doctors selling 'cure all' pill continued</p> <p><b>Surgeons:</b> Huge improvement due to antiseptics, anaesthetics and aseptic surgery.</p>	<p style="text-align: center;"><b>Carers &amp; Doctors</b></p> <p><b>Training</b> – Nurses have developed specialist skills in the care of patients, some can now prescribe medicine.</p> <p><b>Doctors:</b> the GPs Charter, 1966 – This gave incentives to GP's who kept up with medical research and encouraged GP's to work in practices together</p>

**The long profile of a river**



**Upper course-**

- Steep gradient, v-shaped valley cut by erosion
- Small, shallow river due to low water volume
- Low water velocity as friction removes energy

**Middle course-**

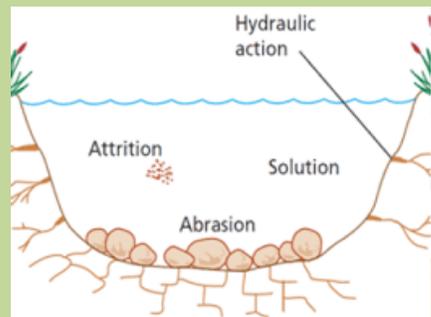
- Gently sloping, fairly flat land either side
- Meandering river of greater volume
- Eroding laterally, so river changes course
- Losing velocity so deposition occurs

**Lower course-**

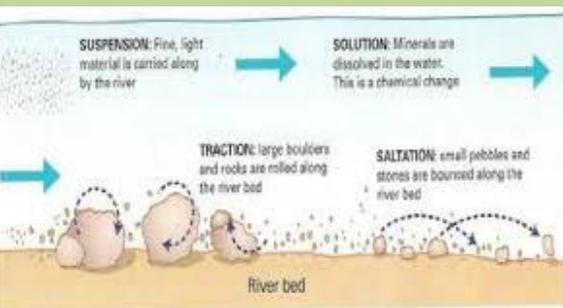
- Very flat land either side, prone to flooding
- Wide river – river is many times larger
- Fast flowing water – reduced friction
- Levees created by deposition during floods

**Fluvial processes**

**Erosion**



**Transportation**



Upper course- mostly erosion – leads to waterfalls and gorges

Middle course- erosion and deposition- creating oxbow lakes and meanders

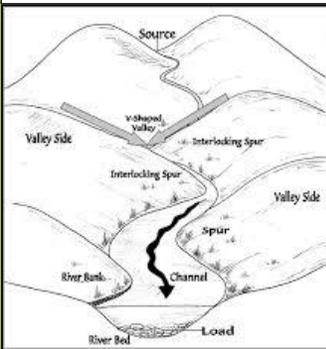
Lower course- mostly deposition- resulting in the formation of levees

**Interlocking spurs**

In the upper course river discharge and volume is low and most of the energy is used to overcome friction and eroding vertically.

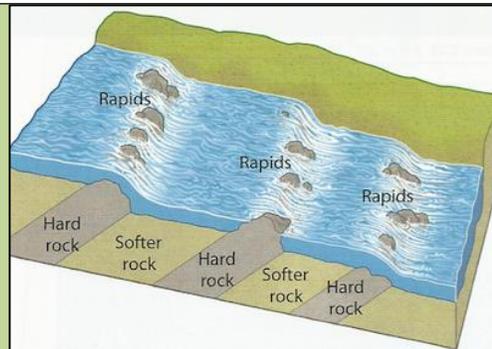
The river erodes by hydraulic action and freeze-thaw weathering giving the valley the V-shape and causing weak rock to fall.

The winding path is due to obstacles of hard rock and the river likes to take the easiest path to the sea, therefore this results in projections of hard land of the valley from alternate sides called interlocking spurs.



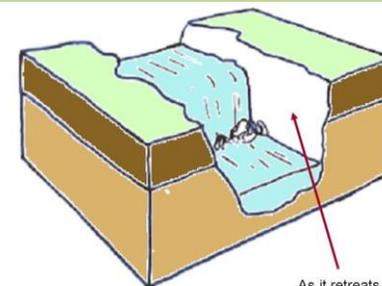
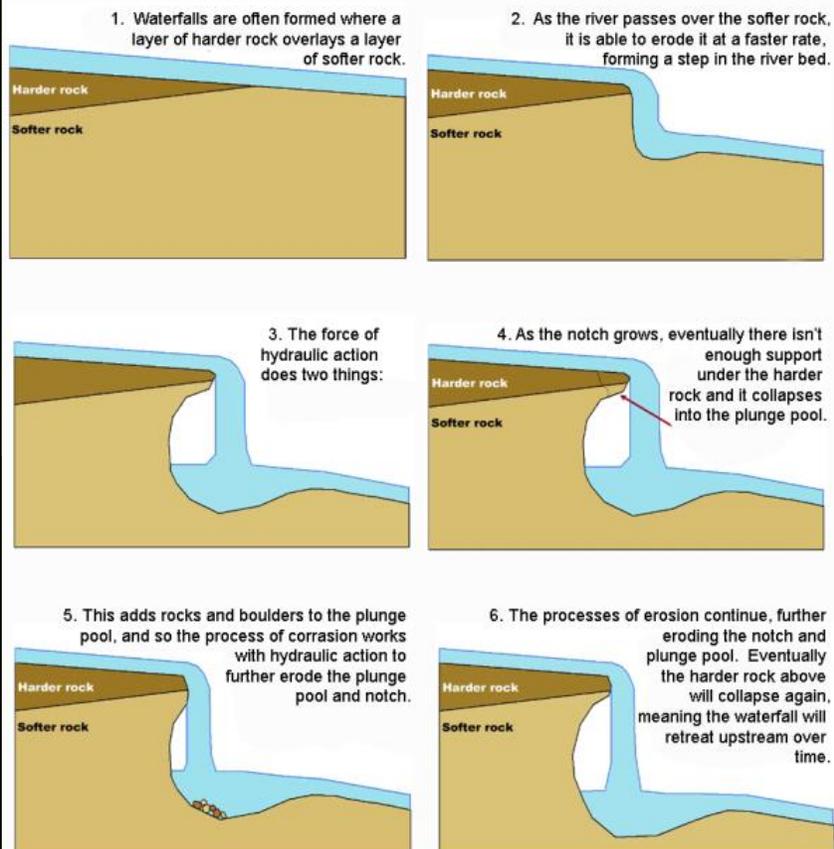
**Rapids**

Are formed by different rates of erosion of vertical layers of soft and hard rock >>>



**Waterfalls and gorges**

Waterfalls often form in the upper stages of a river where it flows over different bands of horizontal rock.



As it retreats, it leaves behind a steep sided gorge.

Over time, this process is **repeated** and the waterfall moves upstream. A steep-sided **gorge** is formed as the waterfall retreats.

## Meanders and Oxbow Lakes

In the middle course the river has more energy and a high volume of water. The gradient here is gentle and lateral (sideways) erosion has widened the river channel. The river channel has also deepened. A larger river channel means there is less friction, so the water flows faster:

- As the river erodes laterally, to the right side then the left side, it forms large bends, and then horseshoe-like loops called meanders.
- The formation of meanders is due to both deposition and erosion and meanders gradually migrate downstream.
- The force of the water erodes and undercuts the river bank on the outside of the bend where water flow has most energy due to decreased friction.
- On the inside of the bend, where the river flow is slower, material is deposited, as there is more friction.
- Over time the horseshoe become tighter, until the ends become very close together. As the river breaks through, e.g. during a flood when the river has a higher discharge and more energy, and the ends join, the loop is cut-off from the main channel. The cut-off loop is called an oxbow lake. The blockage between channel and loop colonises with marsh plants and the water in the lake become stagnant, with a slip-off slope in the middle and a steep drop around the curve- this is where the deepest water is.

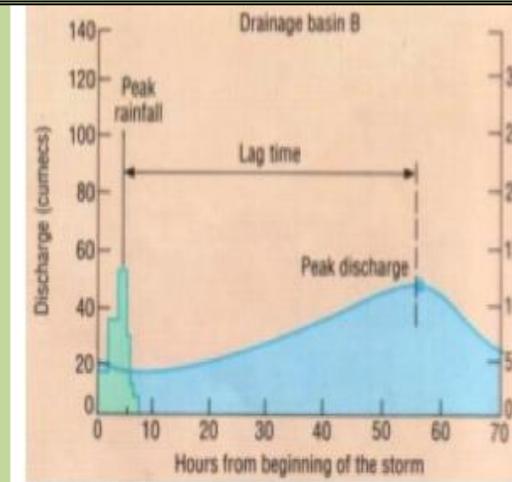
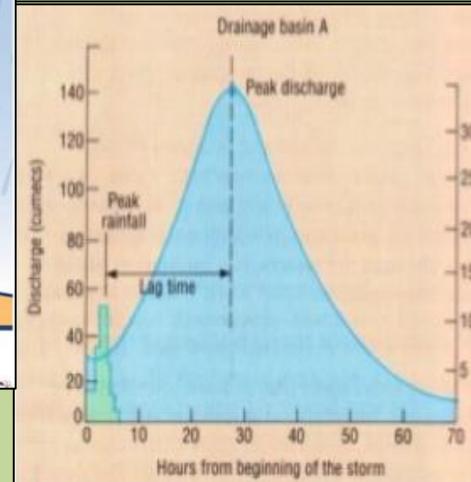
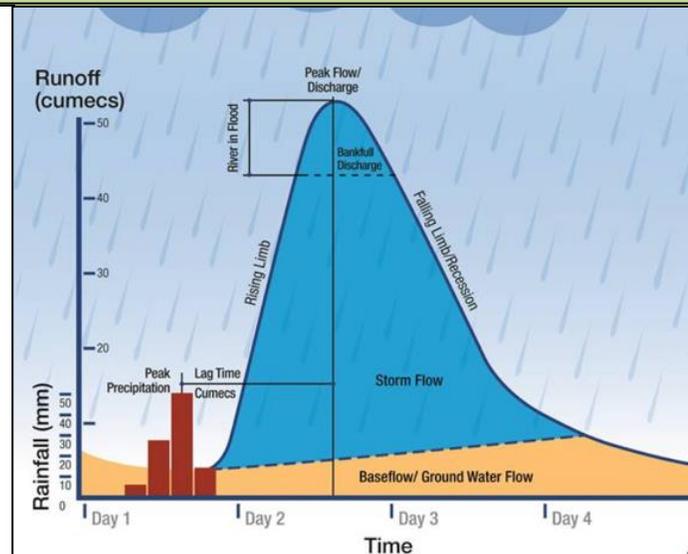
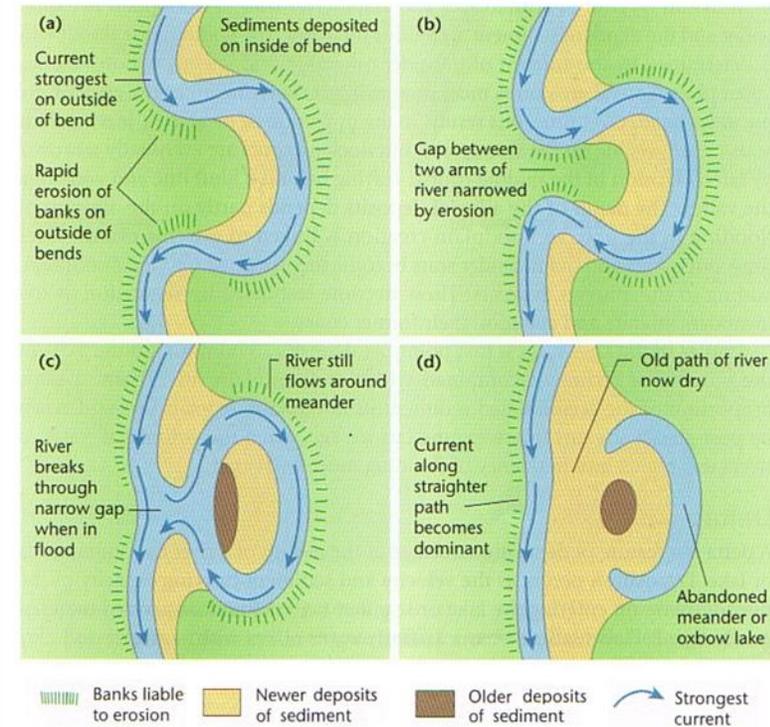
**Storm Hydrographs** are graphs that show how a drainage basin responds to a period of rainfall. They are useful in planning for flood situations as they show the discharge (amount of water reaching channel via surface run-off (storm flow), through flow, and base/groundwater flow) that originated as precipitation and whether this will exceed the amount the river can cope with before bursting it's banks (bankfull discharge).

A Flashy response hydrograph shows a river which is more likely to flood (drainage basin A). This may be as a result of factors such as:

- Impermeable rock and a steep-sided valley
- Prolonged rainfall leading to saturation of the ground
- Urbanisation and increased use of drains, concrete and tarmac
- Little vegetation / deforestation

A Slow response hydrograph (B) illustrates a river less likely to flood, because:

- Forests slow down transfer through interception
- Permeable rocks and gently sloping valleys
- Less human interference – fewer buildings, roads and drainage systems
- Large river basin means it will take longer for water to reach the river



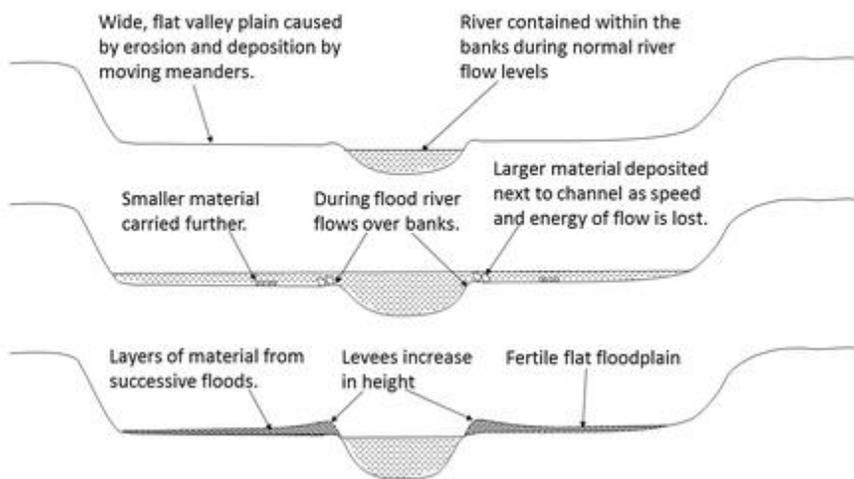
## Levees

1. When a river floods, friction reduces the velocity of the river and deposition occurs.
2. Heavy sediment is deposited closest to the river and the size becomes smaller the further away.
3. With each flood, the banks are built up higher and over time the river bed also develops sediment which raises the river channel.

## Flood plains

1. The width of a flood plain is due to how far a meander has migrated previously, as when a river erodes laterally it carves out a wider valley floor.
2. When a river floods then recedes the floodplain is fertile due to a build-up of deposition of silt and alluvium. It is built up over the years with each flood adding more material.

### The Formation of a Floodplain



## Hard engineering

- Dams & reservoirs- controls flow of water; reduces risk of flooding downstream
- Channel straightening- speeds up rate of flow, water can be moved away faster, less friction
- Embankments- increased capacity of river, can hold more water
- Flood-relief channels – redirects water to reduce pressure on main river, increases capacity.

## Strategies to reduce flooding

### Soft engineering

- River restoration- promoting natural flow of the river
- Flood plain zoning- allows us to use land appropriately
- Afforestation & wetlands- increasing water storage and interception, decreases speed of water getting to river
- Flood warnings- to allow preparation to occur.

## Estuaries

1. Mud flats and saltmarshes in an estuary are formed when alluvium is transported by the river to the sea and the incoming waves transport sand and silt up the estuary.
2. Deposition occurs because the fresh water river mixes with the sea water (creating 'brackish' water) and where they meet, the velocity is reduced and so deposition occurs.
3. These are valuable habitats, eventually becoming salt marsh – home to a variety of wildlife that is well adapted to it's conditions.



## Jubilee flood-relief river

The Jubilee River scheme was built by the Environment Agency and it opened in 2002. The scheme reduces the risk of flooding to over 3,000 properties in Maidenhead, Windsor, Eton and Cookham.

The Jubilee River diverts river water from the River Thames upstream of Maidenhead, running parallel and to the north of the river, and rejoins the Thames downstream of Windsor.

Under normal conditions, the Jubilee River provides a local recreational and wildlife amenity. In flood conditions, further water is diverted from the Thames and into the Jubilee River. This reduces flood levels in the River Thames running through Maidenhead, Windsor, Eton and Cookham.

Along the length of the Jubilee River are several weirs that keep water at levels similar to those experienced in the River Thames. The scheme also incorporates flood embankments to the north of Maidenhead and the west and north of Cookham.

The Jubilee River reduces flood risk to properties by increasing the total flood capacity of the channels flowing through the area.

While it does not protect communities downstream of the scheme, it operates so that flood levels downstream are not adversely affected.

- Cost £110 million to construct
- 11,7km long
- Average width of 50m



## Key terms and definitions for this topic

**Watershed** – the edge of a drainage basin

**Tributary** – a river or stream joining into a larger river

**Estuary** – the tidal region of a river (the part of the river which is affected by tides)

**Source** – The point at which the river begins

**Drainage basin** – an area of land drained by one river system and its tributaries

**Confluence** – the junction of two rivers

**Mouth** – the end of a river where it enters the sea

**V-shaped valley** - a valley formed by flowing water cutting down into the rock beneath

**Interlocking spurs** – harder areas of rock the river has to flow between, alternating from opposite sides of the valley

**Fluvial processes** – water related processes in a river

**Hydraulic action** – Water hits the river banks and is forced into cracks under pressure, causing the channel to weaken.

**Abrasion** – rocks scratch and scrape their way down the bank/bed and wear the bank and the stones down

**Attrition** – when stones collide with each other, chipping off the jagged edges

**Solution** – refers to the dissolving of rocks: Minerals are dissolved in water and travel in the water column.

**Traction** – large boulders rolled down the river bed

**Saltation** – small pebbles and stones bounced along the river bed

**Suspension** – fine, light material held up and carried within the river's water column.

**Thalweg** – line of fastest flow through a meander

**Brackish** – a mixture of fresh and salt water

**Tide** - the rise and fall of sea levels twice daily caused by the combined effects of the gravitational forces exerted by the Moon and the Sun, and the rotation of the Earth

**Peak discharge** – the highest recorded discharge following a rainfall event

**Peak rainfall** – the highest amount of rainfall per time unit

**Lag time** – the time delay between peak rainfall and peak discharge

**Rising limb** – shows how quickly the discharge rate rises after a rain storm on a hydrograph

**Falling limb** – shows reduced rate of discharge once the main effect of run off has passed

**Precipitation** - moisture reaching the ground, often in the form of rain

**Interception** – water being prevented from reaching the surface by trees or grass

**Infiltration** – water seeping into the soil from the surface

**Percolation** – water seeping deeper below the surface into and through the rock

**Transpiration** – water lost through pores in vegetation

**Ground water flow** – water flowing through the rock layer parallel to surface

**Surface run off** – water flowing on top of ground

**Through flow** – water flowing through the soil layer parallel to the surface

**River discharge** – volume of water moving through a river at any given moment, measured in cubic metres per second and usually expressed as “cumecs”

**Hard engineering** – use of technology and man-made structures to try to control rivers

**Soft engineering** – utilise and enhance the natural river system as a flood defence

**Sustainable** – actions and forms of progression that meets the need of the present without reducing the ability of further generations to meet their needs

**River bed** – the area immediately below the water column in a river

**River bank** – material holding the water in the river at either side

**Bed load** – the size of material carried by a river and later deposited as it loses energy

**What is a resource?**

A resource is a stock or supply of something that has a value or a purpose. The three most important resources are food, energy and water. **Adequate supplies** of these resources are essential for countries to develop and for personal well-being.

**Energy** is required for **economic development**. It powers factories and machinery and provides fuel for transport. In the past, countries depended on their own resources for energy. Today the situation is more complex. As the world develops the **demand** for energy is increasing.

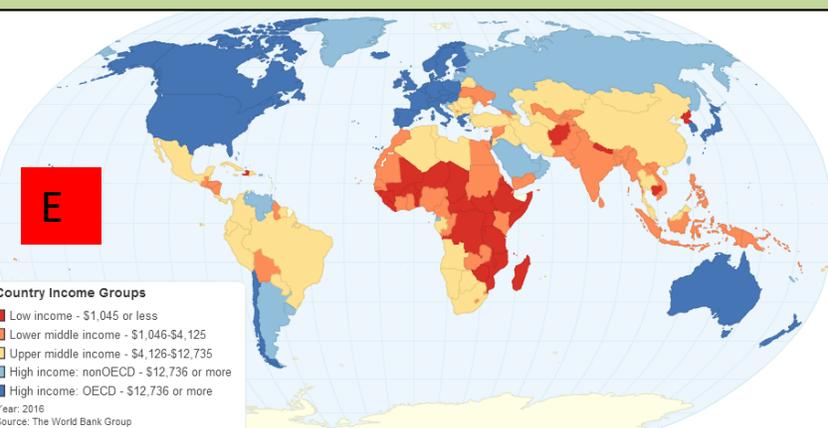
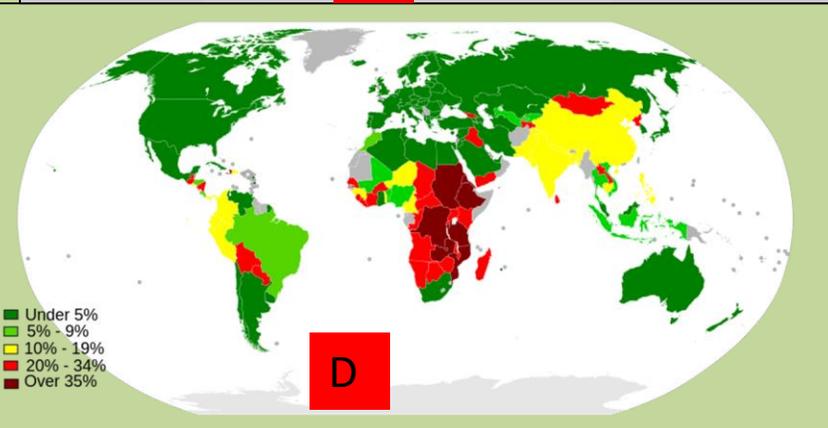
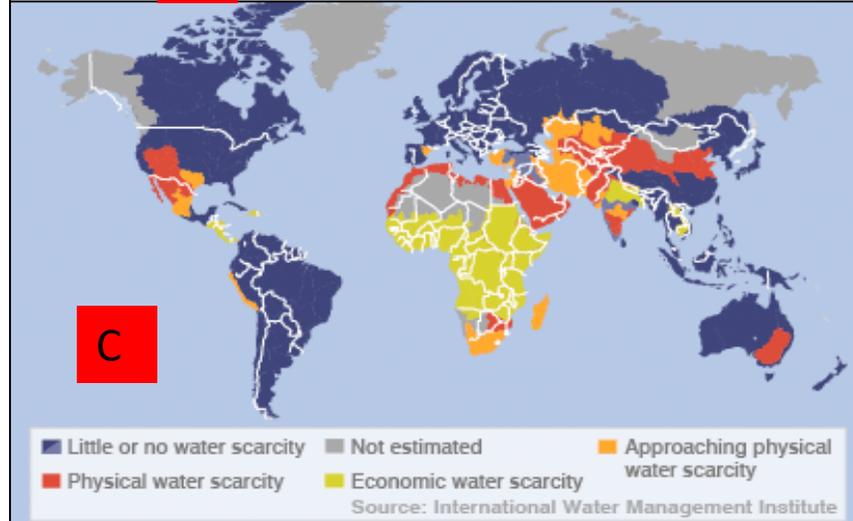
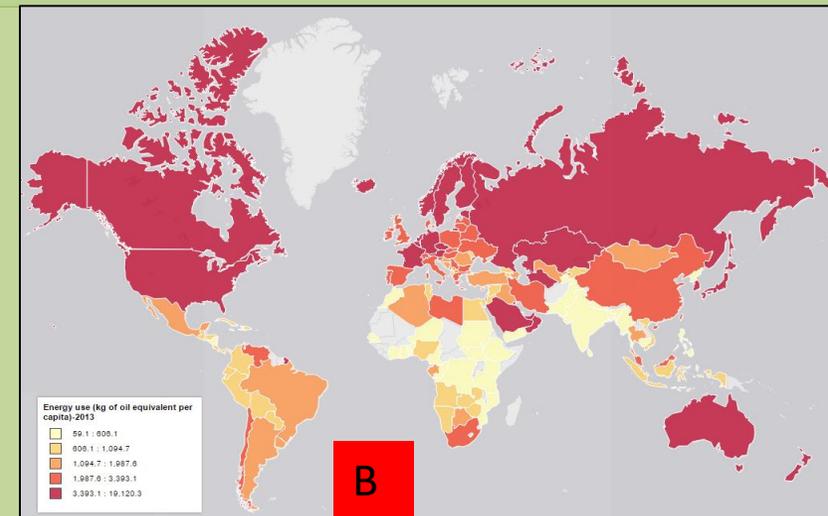
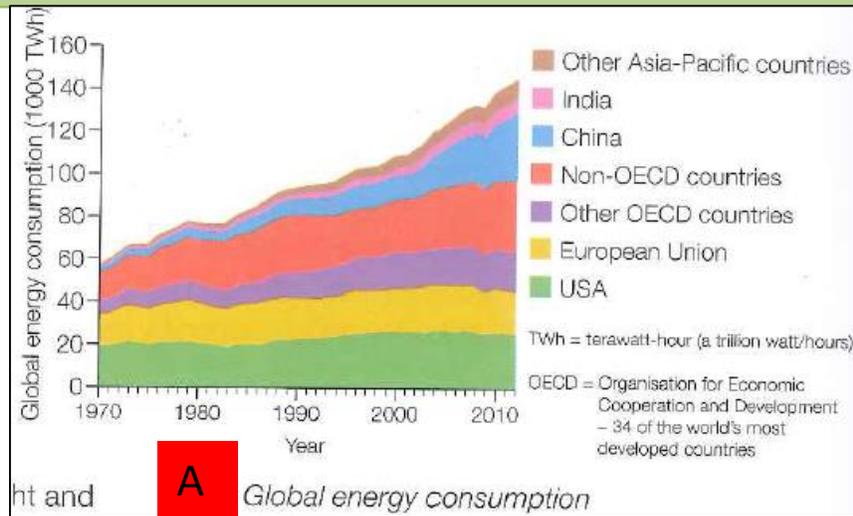
**Water** is essential for people and animals to drink and is vital for crops and food supply. It is also important as a source of power for producing energy. As the global population grows, more people are faced with the shortage of water. The **imbalance** in water supply is due to mainly variations in climate and rainfall. Many of the poorest countries in the world, particularly in Africa, have a shortage.

**Food:** The World Health Organisation suggests we need 2000-2400 calories a day. Over one billion people in the world fall below this level and are described as **malnourished**. A further two billion suffer from **malnutrition**, which can result in a range of illnesses, diseases and obesity.

**Link between wealth and resources**

Graph A and map B show global consumption of energy. You will see that these countries tend to be High Income Countries on map E and that those countries which generally consume less per person are those in Central Africa and Southern Asia. On map C, we again see that in most parts of HICs, there is little water **scarcity**, while in LICs and particularly Africa, there is often either a physical lack of water, or insufficient money to obtain it – known as economic scarcity. Where there is a physical lack of water in some parts of HICs, such as the Nevada Desert in the USA, they have enough money to obtain water from elsewhere.

Map D shows us the percentage of the population in each country who are malnourished. Again – an obvious pattern emerges.



**How has demand for food in the UK changed?**  
 Seasonal food refers to the times of year when the harvest or the flavour of a given type food is at its peak. This is usually the time when the item is harvested. Before supermarkets, most food eaten in the UK was sourced in the UK and seasonal. Fruit and vegetables were available according to the season. For example, during the summer months, lettuce and strawberries were widely available, whereas during the winter parsnips and cabbage were sold. Food was also preserved by being bottled, frozen and pickled. Today, we are used to enjoying seasonal fruit and vegetables throughout the year. However, because some food cannot be grown throughout the year in the UK, it has to be imported from other countries, along with food that is not native to the UK such as avocado and mango. Therefore, there has been an increase in food being imported into the UK.

Even seasonal fruits and vegetables which can be grown here, are imported from other countries. It can be cheaper for food to be grown in low income countries and transported to the UK, despite the increased food miles. 47 percent of the UK's food was imported in 2013.

**What are food miles and carbon footprints?**  
 The distance that food travels from producer to consumer is called food miles. Food in the UK travels over 30 billion kilometres each year by air, ship, train and road. A carbon footprint is the amount of CO<sub>2</sub> and other greenhouse gases released into the atmosphere as a result of the activities of humans.

**How does importing food increase the UK's carbon footprint?**  
 19 million tonnes of carbon dioxide are released each year into the atmosphere by transport used to import food, increasing the UK's carbon footprint. The further food travels the greater the food miles and carbon footprint. However, the food production techniques used also affect these, for example, the use of heated greenhouses increases carbon emissions. 17% of carbon dioxide emissions in the UK are linked to food.

**What are the alternatives to importing food?**  
 In order to reduce emissions, the volume of food products flown into the UK needs to be reduced. This can be achieved by:

- Consuming seasonal produce from the UK.
- Only allowing imported foods that cannot be grown in the UK and limiting which can be transported by aeroplane.
- Label the origin of food on restaurant menus so customers can make an informed choice as to what they eat.
- Consuming food that has been produced locally e.g. from farm shops.
- Growing your own food in your garden or on an allotment

**Reducing our carbon footprint**  
**Seasonal food consumption**  
 In the past, people ate food that was in season, eg cabbages during the winter and salad crops during the summer. Food is now available out of season thanks to heated greenhouses to produce it in the UK and cold storage to transport it to the UK. Seasonal food consumption reduces food miles and electricity use.

**Reduction of food waste**  
 Developed nations waste a lot of food. Buying only the food that is needed is more sustainable as there is more food left to feed others.

**Why is there a trend towards agribusiness?**  
 When a farm is run like a large industrial business they are known as an agribusiness. They are large-scale, money-intensive commercial activities. This has led to the size of farms increasing significantly by increasing field sizes, removing hedgerows, increased mechanisation (more machinery), combining small family farms, using hi-tech solutions, improved seeds (genetically modified) and greater use of pesticides and fertilisers. Crop Irrigation using large scale technology also helps to improve yields. Many large agribusinesses now own processing factories, transport and shops where the produce is sold. This is known as 'farm to fork'. Supermarkets and food-processing companies buy crops before they are even planted. Agribusiness has had a negative impact on the environment through the increased used of chemical fertilisers and pesticides. Also, as farms have become more mechanised there has been a decline in agricultural employment as fewer people are needed to work on farms. Also, smaller family farms struggle to compete with large farms. Agribusiness faces risks every growing season. From the weather to insect infestations to unexpected livestock death from disease, there are numerous influences that can shape profits. Even simple climate changes, like having a little too much rain, can create risk. The positives of agribusiness include more food security and cheaper prices for consumers as overheads are lower. Research and development in modern agricultural practices, including the use of technology, is providing jobs to skilled workers.

**Organic farming**  
 Organic farming uses natural methods to grow foods. This means using organic fertilisers and pesticides, such as animal slurry and natural predators and no artificial fertilisers or pesticides. Yields from organic crops are initially low, but they increase over time until they are in line with inorganic crops. Organic farming is environmentally sustainable because it doesn't pollute the environment.

**UK - food**





## How is the UK's energy demand changing?

Despite increasing demand for electricity in the UK, energy consumption has fallen in recent years. This is due mainly to the decline of heavy industry and improved **energy conservation**. Low-energy appliances, better building insulation and more fuel-efficient cars have resulted in a 60 per cent fall in energy use by industry and a 12 per cent fall in domestic energy use.

## How and why has the UK's energy mix changed?

The UK is no longer self-sufficient in energy. About 75 per cent of the UK's known oil and natural gas reserves have been exhausted. By 2020 the UK is likely to be importing 75 per cent of its energy. The UK's **energy security** is affected as it becomes increasingly dependent on imported energy.

Two-thirds of UK gas reserves remain, with oil remaining in less accessible oilfields. The remote Mariner oilfield (150km east of the Shetland Isles) will start producing in 2017, but UK oil production overall has declined by 6 per cent each year during the last decade.

The major change in the UK energy mix has been the decline of coal. Between 1990 and 2007 there was a steady decline because of concerns about greenhouse gas emissions and ageing coal-fired power stations.

However, fossil fuels are likely to remain important in the future because:

- ◆ the UK's remaining reserves of fossil fuels will provide energy for several decades
- ◆ coal imports are cheap – over three-quarters of the UK's coal now comes from abroad, mainly from Russia, Colombia and the USA
- ◆ existing UK power stations use fossil fuels – all coal-fueled power stations to be closed by 2025
- ◆ shale gas deposits will be exploited in the future.

# UK - energy

## Extracting natural gas

### Advantages

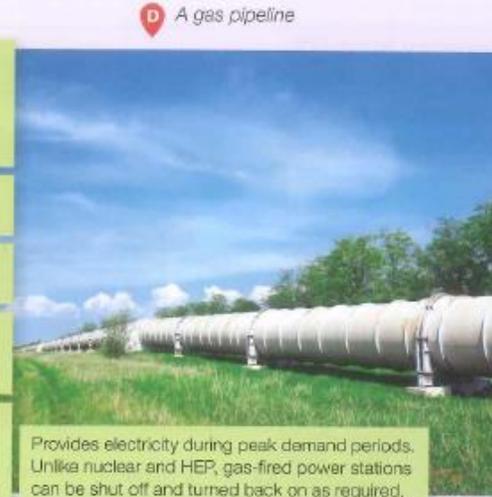
Cleanest of the fossil fuels with 45% less CO<sub>2</sub> emissions than other non-renewable sources and less toxic chemicals like NO and SO<sub>2</sub>.

Less risk of environmental accidents than oil.

Provides employment for 1.2 million people.

Can be transported in a variety of ways, i.e. through pipelines or by tankers over land and sea.

Relatively abundant compared to other fuels. This is increasing as technology makes exploitation of shale gas more economic.



Provides electricity during peak demand periods. Unlike nuclear and HEP, gas-fired power stations can be shut off and turned back on as required.

A gas pipeline

### Disadvantages

Dangerous if handled or transported carelessly.

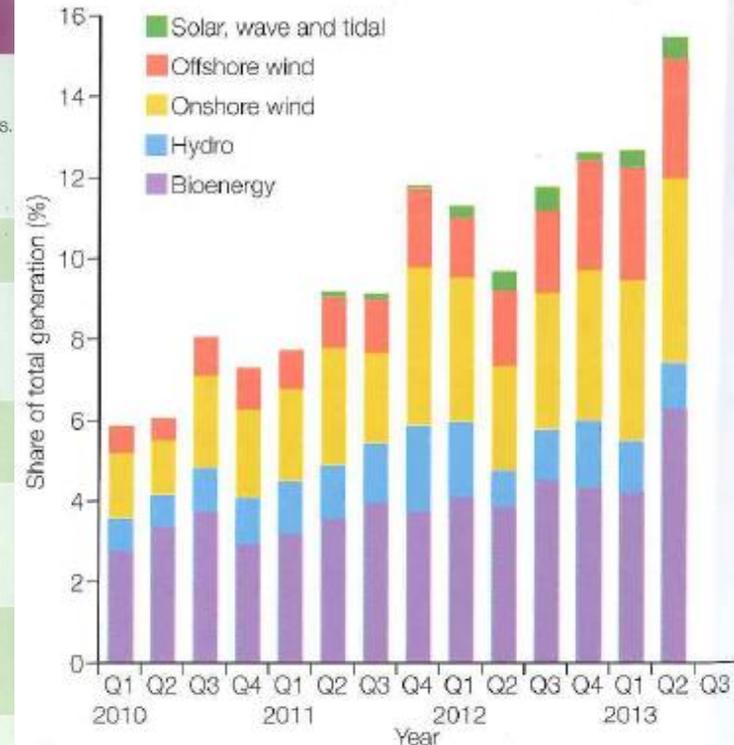
Some gas reserves are in countries that are politically unstable or prepared to use gas supply as a political weapon.

Contributes to global warming by producing CO<sub>2</sub> and methane emissions.

Fracking is controversial. Lots of water is needed. Wastewater and chemicals could contaminate groundwater and minor earthquakes are possible.

Pipelines are expensive to build and maintain.

Renewable energy source	How does it work?	Can it increase energy supplies?
<b>Biomass</b>	Energy produced from organic matter includes: <ul style="list-style-type: none"> <li>• burning dung or plant matter</li> <li>• the production of biofuels, by processing specially grown plants such as sugar cane.</li> </ul>	<ul style="list-style-type: none"> <li>• Using land to grow biofuels rather than food crops is very controversial.</li> <li>• Burning organic matter can create smoky unhealthy conditions.</li> <li>• Fuelwood supplies are limited.</li> </ul>
Wind	Turbines on land or at sea are turned by the wind to generate electricity.	<ul style="list-style-type: none"> <li>• In 2014, wind power met 10% of the UK's electricity demand.</li> <li>• Unpopular, but considerable potential.</li> </ul>
Hydro (HEP)	Large-scale dams and smaller micro-dams create enough water to turn turbines and generate electricity.	<ul style="list-style-type: none"> <li>• Large dams are expensive and controversial.</li> <li>• Micro-dams are becoming popular options at the local level.</li> <li>• An important energy source in several countries. It currently contributes 85% of global renewable electricity.</li> </ul>
Tidal	Turbines within barrages (dams) built across river estuaries use rising and falling tides to generate electricity.	There are few tidal barrages (the largest is the Rance in France) due to high costs and environmental concerns.
Geothermal	Water heated underground in contact with hot rocks creates steam that drives turbines to generate electricity.	Limited to tectonically active countries: <ul style="list-style-type: none"> <li>• the USA (has the most geothermal plants – 77)</li> <li>• Iceland (provides 30% of the country's energy)</li> <li>• the Philippines and New Zealand.</li> </ul>
Wave	Waves force air into a chamber where it turns a turbine linked to a generator.	<ul style="list-style-type: none"> <li>• Portugal has built the world's first wave farm, which started generating electricity in 2008.</li> <li>• There are many experimental wave farms but costs are high and there are environmental concerns.</li> </ul>
Solar	Photovoltaic cells mounted on solar panels convert sunlight into electricity.	<ul style="list-style-type: none"> <li>• Energy production is seasonal.</li> <li>• Solar panel 'farms' need a lot of space.</li> <li>• Great potential in some LICs with high levels of sunshine.</li> </ul>



**B** The renewable share of total electricity generation

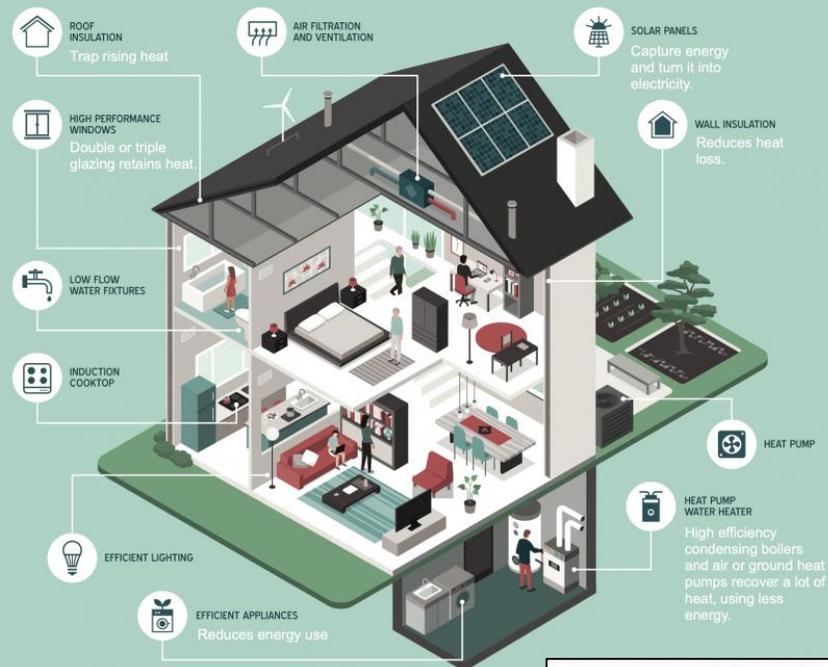
## Why is energy consumption increasing?

Energy consumption has rapidly increased since the 1950s. This is because:

- Economic development leads to higher demand for energy. Currently, the most significant need for energy comes from HICs such as the USA and Australia, and rapidly developing NEEs such as Brazil, China and Nigeria. In the future, energy demand is likely to develop in LICs, especially in Africa.
- As a country becomes more developed, there is a higher demand for food, leading to more intensive farming techniques. These techniques require additional energy to power machinery, provide lighting and heating. The processing, manufacturing and transport of food also lead to increased energy demands. As agriculture shifts from subsistence to commercial farming as a country develops the demand for energy also increases.
- Rapid industrialisation leads to the development of processing and manufacturing industries. Global demands for energy are increasing, fuelled by industrialisation in NEEs. Future demands are likely to come from current LICs as they develop.
- As improvements in living standards continue across the world, car ownership has continued to grow. Despite advances in the efficiency of engines, car manufacturing places considerable demands on energy.
- Demand for energy increases with urbanisation. As more people live in urban areas, the demand for energy for lighting, cooking, domestic appliances and heating also increases. In the future, urbanisation is going to place demands on energy in regions such as Africa and parts of Asia.
- As people become wealthier, their demand for energy grows with increased purchases of domestic appliances, leisure and recreation activities. Global energy supplies will increase significantly in highly populated NEEs such as India, China and Brazil.
- Population growth creates an increased demand for energy. Since 1950 the world's population has increased dramatically, leading to the growth in demand for energy. The overwhelming majority of this growth has been in LICs and NEEs, where there are already energy deficits.

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### Energy security

Energy security is largely determined by energy supply and demand. Most of the world experiences energy insecurity. Research shows that despite having a high reliance on imports, North America and Europe are largely energy secure. However, large areas of central and southern Africa, Asia and South America experience energy insecurity.

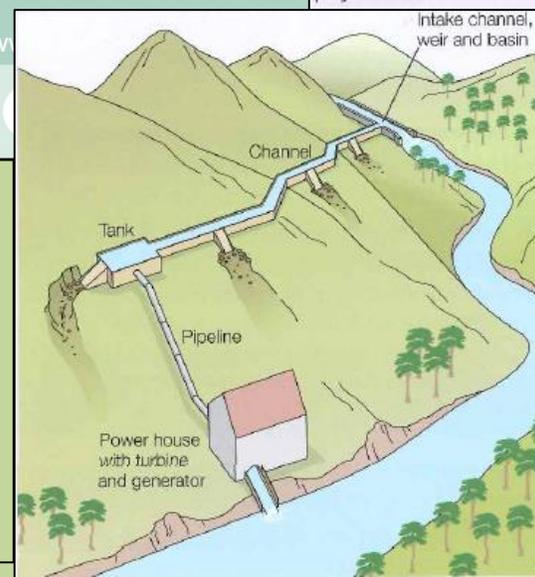
## Chambamontera, Peru – an example of a micro HEP scheme to improve people's lives

Most people in the area are dependent on subsistence farming with some small-scale coffee growing and rearing of livestock (photo B). Development has been severely restricted by a lack of electricity for heat, light and power. Despite farming being efficient, nearly half the population survive on just US\$2 a day.

The steep slopes rise to 1700m and the rough roads are impassable in winter. This makes Chambamontera a very isolated community. Due to the low population density it was uneconomic to build an electricity grid to serve the area.

The solution to Chambamontera's energy deficit involved the construction of a micro-hydro scheme supported by the charity Practical Action. The high rainfall, steep slopes and fast flowing rivers make this area ideal for exploiting water power as a renewable source of energy (diagram C).

The total cost of the micro-hydro scheme was US\$51 000. There was some government money and investment from Japan, but the community had to pay part of the cost. The average cost per family was US\$750. Credit facilities were made available to pay for this.



The scheme has had many positive outcomes: Regulating the flow of water in rivers has reduced the danger of flooding. Less need to burn wood as a source of heat has reduced deforestation and reduced soil erosion. Electricity is available in the winter when heating demands are high. Healthcare has improved as fridges allow the storage of medicines. Improved school facilities and the possibility of doing school work after dark. Reduced fire risk because paraffin lamps are no longer needed in homes.

# Marriage

# BVT - Relationships

Christianity	Islam
<ul style="list-style-type: none"> <li>• Marriage is a bond between the couple and between them and God</li> <li>• Christians will also get married to have a family, this is called <b>procreation</b></li> <li>• Marriage is a <b>sacrament</b> – an important part of being a Christian</li> <li>• <b>“Man shall leave his mother and father and will join with his wife and become one flesh” (bible)</b></li> <li>• Bride and groom <b>exchange rings</b> – signify commitment and circle of everlasting love</li> <li>• <b>Vows</b> are exchanged to make promises e.g. love and cherish, till death do we part, in sickness and health</li> <li>• Hymns, bible readings , prayers signify the religious celebration within the community</li> <li>• Priest reads a <b>homily</b> – speech about importance of marriage</li> </ul>	<ul style="list-style-type: none"> <li>• Many Muslims have <b>arranged marriages</b> where the parents and children agree to the marriage. The couple will be chaperoned in earlier meetings</li> <li>• Muslims will get married to join two families together.</li> <li>• Marriage is a <b>gift from Allah</b> and therefore an important part of being Muslim</li> <li>• Muslims will also get married to have a family, this is called <b>procreation</b></li> <li>• The wedding ceremony can take place in a mosque or home</li> <li>• The ceremony / contract is called a <b>Nikkah</b></li> <li>• The bride can sign the contract separate from the groom and meet up later</li> <li>• A <b>dowry</b> is paid by the groom to bride – it is a gift e.g. money, a house</li> <li>• The whole wedding can take up to 5 days</li> </ul>

Type of relationship	Definition
Polygamy	A husband with more than one wife, in some Islamic countries; The husband must be able to provide and care for all wives
Cohabitation	2 partners living together, but not married
Civil marriage	This is a non-religious marriage. In 2014 this marriage became legal for homosexuals (before this they could only have a civil partnership)
Arranged marriage	Parents help Muslim children find a partner, both children and parents agree to the marriage
Forced marriage	Parents force their children into a marriage (unwanted), can often be underage children.



## Role of parents

The **role for religious parents** is much the same as non religious parents, however there is the added **responsibility to teach their faith and bring them up within the religious community**

- Provide all that children need materially e.g. food, shelter, clothing
- Allow children to develop independence and confidence
- Provide protection for children
- Bring them up with good morals and behaviour e.g. teaching respect

*“Fathers do not provoke your children to anger, but bring them up in the discipline and instruction of the Lord” Bible*

- Teach them about their faith
- Some children maybe **attend teaching at a place of worship** e.g. Christian Sunday school, teaching at mosque
- They may have practises to follow as children e.g. Christian **baptism**





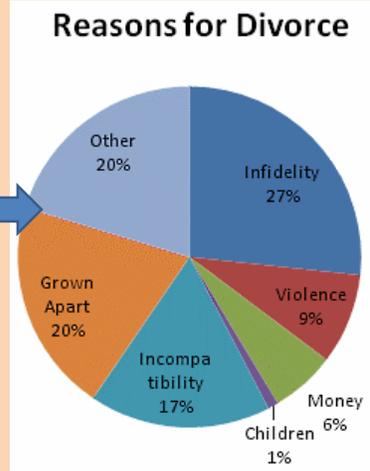
# Adultery, Divorce and re-marriage

## UK Laws regarding divorce

- Divorce laws have not changed since **1967** and there is a call for modernising them
- At present you can only divorce straight away if there has been **poor behaviour or adultery**
- Couples that both wish to divorce under different reasons have to have **5 years** separation first.
- There are calls for reform because life expectancy are rising, couples are often together for many years.

*"Thou shall not commit adultery"* 10 Commandments

Why do marriages break down?



	Catholics	Muslims
Adultery	<ul style="list-style-type: none"> <li>• Adultery is a sin and <b>breaks wedding vows</b> e.g. To love and cherish</li> <li>• In the <b>10 commandments</b> it says <i>"Thou shall not commit adultery"</i></li> </ul>	<ul style="list-style-type: none"> <li>• The Qur'an says <i>"Do not commit adultery. It is shameful and an evil way to act"</i></li> <li>• Adultery can be punishable by execution in some Islamic countries</li> </ul>
	<ul style="list-style-type: none"> <li>• Divorce is always wrong as marriage is a sacrament (sacred)</li> <li>• Divorce breaks wedding <b>vows made to God</b> so cannot be broken – Until death do us part: <i>"What therefore God has joined together, let not man separate."</i> Bible</li> <li>• Jesus said <i>"Whoever divorces... then marries another; it is as if he committed adultery"</i></li> <li>• An annulment (making the marriage invalid) can be given in exceptional circumstances</li> <li>• There is no remarriage as divorce is not recognised by God</li> </ul>	<ul style="list-style-type: none"> <li>• Divorce is <b>available</b> to Muslims however it is seen as a <b>last resort</b>.</li> <li>• Couples facing problems have mediation – someone to try and help resolve the problems.</li> <li>• The couple must wait <b>3 months</b> through counselling before a divorced can be given.</li> <li>• If after counselling divorce is still wanted, then the man states "I divorce you 3 times", whereas a woman must seek approval at a Islamic council / Imam at their mosque</li> <li>• Half the <b>dowry</b> must be returned by the wife to husband</li> </ul>
Divorce and re-marriage		

Divorce is becoming more common over the last 50 years. If divorce laws are relaxed, what would be the impacts?

Against relaxing divorce laws:

- For religious believers marriage is a **sacrament about God too**.
- Marriage will be taken into lightly – with no serious thought to "death do us part"
- It could have negative effects on children
- People will give up and not try to work through their difficulties

For relaxed divorce laws:

- Allowing people to move on to another relationship, where they are in love
- Love does not always last forever
- To end the relationship is often healthier if there are problems (even when children are involved)

# Gender Equality

Christianity	Islam
<i>"Neither Jew nor Greek, slave nor free, male nor female, for you are all one in Jesus Christ"</i> Bible	Muhammad said <i>"I command you to be kind to women"</i>
God created mankind in his own image therefore they are equal	<i>"Men and women have equal rewards for their deeds"</i> Qur'an
In the Anglican church the <b>first bishop was appointed in 2015</b>	<b>Benazir Bhutto</b> was elected PM in Pakistan - a Muslim country
<b>However, men and women can have different ROLES in Religion.</b>	
However, In Catholic church women are not allowed to become priests	However all Islamic leaders are men. Women are not allowed to pray at the front of the mosque
	A man can get a divorce by just declaring it 3 times, women must seek approval from a council at a mosque

## Women in the Bible



Eve shows by giving into evil, she reminds the world that while God is good, Satan's temptations are not. Eve has also been shown to lead man (Adam) astray.

Mary Magdalene is an oft-misunderstood Biblical figure, but she was certainly a faithful follower of Jesus. After being healed by Him, she travelled with Him and witnessed his crucifixion, burial, and resurrection.

Abraham's wife Sarah is an example of how God keeps his promises: After telling Abraham she would bear a son, despite being barren, Sarah gave birth to Isaac at 90 years old. She always show loyalty staying with Abraham by his side, even when he married a second time.

## Inequality impacts....

- Aspirations
- Jealousy and tension
- Government laws to restrict or promote women
- Inclusion / exclusion
- Prejudice and attitudes
- Self worth and confidence
- opportunities



## Gender has been in the news recently, expressing problems and inequality for women

<b>Pay Gap</b>	9.7% is the average full time pay gap between men and women. For every £1 earned by a man a woman earns 81p. Company's like BBC were challenged for showing this divide.
<b>#MeToo movement 2017</b>	Sexual harassment story of females in Hollywood facing sexual harassment. Many spoke out against the director Harvey Weinstein. Statistics shows that 1 in 10 women have faced sexual harassment at work.
<b>#Reclaim the streets. March 2021</b>	Highlights safety for women in UK. Sarah Everard was attacked and murdered after walking home at night. Sparked protests in London of women's rights. This led to Parliament discussing a bill in Parliament to put more money into street lightening, CCTV and plain clothes officers in bars at night.



## Types of Worship

### At church:

**Liturgical worship** is worship at church which follows a set pattern or order. This is very traditional and is used for formal and routine services, for example the Eucharist or Advent service. This means they are the same each time. This can give familiarity and comfort for Christians. They have set prayers and passages from the bible that reflect that service, with set hymns too. This worship is also very formal and would be the same whoever lead the worship.

**Non-Liturgical worship** is more informal. This is where the preacher (vicar, priest etc) will create his own service. He would speak from the heart for prayer and would choose a theme for his service e.g. forgiveness or sin etc. This way he could choose relevant bible passages or parables to use. This service is more personal to the preacher and his community. The worship could also focus on something important in the community or world for example if there has been a disaster to focus on. Services can also have modern music and songs. This clip (below the photo opposite) is from London Holy Trinity Church, a more modern church and service.

**Charismatic worship** is very free flowing and informal. This would be a church where the service is filled with music and movement. The congregation would often sing out and throw their hands up in praise of God, they may even call out, as if the Holy Spirit is within them. This allows the congregation to express themselves and their devotion to God and be free with their feelings.

### At Home:

**Private worship** can be done wherever and when ever a Christian wants. This may be more formal like a set Grace (prayer) before dinner or the Lord's prayer before bed. Or this can be informal such as choosing to pray when they like, speaking from the heart. A Christian may also use things to worship such as lighting a candle (Jesus represents the light of the world). Catholics use Rosary beads to prayer. Other Christians may meditate or read a parable or bible passage.

## Christian Practices



<https://www.youtube.com/watch?v=Jacv52sRyEA>



### Key vocabulary

Liturgical  
Non-Liturgical  
Charismatic  
Congregation  
Rosary beads  
Lord's prayer

## Why do Christians worship?

- Connection to God to develop a relationship
- Show praise and devotion
- Show deep love and respect
- To join a religious community



## Prayer

There are 5 general reasons for a Christian to pray these are illustrated on the **prayer hand** (see below. There are lots of these you could also search too).

*The parable of the persistent widow*, talks about how a widow continued to pray and ask for help from God, each time nothing changed. Then after some number of prayers God answers her prayers and helps her. This teaches Christians that continue to pray, and your prayers will be answered.

The **bible** also teaches this using the quote *"Ask and it will be given to you"* (Bible: Matthew)

Some Christians use **set prayers** (those already written), the most common of these is the **Lord's Prayer** (below)



### **THE LORD'S PRAYER**

**Our Father, who art in heaven,  
hallowed be Thy name.  
Thy kingdom come.  
Thy will be done on earth as it is in  
heaven.  
Give us this day our daily bread and  
forgive us our trespasses as we  
forgive those who trespass against us.  
And lead us not into temptation, but  
deliver us from evil.  
Amen.**

## Key vocabulary

Sacraments  
 Conformation  
 Baptism  
 Believers Baptism  
 Testimony  
 Declaration of  
 Penitence



# Christian Practices



## Baptism – origins and reasons for

This is one of the most common sacraments taken by Christians. It originates back to when Jesus was baptized by John the Baptist in the River Jordan, when he was an adult. The baptism signifies **washing away of sin and being re-born into the Christian faith**. Jesus wanted all his followers to be baptised, as it also embraces the Holy spirit and God's love into a Christian. Jesus said **“Go make disciples of all Nations”**.



## Sacraments

A sacrament is a **special event** in a Christians life. These events could be taken once or on a regular basis. A sacrament means an **outward action that has an inner meaning**.

*Here are 2 examples: Baptism outward action is to pour water over a person, the inward meaning is that this washing away sin. Marriage: the Outward action is placing the rings on finger; the inward message is eternal love.*

### Catholics beliefs of Sacraments:

- See the sacraments as God's gift and follow all of them (x7)
- They are special events that are regular or at different times of a person's life e.g. baptism, confirmation
- They connect closer with God's love by taking part in them

### Quakers beliefs about Sacraments:

- They reject the sacraments, saying many are not mentioned in the bible
- They believe Jesus did not intend for baptism and Eucharist to become a ritual
- They believe Christians speak directly to God – there is no need for sacraments to connect with God

	Infant Baptism	Believers baptism (adult)
Why choose this baptism?	<ul style="list-style-type: none"> <li>• Traditional to English Christianity</li> <li>• Bring up their children as Christian</li> <li>• Children can then take part in other sacraments as they grow</li> <li>• If the baby is ill and may die</li> </ul>	<ul style="list-style-type: none"> <li>• It is the adults choice – they understand that they are becoming a Christian and joining the church</li> <li>• Jesus was baptised as an adult</li> <li>• As a baby you would not have sins, therefore it has more meaning as an adult</li> </ul>
What happens?	<ul style="list-style-type: none"> <li>• Baby wears white</li> <li>• Oils are given as a sign of strength and to fight off evil and acceptance into Heaven (Salvation)</li> <li>• Holy water is placed in the sign of a cross over the baby's head, showing their faith to Jesus</li> <li>• Godparents make promises to protect the child growing up</li> <li>• A candle is lite, signifying receiving the light of Christ (Jesus)</li> </ul>	<ul style="list-style-type: none"> <li>• White clothes are often worn</li> <li>• A testimony is given by the person, to show why they wanted to be baptised.</li> <li>• A Declaration of Penitence (sins) is given to show they are truly sorry for their sins, dedicating themselves to Christ</li> <li>• The person is dropped backwards into the pool of water, then risen. This also represents re-birth, much like Jesus' resurrection.</li> </ul>

# Eucharist

# Christian Practices

## Why do Christians go on pilgrimage?

The Eucharist is another name for Holy mass or communion. All Christians take the Eucharist, however this may vary in how and how often.

The Eucharist sacrament comes from the instruction of Jesus at the **Last Supper**. The night before he would be crucified, Jesus knew of his death so told his disciples to remember him and the **atonement** (sacrifice) for mankind by representing wine and bread as his body and bread. By taking part in the Eucharist Christians are showing **faith and obedience to Christ**, they are receiving **God's Grace and salvation**.

### **Catholic Eucharist: What happens and why?**

- Often called Holy Communism. Happens quite regular as seen as important.
- The service starts with the confession of peoples sins and God's forgiveness.
- The Eucharist prayer is read at the beginning and end of service.
- Bread and wine are consecrated (blessed) at the altar.
- The priest places the consecrated bread on the worshippers tongue or in their hands, wine is drunk, often from a chalice.
- Catholics believe in **transubstantiation**. This is a belief that the wine and bread become the blood and body of Christ. Therefore the Eucharist is more about a **spiritual connection with Christ**, embracing the Holy Spirit.

### **Protestant Eucharist: What happens and why?**

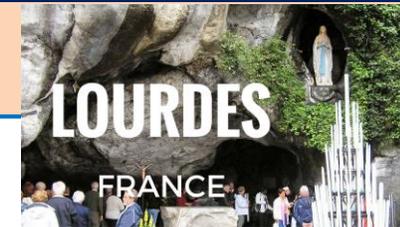
- It is often called the Lord's Supper
- The Minister reads the Gospel (Bible) story of The Last Supper.
- Worshippers stand at the front of the church, bread is given and wine (usually non-alcoholic) is in separate glasses.
- The Lord's Prayer is read at the end.
- Therefore the Eucharist for Protestants is more about the **remembrance of Jesus' sacrifice**.



### Key vocabulary

Eucharist  
Atonement  
Grace of God  
Salvation  
Holy Communion  
Lord's Supper  
Transubstantiation  
Pilgrimage  
Lourdes

- To follow the footsteps of Jesus e.g. to Jerusalem
- To visit a sacred place e.g. place of Jesus or a disciple / saint
- For healing – physical or spiritual
- To break from normal life and focus on God
- To reflect on their life
- To connect with God
- For forgiveness of sins
- To meet other Christians
- To connect with Christian communities around the world



### Pilgrimage places

#### Lourdes:

Lourdes is a pilgrimage site because of Saint Bernadette. Bernadette was illiterate, poor and suffered with health problems. Bernadette had 8 religious visions, the last from the Virgin Mary. On one vision, Bernadette had injured her arm, Mary had told her to dig out a spring water in a nearby cave to heal her dislocated arm. Her arm was healed by being placed in the water in the cave. Others after her had shown that the spring in the cave had healing powers.

Today many people come to the caves to touch the walls and bath / drink the spring water. There are processions at different times of year to celebrate the religious site. The Catholic church arrange for pilgrimages for the sick and there is a special children's pilgrimage there every Easter, where 1,000 sick or special needs children come.

#### Santiago de Compostela.

Santiago is the local Spanish name for Saint James. James was one of the 12 disciples of Jesus. According to legend, the remains of St James were carried by boat from Jerusalem to northern Spain where he was buried on what is now the city of Santiago de Compostela.

Today, thousands of Christian pilgrims travel a pilgrimage route to Santiago de Compostela. Most travel by foot, some by bicycle and a few travel, as some of their medieval forbears did, on horseback or by donkey. It takes 35 days to walk the 500 miles. Many of the pilgrims wear cockle-shell badges and this is the emblem of pilgrims to Santiago.

# Christmas

## Matthews Gospel:

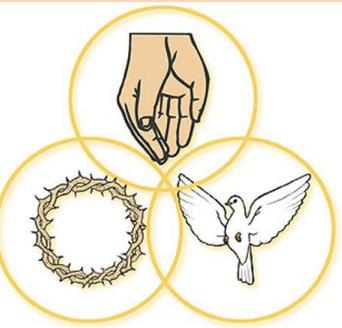
Matthew mainly talks about how Mary found out she was with child from the **Angel Gabriel**. This talks about Joseph's reaction. It talks of how she will give birth a virgin to a **Messiah**. Matthew also talks about the **Magi** (wise men) who were instructed by Herod to visit the Messiah and inform him. The Magi worshiped the Messiah and presented him with gifts.

## Luke's Gospel:

Luke mainly talks about how and why Joseph and Mary travel from Nazareth to Bethlehem. He talks about how the **Shepard's** find out and find their route to visit Jesus.

## Why is the birth of Jesus important?

- It was foreseen in a **prophecy** that the **Messiah** would be born in Bethlehem to lead the people of Israel
- The virgin Mary showed that Jesus was the Son of God; this in turn showed the **Trinity**: God, his power of the Holy Spirit living through his Son
- The birth of Jesus showed the **incarnation** of God and **God's grace** (love ) for mankind to send his son down.



*"The word became flesh and lived among us for a while"*

# Christian Festivals

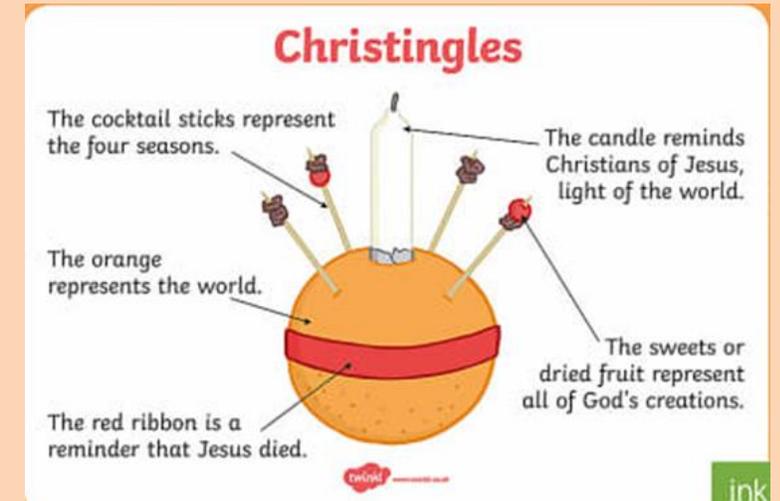
## Key vocabulary

Gospel	Messiah
Incarnation	Trinity
Atonement	Christingle
Grace of God	Magi
Prophecy	Midnight mass



## How do Christians celebrate Christmas?

- Attending **Midnight mass** on Christmas Eve, where the Eucharist is practiced. This begins in darkness and when the Gospel story is read, a candle is lit to signify the light as Jesus' birth.
- **Christingle service**; Carols and readings from the Gospels about the nativity story. A Christingle is given, often to children.
- Churches are decorated and nativity scenes are put up
- Exchanging of gifts and presents to show love for family and friends; like those of the Magi.
- Some Christians invite someone into their house or go and help serve meals for the homeless



# Easter

# Christian Festivals

## Why is Holy Week important to Christians?

- Shows the **Prophecy** of the **Messiah**
- Show Jesus' **Atonement** for mankind
- Establishes the **Eucharist**
- Shows **God's Grave** (love) *"God loved the world so much he gave his only son"*
- Enables **salvation** for Christians
- **Resurrection** shows Jesus is the Son of God (**Incarnation**)

## Key vocabulary

Palm Sunday  
Maundy Thursday  
Good Friday  
Atonement  
Grace of God  
Salvation  
Prophecy  
Eucharist  
Resurrection

## How do Christians celebrate over Easter?

 Palm crosses are given out at church	 Christians often eat fish as opposed to red meat.	 Christians may walk behind a procession of someone carrying a Cross
 The church may be stripped of its decorations to show God's House.	 The Queen often gives out money (coins) to the elderly.	 A light is lit at the start of the church service to represent Jesus.
 Easter eggs are given and broken	 In Rome the Pope reads out Mass on Sunday	 Christians take part in the Eucharist

## Events in Holy Week

- **Palm Sunday** - Jesus rides into Jerusalem over palm branches to celebrate Passover (Jewish festival to remember Moses) on a donkey as stated in the **prophecy** from the Old testament saying a **Messiah** would save them.
- **Monday** - Jesus went to the **temple** and spoke about how God did not need followers to pay riches to the church and use the sacred house for trading.
- **Tuesday** - Jesus went back to the **temple** to challenge the authority of the high priests called the Sanhedrin.
- **Wednesday** - On the Wednesday it is said that **Judas** agreed to betray Jesus. He was paid **30 pieces of silver**. Judas was fed up with Roman oppression and believed Jesus was one to start a rebellion, he was disappointed to learn that this was not so.
- **Maundy Thursday** - **The last Supper** - including the wine and bread. Jesus challenges Judas on his betrayal and is later arrested and brought before the high priests.
- **Good Friday** - The trial of **Pontius Pilate**, Jesus is **crucified**. Jesus atones for the sins of mankind to reconcile the relationship between God and his believers, so they can have salvation. The temple curtain ripped showing all had access to God.
- **Saturday** - The **disciples** hide, fearing they will be arrested. Losing Jesus had challenged their faith in God.
- **Easter Sunday** - 2 women arrive at the tomb, the stone covering the tomb entrance is gone. Jesus has **resurrected** from the dead.



## GCSE FRENCH YEAR 10: WHERE I LIVE

### Où habites-tu? (Where do you live?)

J'habite / nous habitons en ville / dans un village... (I / we live in town / in a village...)

Qui est situé(e) / qui se trouve (Which is situated / which is to be found)

Dans le sud / l'ouest / le nord / l'est de l'Angleterre (In the south / west / north / east of England)

À la campagne / Au bord de la mer (In the country / by the sea)

Près de / pas loin de (near to / not far from)

J'y habite / nous y habitons **depuis**... ans (I have lived / we have lived **there for** ... years)

C'est une ville calme / touristique / historique (it's a quiet town / touristy / historic)

Il y a / nous avons / il n'y a pas de / nous n'avons pas de (there is, are ; we have ; there isn't, we don't have)

En été / hiver / automne / au printemps (In the summer / winter / autumn / spring)

On peut (you / one can)

Faire des promenades / faire des magasins / visiter des monuments / aller au cinéma (go for walks / shops / see the sights / go to the cinema)

Avant / il y a .... ans (previously / ... years ago)

Il y avait / c'était (there was, were ; it was)

Dans le futur je voudrais habiter / vivre... (in the future I'd like to live)

Ma ville idéale serait / aurait (my ideal town would be / would have)

### Les avantages / les inconvénients de ma ville (The advantages / disadvantages of my town)

Il n'y a jamais (there is / are never)

Il n'y a rien (there is nothing)

Il n'y a plus de (there isn't ... any more)

Il n'y a ni...ni... (there are neither ... nor)

Trop de / beaucoup de / plein de / assez de (too much, many / lots of / full of / enough)

La criminalité / la circulation / la pollution / le bruit (criminality / traffic / pollution / noise)

Ce qui est bon / mauvais (what's good / bad)

Ce qui me concerne (what concerns me)

Ce que m'embête (what annoys me)

Ce qui me plaît (what I like, what pleases me)

Parce que / car / étant donné que / puisque (because, as, given that, since)

C'est facile / difficile de... (it's easy / difficult to...)

Se déplacer (get around)

Trouver un bon emploi (find a good job)

### Comment est ta maison? (What's your house like?)

C'est une maison individuelle / jumelée (it's a detached / semi)

C'est un appartement (it's a flat)

Au premier / deuxième étage (on the first / second floor)

Au sous-sol / au rez-de-chaussée (In the basement / on the ground floor)

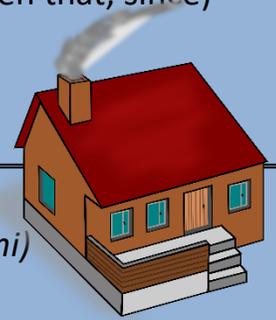
La chambre / la salle de séjour / la salle de bains (the bedroom / living room / bathroom)

Le jardin / le grenier (the garden / the attic)

Les meubles (furniture)

La table / la chaise / la lampe / la télévision (table / chair / lamp / TV)

Au coin de / au milieu de / à côté de / sur / sous / à droite de / à gauche de (in the corner / in the middle / next to / on / under / to the right / to the left)



**R** – range

**O** –

**opinions**

**T** – tenses

**A** –

**adjectives**

**T** – tie

**together**

**E** – extend

## Comment passes-tu tes vacances? (How do you spend your holidays?)

Normalement / d'habitude / dans le mois de juillet (*normally / usually / in the month of July*)

Je passe / on passe / nous passons (*I spend / one / we spend*)

Une quinzaine / quelques jours / un mois (*a fortnight / some days / a month*)

En France / en Espagne (*in France / Spain*)

Nous y allons en voiture / avion (*we go there by car / plane*)

Nous louons (*we rent*)

Une gîte / une voiture / des vélos (*a holiday cottage / a car / some bikes*)

Nous restons (*we stay*)

Dans un camping (*on a campsite*)

Dans le sud / le nord... (*in the south / north*)

Pendant la journée (*during the day*)

Le matin / l'après-midi / le soir (*in the mornings / afternoons / evenings*)

Tous les jours / soirs (*every morning / evening*)

Si / quand (*if / when*)

Il fait beau / mauvais / chaud / froid (*it's / the weather is nice / bad hot / cold*)

J'aime / on aime / nous aimons (*I / we like*)

Je préfère / on préfère / nous préférons (*I / we prefer*)

Faire des promenades / aller en ville / visiter les monuments (*doing walks / going to town / seeing the sights*)

Ce que j'aime, c'est... (*what I like is...*)

plus / moins ... que (*more / less .... than*)



L'année dernière / en juillet (*last year / in July*)

Je suis allé / on est allés / nous sommes allés (*I / we went*)

J'ai passé / on a passé / nous avons passé (*I / we spent*)

J'y suis allé en avion (*I went there by plane*)

Pendant le voyage (*during the journey, trip*)

J'ai dormi / j'ai lu / j'ai regardé / j'ai fait / j'ai

mange (*I slept / I read / I watched / I did / I ate*)

C'était barbant / super / genial (*it was boring / super / great*)

L'hôtel était situé (*the hotel was situated / located*)

Près de la plage / en centre ville / dans une forêt (*near the beach / in the town centre / in a forest*)

Je me suis bien amusé / on s'est bien amusés / nous nous sommes bien amusés (*I / we had a good time*)

Il a fait froid / chaud (*the weather was cold / hot*)

Il y avait du soleil / des orages (*it was sunny / stormy*)

L'année prochaine / septembre prochain (*next year / September*)

Je veux / voudrais / vais (*I want / would like / am going*)

Aller / visiter / voir (*to go / to visit / to see*)

J'espère que (*I hope that*)

Il va faire beau (*the weather will be nice*)

J'ai l'intention de (*I intend*)

Essayer / faire / acheter / apprendre / louer (*to try / do / buy / learn / rent*)



## Les vacances de mes rêves

Si j'avais beaucoup d'argent / si j'étais riche (*if I had lots of money / if I were rich*)

J'irais / je passerais / je resterais / je visiterais (*I would go / spend / stay / visit*)

Les vacances de mes rêves seraient en Italie (*my dream holiday would be in Italy*)

J'aurais / je serais / je ferais / je mangerais (*I would have / be / do / eat*)



**R** – range

**O** – opinions

**T** – tenses

**A** – adjectives

**T** – tie together

**E** – extend



## Les avantages et les inconvénients de voyager

A mon avis / je pense que / je crois que (*in my opinion / I think that / I believe that*)

Un avantage / un inconvénient (*one advantage / disadvantage*)

C'est important de (*it's important*)

voyager / apprendre / voir / visiter / faire la connaissance de / se faire des amis (*to travel / learn / see / visit / get to know / make friends*)

D'un côté ... de l'autre côté (*on the one hand ... on the other hand*)

Ça peut être (*it can be*)

Cher / dangereux (*expensive / dangerous*)

Il y a le risque de (*there's the risk of*)

Il a des problèmes (*there are problems*)

La pollution / l'environnement (*pollution / the environment*)

C'est mieux de voyager (*it's better to travel*)

C'est pire (*it's worse*)

## KEY GRAMMAR

### Conditional mood

Saying what you 'would' do, eg I would go  
, I would stay , I would live etc

Use the 'simple future' stem, but this time  
put on the endings from the imperfect  
tense.

je serais = I would be  
j'aurais = I would have  
je ferais = I would do  
j'irais = I would go

je voyagerais = I would travel

nous resterions (we would stay)  
nous louerions (we would rent)

so:

Je –ais  
tu – ais  
il – ait

nous – ions  
vous – iez  
ils - aient

### Perfect tense - reminder!

Most verbs take '**avoir**' as *auxillary verb*

j'ai mangé = I ate (I have eaten)  
j'ai lu = I read  
j'ai choisi = I chose

A *small* number of verbs use '**être**' as *auxillary verb*

je suis allé(e) = I went  
je suis resté (e) = I stayed

je me suis levé(e) = I got up  
je me suis couché(e) = I went to bed

A useful acronym to remember the verbs using **être** is:

### DR & MRS VANDERTRAMP

<b>descendre</b>	<b>entrer</b>
<b>revenir</b>	<b>retourner</b>
<b>monter</b>	<b>tomber</b>
<b>rentrer</b>	<b>rester</b>
<b>sortir</b>	<b>arriver</b>
<b>venir</b>	<b>mourir</b>
<b>aller</b>	<b>partir</b>
<b>naître</b>	
<b>devenir</b>	

+ ALL REFLEXIVE VERBS

### Near future – reminder!

*aller + infinitive (just like in English...!)*

je vais faire = I'm going to do  
on va manger = we're going to eat  
nous allons jouer we're going to play

### Simple future – reminder!

This is when we want to say 'I **will** do x, y, z'

Most of the time put these endings on to the  
**INFINITIVE**

je –ai (je manger**ai**)  
tu – as (tu manger**as**)  
il –a (il manger**a**)

nous –ons (nous manger**ons**)  
vous –ez (vous manger**ez**)  
ils –ont (ils manger**ont**)

**Note:** j'irai = I will go / je serai = I will be  
je ferai = I will do / j'aurai = I will have

## GCSE SPANISH YEAR 10: WHERE I LIVE

### ¿Dónde vives? (Where do you live?)

Yo vivo / vivimos en la ciudad / en un pueblo ... (I / we live in the city / in a town ...)

Que se encuentra / (which is located)

En el sur / oeste / norte / este de Inglaterra (in the south/west/north/east of England)

En el campo / junto al mar (in the countryside/ on the coast)

Cerca / no lejos de (close to/ not far from)

He vivido allí / hemos vivido allí durante ... años (I / we have lived there for ..... years)

Es una ciudad tranquila / turística / histórica (it is a quiet/tourist/historic city)

Hay / tenemos / no hay / no tenemos (there is/we have/there isn't/ we don't have)

En verano / invierno / otoño / primavera (In Summer / Winter/ Autumn / Spring)

Se puede (you can)

Dar un paseo / ir de compras / visitar monumentos / ir al cine (go for a walk / go shopping/ see the sights/ go to the cinema)

Antes / hace.... años (before/ .... years ago)

Había / fue (there was/ it was)

En el futuro me gustaría vivir ... (in the future, I would like to live)

Mi ciudad ideal sería / tendría (my ideal town would be/ would have)



### Las ventajas / desventajas de mi ciudad (The advantages and disadvantages of my town)

Hay / No hay nunca (there is/ is never)

No hay nada (there is nothing)

No hay ... Más (there is no longer)

No hay ni ... Ni (There is neither...nor)

Demasiado / muchos / muchas / lleno de / suficiente (Too much/ lots of/ full of/ enough)

Crimen / tráfico / contaminación / ruido (crime / traffic / pollution / noise)

Qué es bueno / malo (which is good/bad)

Lo que me preocupa (what worries me)

Lo que me molesta (what annoys me)

Lo que me gusta (what I like)

Porque / ya que / dado que (because/ given that)

Es fácil / difícil de ... (it's easy/ difficult to...)

Displazarse ( to get around)

Encontrar un buen trabajo (find a good job)

**R** – range

**O** – pinions

**T** – tenses

**A** – adjectives

**T** – tie together

**E** – extend

### ¿ Cómo es tu casa? (What's your house like?)

Vivo en una casa en... – I live in a house in...

Vivo en un piso – I live in a flat

Moderno/a – Modern

Anticuo/a – Old fashioned

Grande – Big

Pequeño/a – Small

Espacioso/a – Spacious

Elegante – Elegant

Bonito/a – Pretty

Feo/a – Ugly

Acogedor(a) – Warm/welcoming

Hay - There is / There are

Tenemos – We have

Un dormitorio – a bedroom

Una cocina – A kitchen

Un salón – A living room

Un cuarto de baño – A bathroom

Un comedor – A dining room

Un sótano – A basement

Un ático – An attic

Un jardín – A garden

Un garaje – A garage

Un pasillo – A hallway

Un lavadero – A utility room

Un aseo – A toilet

Una sala de juegos- A games room

## ¿ Que haces normalmente en las vacaciones? (*What do you do in your holidays?*)

normalmente / usualmente / en julio (*normally / usually / in the month of July*)

Paso/ pasamos (*I spend / one / we spend*)

Una quincena / unos cuántos días/ un mes (*a fortnight / some days / a month*)

En Francia / en España (*in France / Spain*)

Vamos / viajamos allí en coche / avión (*we go / travel there by car / plane*)

Alquilamos (*we rent*)

Una casa de vacaciones/ un coche/ bicis (*a holiday cottage / a car / some bikes*)

Nos quedamos (*we stay*)

En un camping (*on a campsite*)

En el sur / norte de ... (*in the south / north of*)

Durante el día (*during the day*)

Por la mañana / la tarde / la noche (*in the mornings/ afternoons / evenings*)

Cada día / noche (*every morning / evening*)

Si / cuando (*if / when*)

Hace buen tiempo/ mal tiempo / calor / frío (*it's / the weather is nice / bad hot / cold*)

Me gusta / nos gusta (*I / we like*)

Prefiero / preferimos (*I / we prefer*)

Dar un paseo/ ir al centro / visitar los monumentos (*doing walks / going to town / seeing the sights*)

Lo que me gusta es... (*what I like is...*)

Más / menos ... que (*more / less .... than*)



El año pasado / en julio (*last year / in July*)

Fui / fuimos(*I / we went*)

Pasé / pasamos (*I / we spent*)

Fui en avión (*I went there by plane*)

Durante el viaje (*during the journey, trip*)

Dormí/ leí / veí/ comí / hice/ (*I slept / I read / I watched / I ate/ I did*)

Fue aburrido / fantástico / genial (*it was boring / fantastic / great*)

El hotel estaba (situado) (*the hotel was (situated)*)

Cerca de la playa / en el centro / en un bosque (*near the beach / in the town centre / in a forest*)

Lo pasé bien / lo pasamos bien(*I / we had a good time*)

Hizo frío / calor (*the weather was cold / hot*)

Hizo sol (*it was sunny*)

Nadé / caminé / compré / jugué / comí / bebí / fui / (*I swam / I walked / I bought / I played / I ate / I drank / I went*)



El año próximo / el septiembre que viene(*next year / September*)

Quiero / quisiera / voy a (*I want / would like / am going*)

Ir / visitar / ver (*to go / to visit / to see*)

Espero que (*I hope that*)

Hará buen tiempo (*the weather will be nice*)

Tengo la intención de (*I intend*)

intentar / hacer / comprar / aprender / alquilar (*to try / do / buy / learn / rent*)

## Las vacaciones de mis sueños

Si tuviera mucho dinero / si fuera rico (*if I had lots of money / If I were rich*)

iría / pasaría/ me quedaría / visitaría (*I would go / spend / stay / visit*)

Las vacaciones de mis sueños serían en Italia (*my dream holiday would be in Italy*)

tendría / sería/ haría/ comería (*I would have / be / do / eat*)

Iría al sur de Francia y alquilaría una casa de vacaciones enorme en el campo (*I would go to*

Pasaría todo mi tiempo al lado de la piscina (*I'd spend all my time by the pool*)

Compraría muchos regalos caros para mis amigos (*I'd buy lots of expensive presents for my friends*)



## Las ventajas y desventajas de viajar

En mi opinión / pienso que/ creo que (*in my opinion / I think that / I believe that*)

Una ventaja / una desventaja (*one advantage /disadvantage*)

Es importante de (*it's important*)

viajar / aprender / ver / visitar / conocer / hacer amigos (*to travel / learn / see / visit / get to know / make friends*)

Por un lado... por otro lado (*on the one hand ... on the other hand*)

Puede ser (*it can be*)

caro / peligroso (*expensive / dangerous*)

Hay un riesgo (*there's the risk of*)

Hay problemas (*there are problems*)

La polución /el medioambiente (*pollution / the environment*)

Es mejor viajar (*it's better to travel*)

Es peor (*it's worse*)

**R** – range

**O** – opinions

**T** – tenses

**A** – adjectives

**T** – tie together

**E** - extend



## KEY GRAMMAR

### Conditional mood

Saying what you 'would' do, eg I would go, I would stay, I would live etc

Use the 'simple future' stem, but this time put on the endings from the imperfect tense.

sería = I would be

tendría = I would have

haría = I would do

iría = I would go

viajaría= I would travel

Nos quedaríamos (we would stay)

alquilaríamos (we would rent)

so:

Yo --ía

tú - ías

Él/ella - ía

nosotros - íamos

vosotros - íais

Ellos/ellas - ían

### Preterite tense

The preterite tense is used for single events that happened in the past **at a definite time**. To form the preterite, you have to take the ending (ar, er or ir) off the infinitive and add the following endings:

-ar verbs	-er and -ir verbs
hablé	comí
hablas	comiste
habló	comió
hablamos	comimos
hablasteis	comisteis
hablaron	comieron

### Imperfect tense

The preterite tense is used for events that happened in the past (used to/was) **over a period of time**. To form the imperfect, you have to take the ending (ar, er or ir) off the infinitive and add the following endings:

ar verbs	-er and -ir verbs
Hablaba	comía
Hablabas	comías
Hablaba	comía
Hablábamos	comíamos
Hablabais	comíais
Hablaban	comían

### Near future – reminder!

*Voy a + infinitive (just like in English...!)*

Voy a hacer= I'm going to do

Vamos a comer= we're going to eat

Vamos a jugar= we're going to play

### Simple future – reminder!

This is when we want to say 'I **will** do x, y, z'

Most of the time put these endings on to the **INFINITIVE**

yo	-é
tú	-ás
usted, él, ella	-á
nosotros	-emos
vosotros	-éis
ustedes, ellos, ellas	-án

**Note:** iré = I will go / seré = I will be  
haré = I will do / tendré = I will have

# ART TERMINOLOGY YOU SHOULD KNOW LEARN AND USE

## Shape, form, space

Closed  
 Open  
 Distorted  
 Flat  
 Organic  
 Deep  
 Positive  
 Negative  
 Foreground  
 Background  
 Composition  
 Curvaceous  
 Elongated  
 Large  
 Small  
 2D                  3D

## Tone

Bright  
 Dark  
 Faded  
 Smooth  
 Harsh  
 Contrasting  
 Intense  
 Sombre  
 Grey  
 Strong  
 Powerful  
 Feint  
 Light  
 Medium  
 Dark  
 Dramatic  
 Large  
 Small

## Pattern and Texture

Repeated  
 Uniform  
 Geometric  
 Random  
 Symmetrical  
 Soft  
 Irregular  
 Coarse    Bold  
 Uneven  
 Bumpy  
 Rough  
 Smooth  
 Uneven  
 Spiky  
 Broken  
 Furry  
 Fine Flat  
 Grid

## Line

Fluent  
 Free      Rough  
 Controlled  
 Powerful  
 Strong  
 Geometric  
 Angular  
 Light  
 Delicate  
 Flowing  
 Simple  
 Thick Thin  
 Horizontal  
 Broken  
 Interrupted  
 Rounded  
 Overlapping  
 Feint

## Colour

Bright    Bold  
 Primary  
 Secondary  
 Tertiary  
 Radiant  
 Dull      Vivid  
 Contrasting  
 Deep  
 Monochrome  
 Harmonious  
 Complementary  
 Natural  
 Earthy  
 Subtle  
 Pale  
 Cool Warm  
 Saturated  
 Luminous  
 Strong

## Mehndi

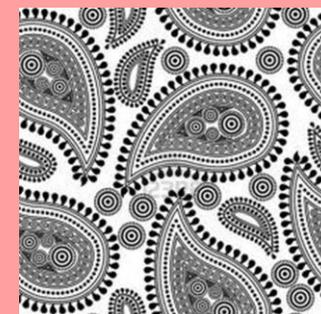
1.The application of henna paste in intricate designs to decorate the body, often for wedding celebrations and other festive occasions in South Asia, the Middle East, and North Africa.

2.Decoration on the body made by mehndi.



## Paisley

The Paisley teardrop 'buta' / comma shape



Basic, simple, solid, loud, quiet, bright, realistic,  
 stylised, observed, busy, vibrant, strange, interesting,  
 balanced, lively, negative, recognisable, abstract,  
 tactile, meaningful, symbolic, depressing, unique,  
 emotive, hidden, textural, dynamic, powerful,  
 intentional, concealed, subtle.



## Mexican Day of the Dead

It is believed that the gates of heaven are opened at midnight on October 31, and the spirits of all deceased children (angelitos) are allowed to reunite with their families for 24 hours. On November 2, the spirits of the adults come back to enjoy the festivities that are prepared for them.

# Mexican Day of the Dead



James Bond 'Spectre' scene set at a Day of the Dead celebration

The festival is known as: 'El Día de los Muertos', 'Días de Muertos' or just 'Muertos' for short.

Mexicans view it not as a day of sadness but as a day of celebration because their loved ones awake and celebrate with them.

View these clips showing the festival in Mexico:

[https://www.youtube.com/watch?v=\\_sSawpU81cl&safe=active](https://www.youtube.com/watch?v=_sSawpU81cl&safe=active)

<https://www.youtube.com/watch?v=8FHRhH9k-PY&safe=active>

<https://www.youtube.com/watch?v=7FXYeSlu9QQ&safe=active>

## Carnival Processions



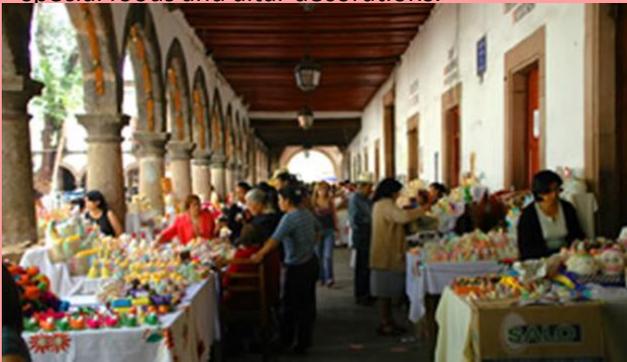
Sugar skulls are made and purchased.



### The 'ofrenda' - offering



Day of the Dead outdoor market in Patzcuaro, Michoacan where locals buy their sugar skulls, special foods and altar decorations.



It is a veritable family 'feast', laid on every year especially for the dead, and it aims to appeal to all the senses: attracted by the sounds (from music to fireworks), lights (of candles), aromas (of foods, flowers and incense) and general festivity, the souls can come back to Earth to enjoy, however briefly, some of the pleasures they remember when they were alive. They believe that the gates of heaven are opened at midnight on October 31, and the spirits of all deceased children (angelitos) are allowed to reunite with their families for 24 hours. On November 2, the spirits of the adults come back to enjoy the festivities that are prepared for them.



# PAISLEY PATTERN DESIGN

## Paisley Pattern

A Paisley design is basically a teardrop/comma shape. Its shape and design is Persian in origin and can be traced back over 2000 years. Its name comes from the town of Paisley in Scotland.

The first appearance of the tear-shaped 'buta' motif was in Persia, then spread into India. Resembling a comma, it is one of the most recognised patterns in the world. It was used in 18th century Europe as a design motif, particularly being used on shawls. These were mass produced in Paisley, Scotland in the 19th century (hence the name Paisley). Paisley was a major site for the manufacture of printed and woven cotton and wool, particularly for shawls at this time.

It was widely used again in the 1960s when it became synonymous with 'psychedelia' and 'flower power'. It is still a popular motif – you will find it all around you if you look for the design in contemporary printed textile fabric.

View this clip showing paisley:

<http://www.bbc.co.uk/culture/story/20151021-paisley-behind-rocks-favourite-fashion>

Paisley print patterns are often hand printed by using a hand cut wooden or metal paisley stamper like this one.



Use these tutorials to develop your own paisley patterns:

<https://www.youtube.com/watch?v=WsgJIV5WhsE&safe=active>

<https://www.youtube.com/watch?v=2vtKELmA-v8&safe=active>

<https://www.youtube.com/watch?v=ZOyZsCECRsA&safe=active>

## Kaffe Fassett Paisleys



Paisley design for Crabtree and Evelyn by Abigail Borg



Vera Bradley design



Contemporary fabric print by artist Lisa Busby



Alexander McQueen

A famous textile designer whose T-shirts cost nearly £150 each. His logo for this season is based around skulls which incorporate paisley patterns.

## Mehndi Design

### Mehndi

Mehndi is a form of body art originating in ancient India, in which decorative designs are created on a person's body, using a paste, created from the powdered dry leaves of the henna plant (*Lawsonia inermis*). Dating back to ancient India, mehndi is still a popular form of body art among the women of the Indian subcontinent, Africa and the Middle East.

Mehndi is derived from the Sanskrit word mendhikā.

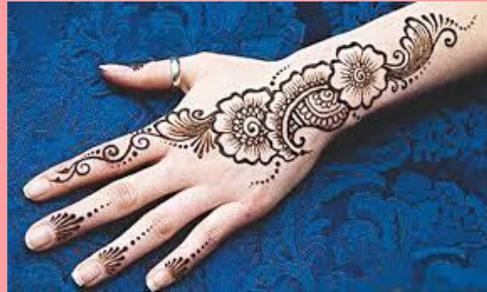
Traditional Indian designs are representations of the sun on the palm, which, in this context, is intended to represent the hands and feet.

Mehndi has a great significance in performing classical dance like Bharatnatyam.

Henna paste when applied to the skin creates a temporary but quite long lasting tattoo.

View this clip showing Mehndi henna paste being applied:

<https://www.youtube.com/watch?v=MIkHNehkHKc&safe=active>



The technique of Mehndi is detailed and intricate. It requires care and accuracy as any henna paste applied to the skin will stain it.





# REEEWIND!

During terms 5 & 6 you will undergo a series of assessments following the criteria set out in the right hand summary.

Within this Knowledge Organiser is a lifesaver set of information to help you achieve more than you first thought possible.



BBC Bitesize provide an essential revision resource.



Here is a good Music Theory Revision section from the same site.

# GCSE MUSIC

## SUMMARY OF ASSESSMENT

### Component 1: Performing

Total duration of performances: 4-6 minutes  
Non-exam assessment: internally assessed, externally moderated  
30% of qualification

A **minimum of two** pieces, **one** of which must be an **ensemble** performance of **at least one minute** duration. The other piece(s) may be **either solo and/or ensemble**. **One** of the pieces performed must link to an area of study of the learner's choice.

### Component 2: Composing

Total duration of compositions: 3-6 minutes  
Non-exam assessment: internally assessed, externally moderated  
30% of qualification

**Two** compositions, **one** of which must be in response to a **brief set by WJEC**. Learners will choose one brief from a choice of four, each one linked to a different area of study. The briefs will be released during the first week of September in the academic year in which the assessment is to be taken. The **second** composition is a free composition for which learners set their **own brief**.

### Component 3: Appraising

Written examination: 1 hour 15 minutes (approximately)  
40% of qualification

This component is assessed via a listening examination.

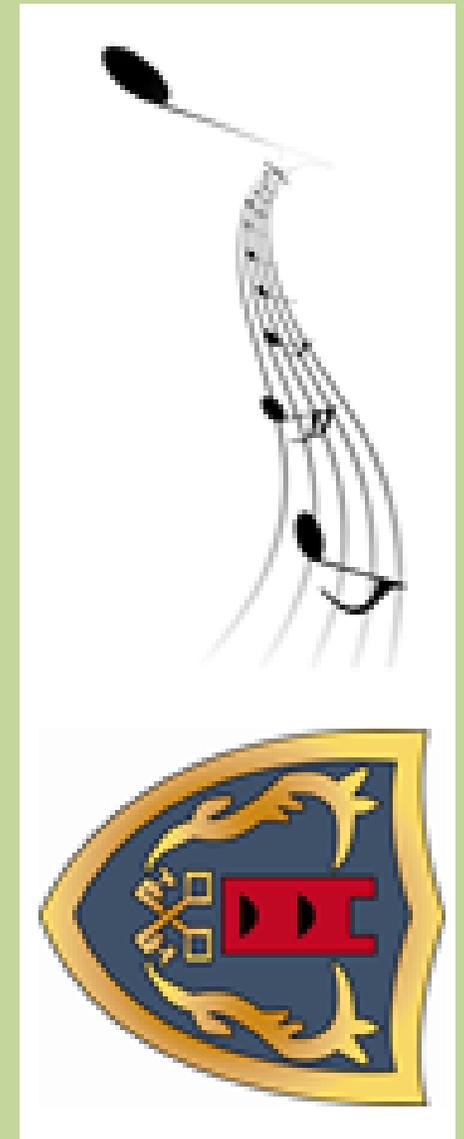
**Eight** questions in total, **two** on each of the four areas of study.

**Area of study 1: Musical Forms and Devices**

**Area of study 2: Music for Ensemble**

**Area of study 3: Film Music**

**Area of study 4: Popular Music**



# Area of Study 1

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## Musical Forms and Devices

### Musical Forms

<b>Binary (A, B)</b>	<b>Rondo (A, B, A, C, A)</b>
<b>Ternary (A, B, A)</b>	<b>Variation (T, V1, V2, V3)</b>
<b>Minuet and Trio (M, T, M)</b>	<b>Strophic (A, A, A)</b>



Treble Clef (used by the violin)



Bass Clef (used by the cello)



Alto Clef (used by the viola)

### Key words

- Accidental** – changes the pitch of the note
- Cadence** – two chords played one after the other to produce the end of a phrase
- Interval** – the distance between two notes
- Unison** – all parts singing the same notes
- Accented** – when emphasis is placed on a note
- Chromatic** – music goes up or down in semitones
- Sotto voce** – hushed voice/soft voice/under the voice
- Suite** – a collection of short musical movements
- Diminution** – making the note values shorter
- Subdominant** – the 4<sup>th</sup> note of a scale and its chord

### The Baroque Era (1600-1750)

Bach, Handel, Vivaldi, Corelli, Lully, Purcell

### The Classical Era (1750-1810)

Haydn, Mozart, Beethoven

### The Romantic Era (1810-1910)

Schubert, Mendelssohn, Chopin, Schumann, Liszt, Wagner, Verdi, Brahms, Tchaikovsky, Dvorak

### Texture

- Monophonic** – single melodic line for an instrument or voice or when instruments/voices are unison
- Homophonic** – One main melody plus harmonic accompaniment of chords (inc. broken chords)
- Polyphonic Texture** – Number of melodic lines heard independently of each other.

### Textural Devices

- Unison** (2 or more musical parts sound at the same pitches at the same time - can be in octaves) (monophonic)
- Chordal** - parts move together producing a series or progression of chords (homophonic)
- Melody and accompaniment** – the tune is the main focus of interest and importance, and it is 'accompanied' by another part/parts which support the tune (homophonic)
- Canon or imitation** - the melody is repeated exactly in another part while the initial melody is still being played (polyphonic)
- Counter melody** – a new melody played at the same time as a previous melody
- Layered** – when more parts are added on top of each other

### Musical Theatre

Instrumentation (timbre)

Texture

## Music for Ensemble

- Sforzando (sfz)** – a sudden, forced accent on a note or chord
- Calla voce** – When the accompaniment has to follow the vocal part, without strictly sticking to the tempo
- Recitative** – a vocal style that imitates the rhythms and accents of the spoken language
- Declamatory writing** – a type of vocal writing, similar to recitative in that it has speech-like quality
- Sforzando (sfz)** – a sudden forces accent on a note or chord
- Basso Continuo** – continuous bass line

- Rhythm Section** – underlying rhythm, harmony and pulse of the accompaniment
- Pentatonic** – a 5 note scale
- Improvisation** – music is made up on the spot
- Stanza** – another word for a verse
- Swing style** – dotted rhythm feel to the beat
- Call and Response** – Music sung or played by the leader and responded to by the rest of the group
- Blues scale** – minor pentatonic scale + flattened 5<sup>th</sup>
- Blues notes** – flattened 3<sup>rd</sup>s, 5<sup>th</sup>, 7<sup>th</sup> notes
- Riffs** – short repeated musical pattern

- Duet – 2 performers
- Trio – 3 performers
- Quartet – 4 performers
- Quintet – 5 performers
- Sextet – 6 performers
- Septet – 7 performers
- Octet – 8 performers
- Jazz and Blues Trios
- Vocal Ensembles: duets, trios, backing vocals

- Trio Sonata**
- A work in several movements for 1 or 2 soloists + basso continuo

### String Quartet

- Mvt 1 (sonata form)
- Mvt 2 – slow (ABA or T&V)
- Mvt 3 – moderate dance (minuet and trio)
- Mvt 4 – fast sonata or rondo form

### 12-bar structure

- I, I, I, I,
- IV, IV, I, I,
- V, IV, I, IV

### Devices

- Repetition** – exact repeat of a musical idea
- Contrast** – a change in the music
- Anacrusis** – A note before the first beat
- Imitation** – when another part copies a musical idea
- Sequence** – A repeated idea but at a different pitch
- Ostinato** – a repeated pattern or phrase
- Syncopation** – off-beat
- Dotted rhythms** – lengthening a note by half of its value by placing a dot after it
- Drone** – a long held note
- Pedal** – a held or repeating note against which harmonies change
- Canon** – melody is repeated in another part whilst the original melody continues to play
- Conjunct movement** – (mainly) stepwise melody
- Disjunct movement** – leaping melody
- Broken Chord/Arpeggio** – notes of a chord are played separately one after the other
- Alberti bass** – broken-chord accompaniment ( I, V, III, V)
- Regular phrasing** – balanced melody
- Motifs** – short melodic or rhythmic ideas
- Chord progressions** – a series of related chords
- Modulation** – changing key

## Area of Study 3

### A Short History

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Early films had no soundtrack (“**SILENT CINEMA**”) and music was provided live, usually **IMPROVISED** by a pianist or organist. The first **SOUNDTRACKS** appeared in the 1920’s and used existing music (**BORROWED MUSIC** – music composed for other (non-film) purposes) from composers such as Wagner and Verdi’s operas and ballets. In the 1930’s and 1940’s Hollywood hired composers to write huge Romantic-style soundtracks. **JAZZ** and **EXPERIMENTAL MUSIC** was sometimes used in the 1960’s and 1970’s. Today, film music often blends **POPULAR, ELECTRONIC** and **CLASSICAL** music together in a flexible way that suits the needs of a particular film.

### How music is used in film

- To create an atmosphere.
- To create a specific or geographic setting.
- To set the era, time or period, e.g. the use of classical music for a film set in the 18<sup>th</sup> century
- To support the physical action and control the pace.
- To support the emotions of the characters and evoke certain emotions in the audience.
- To generate tension and build suspense.
- To support characters, situations and places through the use of a **leitmotif**.
- To predict events or inform the audience of impending events, e.g. when the *Jaws* theme is heard, but the shark has not yet been seen in the film. The audience are aware of the forthcoming danger, but the on-screen characters are not.
- To create a sense of space, breadth, depth i.e. the ‘size’ of something.

### Musical Devices and Techniques

**Leitmotif** – A short musical theme or idea that is associated with a character, place, object or situation – often abbreviated to ‘motif’.

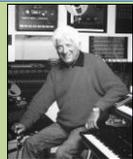
**Ostinato** – A short repeating musical idea. In film music this could be a melody, rhythm or chord sequence. Often, other parts will be layered over the ostinato to emphasise a build up of the action or tension in the film

**Riff** – Similar to the ostinato. The word riff indicates music from a popular or modern genre.

**Layering** - Building up the musical ideas to fill out the texture, to achieve a more powerful or interesting outcome.

**Minimalism** - A style of music characterised by the repetition of small cells of music, which evolve very gradually to create a hypnotic effect. Often used by film composers to establish the mood of a scene.

## Top Film Music Composers



**Jerry Goldsmith**  
*Planet of the Apes*  
*Star Trek: The Motion Picture*  
*The Omen*  
*Alien*



**John Williams**  
*Star Wars*  
*Jaws*  
*Harry Potter*  
*Indiana Jones*  
*Superman, E.T.*



**James Horner**  
*Titanic*  
*Apollo 13*  
*Braveheart*  
*Star Trek II*  
*Aliens*



**Ennio Morricone**  
*The Good, The Bad and The Ugly*  
*For a Few Dollars More*  
*The Mission*



**Danny Elfman**  
*Mission Impossible*  
*Batman Returns*  
*Men in Black*  
*Spider Man*



**Hans Zimmer**  
*The Lion King*  
*Gladiator*  
*Dunkirk*  
*Blade Runner 2049*  
*No Time to Die*



**Bernard Herrmann**  
*Psycho*  
*Vertigo*  
*Taxi Driver*

# Area of Study 3

REEEWIND!!!



## Topic 2 – Use of Musical Elements

**Melody** – This adds character and shape to musical ideas. It is common in film music to have a variety of different themes of equal importance. An important melodic theme will often be referred to as a **Leitmotif**.

**Tempo** – This will often reflect the action on the screen.

**Metre** - The time signature used – how many beats in each bar and what type of beats they are.

**Rhythm** – Different length durations of notes and rests to create a pattern. There many rhythmic devices used in film music – please refer to your film music PowerPoint resource.

**Harmony** – The way in which chords are used to create interest and complexity to the music.

- **Diatonic** – Chords that use notes from a specific key.
- **Chromatic** – Use of notes that are not in the key.
- **Dissonant** – Chords that use notes that do not ‘fit’ together well.

**Intervals** – The gaps between notes. Some intervals are very effective in film music in creating a certain mood, atmosphere and tension.

**Fanfare** – A short musical flourish or call to attention based on chords. It is often associated with an announcement or significant event.

**Tonality** – This refers to whether the music is Major, Minor or Atonal (no key/tone).

- **Atonal** – No sense of a tonic or ‘home’ key. Often use by composers to create an unsettling feeling.

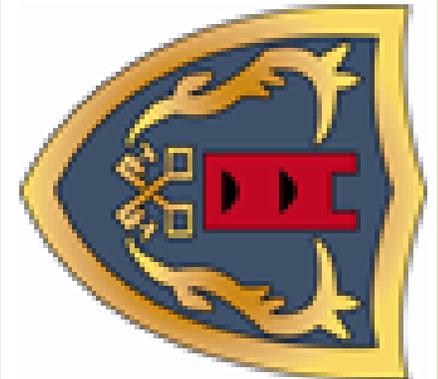
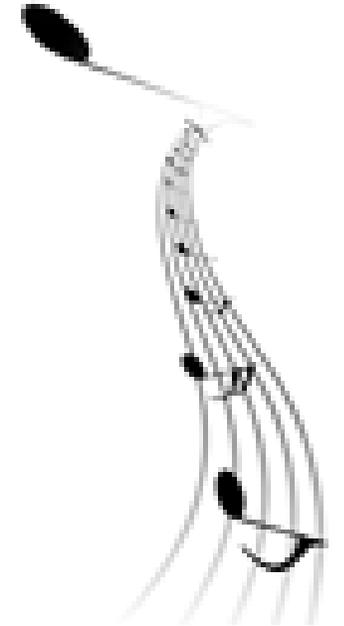
## Topic 1 – The Film Industry

**Main categories of films:**

- Action
- Adventure
- Animation
- Biography
- Documentary
- Children’s film
- Comedy
- Crime
- Disaster
- Fantasy
- Horror
- Musical
- Mystery
- Romance
- Sci-fi
- Spy
- Thriller
- War
- Western

**There are 2 main categories of film music:**

- **Diegetic** – The music is heard as part of the storyline, e.g. music heard on a speaker during the scene.
- **Non-Diegetic** – Back ground music that supports the on-screen action. It is only heard by the audience.



# Area of Study 4

REEEWIND!!!



## Toto's Africa Knowledge Organiser

### Background

Africa is a song recorded by the American rock band Toto in 1981 for their fourth studio album entitled Toto IV. It is a soft-rock love song with features of African music. The song was written by band members David Paich (born June 25th 1954) and Jeff Porcaro (born April 1st 1954 and died August 5th 1992). Africa was released as the third single from the album on September 30th 1982 through Columbia Records. In 2012, Africa was listed by music magazine NME in 32nd place on its list of '50 Most Explosive Choruses'.

### The Structure

**Verse / Chorus Form:**

Intro	Bars 1 – 4	4 bars
Verse 1	Bars 5 – 39	35 bars
Chorus 1	Bars 40 – 57	18 bars
Link 1	Bars 58 – 65	8 bars
Verse 2	Bars 14 – 39	26 bars
Chorus 2	Bars 40 – 57	18 bars
Link 2	Bars 58 – 65	8 bars
Instrumental	Bars 66 – 82	17 bars
Chorus 3	Bars 40 – 92	22 bars
Outro	Bars 93 – 96	4 bars

Keyword	Definition
Grace notes	Ornamental notes not essential to harmony or melody
Harmonic rhythm	The rate at which the chords change
NME	'New Musical Express' a British music journalism website and former magazine that has been published since 1952.
A pentatonic scale	A scale consisting of 5 notes
A riff	Short repeated phrase typical in rock music (ostinato)
Syncopation	Playing off the beat, stressing unaccented usually beats
Triplets	Playing 3 notes in the space of 2
Split Common Time	4/4 time that has been cut rhythmically. Written 2/2 or 4/4
Anacrusis	Notes of a phrase which begin before the main beat. Also known as pick up
Conjunct	Melody moving by step
Syllabic	Singing many notes to one syllable
Sustained chord	A chord held on, harmony may change over the same chord
Ascending melody	A melody moving in an upwards direction
Descending melody	A melody moving in an downwards direction
Counter melody	A second melody playing over existing melody as decoration
Parallel harmony	Parallel movement of 2 lines in harmony, homophonic.

**The Introduction is in B major and uses 3 chords:**

A	G# minor	C# minor
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**The Verse is in B major:**

B major	D#m	G# m	B/F#	A/E	C# m
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The intro reappears at the end of each line making each line an unusual 9 bar phrase

**The Chorus is in A major:**

F# minor	D	A	E
C# minor	E	F# minor	A

**Instrumental**

Performed on the synthesizer. Completely homophonic in parallel harmony.  
**First:** A descending melody using a B major pentatonic scale with the notes falling into groups of three and ending with a triplet.  
**Then:** An ascending and descending melody using the E major scale which contains more rhythmic variety than the first. Then returns to B major.

**The Outro is a repeat of the introduction.**

On the recording the music repeats continually and the texture is gradually reduced each time so that by the end the music is reduced to only the rhythm track heard at the beginning of the song accompanied by the bass line of Riff a.

**Rhythm and Metre**  
 Ostinato rhythms, consisting almost totally of quavers  
 Constant use of syncopation.  
 The time signature is 2/2 (split common time) throughout  
 Moderately fast

**Dynamics**  
 Most of the song is mezzo-forte whilst the choruses are forte.

**Timbre**  
 Rock Band Line up:  
 Drum kit with additional percussion  
 Lead and bass guitars  
 Synthesizers  
 Male lead vocals and male backing vocals.  
 African percussion used such as congas, marimbas, xylophones and cowbells.

**Harmony**  
 The majority of the song is in B major whilst the choruses are all in A major.  
 Diatonic throughout

**Texture**  
 Homophonic chords  
 Melody and Accompaniment  
 Parallel harmonies in the vocal part during the chorus

**Melody**  
 The melody is mostly conjunct (moving in step)  
 Includes occasional use of the pentatonic scale.  
 The pitch range of the vocal line is just less than two octaves on the printed score, but it is wider on the recording with the vocal improvisations towards the end of the song.  
 Verse 2 is accompanied by a **countermelody** or descant, played on a flute-like instrument, which can be heard across the top of the texture. It changes pitch conjunctly, moving at the same speed as the harmonic rhythm.

# Area of Study 4

REEEWIND!!!



## Melodic Analysis

**Riff A – bars 1 & 2:** A distinctive syncopated rhythm pattern mostly repeating chord IV and concluding with chords vi and ii:

Riff A

With the exception of the Chorus, Riff A makes an appearance in every other section of the song.

**Riff B – bars 3 & 4:** starts with an anacrusis and is an ostinato pattern of five notes – based on the E major pentatonic scale – over a sustained chord ii:

Riff B

## Use of African Instruments



## Chorus 3

A new electric guitar riff is heard on the recording in the last bar of each phrase:



Phrase 3 - I bless the rains down in Africa - is heard five times, making this section significantly longer than before.

A solo vocal improvisation is heard at the end of the second, third and fifth repeats. Each one is different, the first two using the lyrics *I bless the rain*, whilst the final one uses, *I'm gonna take the time*.

## African Influences

### Riff A and B:

- Use of syncopation
- pentatonic scale
- Irregular ostinato groupings that cut across the 2/2 time signature.

### The instrumental sonorities:

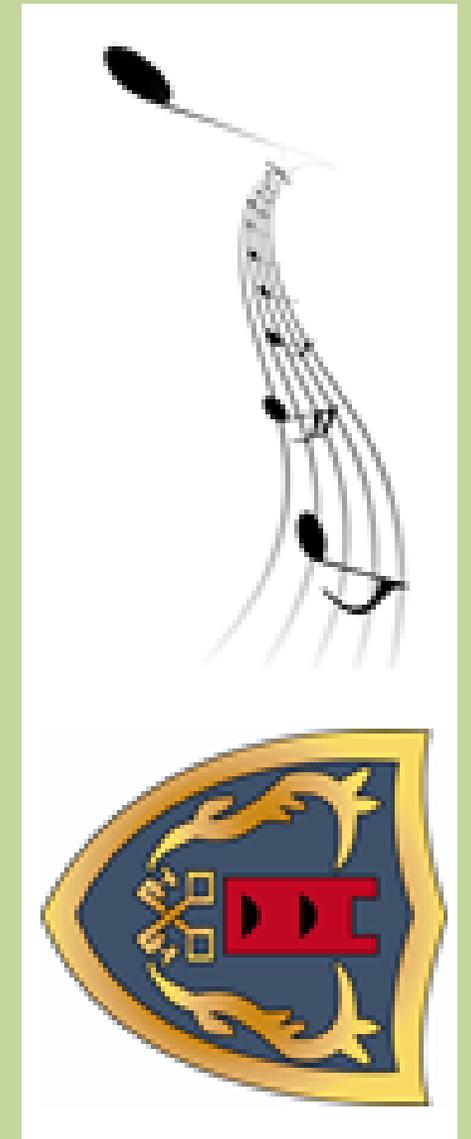
- Xylophones and marimbas – suggest the sounds of pitched percussion instruments which originate from the various countries of the African continent.
- Polyrhythms created

### Start of the song:

- An additional eight bar introduction, performed only by unpitched percussion instruments. This is heard before the vocal score begins and contains African influence in its use of layered rhythm parts and ostinatos.

### Vocals

- Homophonic texture in the vocal parts – movement in parallel harmony



# Area of Study 4

REEEWIND!!!



## Introduction (instrumental) X4

### Verse 1:

B D#m G#m

I hear the drums echoing tonight

B/F# A/E C#m G#m (INTRO)  
But she hears only whispers of some quiet conversation

B D#m G#m  
She's coming in, 12:30 flight

B/F# A/E C#m G#m (INTRO)  
The moonlit wings reflect the stars that guide me towards salvation

B D#m G#m  
I stopped an old man along the way

B/F# A/E C#m G#m (INTRO)  
Hoping to find some old forgotten words or ancient melodies

B D#m G#m (INTRO)  
He turned to me as if to say, "Hurry boy, it's waiting there for you"

### Chorus:

F#m D A E  
It's gonna take a lot to drag me away from you

F#m D A E  
There's nothing that a hundred men or more could ever do

F#m D A (C#m E F#m E)  
I bless the rains down in Africa

Gonna take some time to do the things we never had (ooh, ooh)

## Introduction (instrumental) X2

### Verse 2:

The wild dogs cry out in the night  
As they grow restless, longing for some solitary company  
I know that I must do what's right  
As sure as Kilimanjaro rises like Olympus above the  
Serengeti

I seek to cure what's deep inside, frightened of this thing  
that I've become

Chorus 2 (same as chorus 1)

## Introduction (instrumental) X2

### Synthesizer solo

B / D#m / G#m / B / A / C#m / G#m /  
B / D#m / G#m / / / (INTRO)

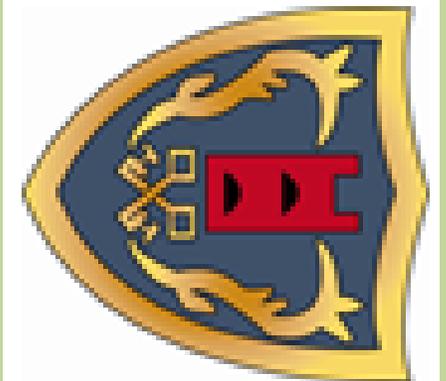
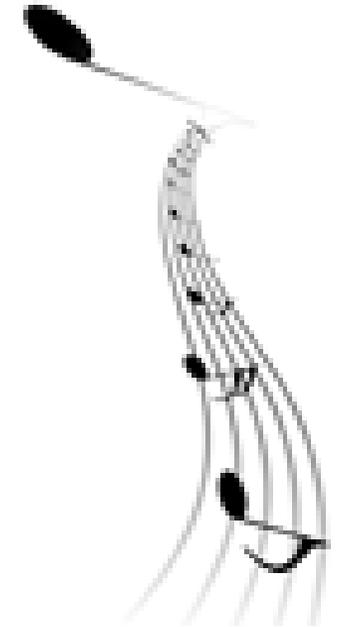
Hurry boy, she's waiting there for you

### Chorus 3

It's gonna take a lot to drag me away from you  
There's nothing that a hundred men or more could ever do  
I bless the rains down in Africa x 5

Gonna take some time to do the things we never had (ooh)

Outro (same as introduction) x 8



# Preparing for Component 3

Component 3 is your 1 ½ hour written examination.  
It is in 2 parts called **Section A** and **Section B**

## Section A -- Understanding & Interpreting Theatre.

Questions on our set text, *The Caucasian Chalk Circle*. The questions will be on any aspect of staging a production & performance of this play. The questions will test you on your knowledge and understanding of how theatre creates meaning and communicates meaning, so you will need a thorough understanding of the roles of the stage director, actor and designer, and the contribution that they make to the production & performance of a play..

These questions on this play are worth 30% of your final grade.

It is worthwhile getting to know *The Caucasian Chalk Circle* and how you would stage it, very well indeed.

You will be tested on your knowledge of the play NOT on Brecht's theories.

## Section B – Live Theatre.

Extended essay type questions on a play that you have watched in performance. You will have a choice from two questions and answer one question only. These questions too will be on any aspect of the performance. This time though, the questions will test you on your ability to analyse & evaluate, so it is very important for you to understand these two intellectual skills and the Evaluative Vocabulary words that you have been given.

This section is worth 10% of your final grade.

We will visit as many performance as we are able. We may view some recordings too. It is a good idea for you to watch performances with your friends and family too.

I want you to understand that all the practical work and practical exams that you have done at GCSE and also in earlier years have been preparing you for this examination. This is because, you will use the knowledge & understanding that you have gained on how to **conceive, rehearse, stage** and **perform** your Component 1, **Devised play** and your Component 2, **Text performance** and apply it to the ways that you would **interpret, produce** and **perform** *The Caucasian Chalk Circle* (section A). You will also apply the knowledge & understanding that you gained in your practical work to **analyse** and then **evaluate** the ways that others (other actors, other directors, other designers etc.) have used their knowledge & understanding to **produce** and **perform** their production of a play that you have watched live in performance. (section B).

# *Understanding & Interpreting Theatre*

## Section A

*The Caucasian Chalk Circle* – Bertolt Brecht 1944

The play – The Caucasian Chalk Circle  
Plot, characters, genre themes- other bits and bobs too

Key Characters  
Grusha Vashnadze  
Simon Shachava

The plot in x words

1<sup>st</sup> performed-  
Original stage  
conditions

Genre

The Plot in Y words

Setting(s)

Themes & Issues

A note on speech

Analyse &  
evaluate

# YR 10 FILM STUDIES TERMS 5 & 6 THE NEA

NEA = 30% of whole GCSE (Production = 20%, Evaluative Analysis = 10%)

## PRODUCTION:

An extract from a screenplay for a genre film (800 – 1000 words) and a shooting script of a key section from the screenplay (about 1 min of screen time about 1 page of screenplay)

## PLUS...

Evaluative Analysis of between 750 – 850 words. This analyses your production in relation to other professionally produced films/screenplays.

The NEA must be individual – no group submissions are allowed. There are strict controls in place regarding supervision, support and ensuring no plagiarism/copying takes place.

The genre that we will be working with is...

# CRIME

OUR QUALIFICATION IS CALLED EDUQAS GCSE  
FILM STUDIES <https://www.eduqas.co.uk/qualifications/film-studies-gcse/>

IMPORTANT INFORMATION ABOUT NEA

The screenshot shows a page from a screenplay with various elements highlighted and annotated. The annotations are as follows:

- SCENE HEADING**: One line description of the location and time of day. (Points to: EXT. SUBURBAN HOME - NIGHT)
- ACTION**: The description of the actions in a scene. (Points to: WE OPEN on a modern suburban home. The front window illuminated by the lights inside. We see the silhouette of a man and a woman in a room. The man is in a room. The woman is in a room. We see a boy running around the house.)
- CHARACTER**: Identifies the character who is speaking. (Points to: FILBERT (V.O.) This is my castle. I am sworn to protect it. Anyone that stands in my way will bear the wrath of the Almighty--)
- DIALOGUE**: The lines of speech your character says. (Points to: FILBERT (V.O.) This is my castle. I am sworn to protect it. Anyone that stands in my way will bear the wrath of the Almighty--)
- INTERCUT**: Instructions when cutting to multiple locations. (Points to: INTERCUT PHONE CONVERSATION)
- SUBHEADER**: Used when there are minor changes in a location. (Points to: INT. SUBURBAN HOME - KITCHEN - NIGHT)
- FADE IN**: Marks the start of the screenplay. (Points to: FADE IN: 1)
- SCENE NUMBER**: Generally numbered only in the shooting script. (Points to: 1)
- TRANSITION**: Used as transitional instructions for editing. (Points to: CUT TO: 2)
- EXTENSION**: Clarifies where a character is when they can't be seen. (Points to: FILBERT (V.O.) This is my castle. I am sworn to protect it. Anyone that stands in my way will bear the wrath of the Almighty--)
- PARENTHETICAL**: Provides info on how the actor should say the line. (Points to: Oh that's perfectly normal.)
- SHOT**: Indicates the camera angle or movement in a scene. (Points to: FILBERT comes around the corner, distracted by his fantasy, bumps into the wall. His favorite ball slips from his hand. Everything slows down for Filbert.)

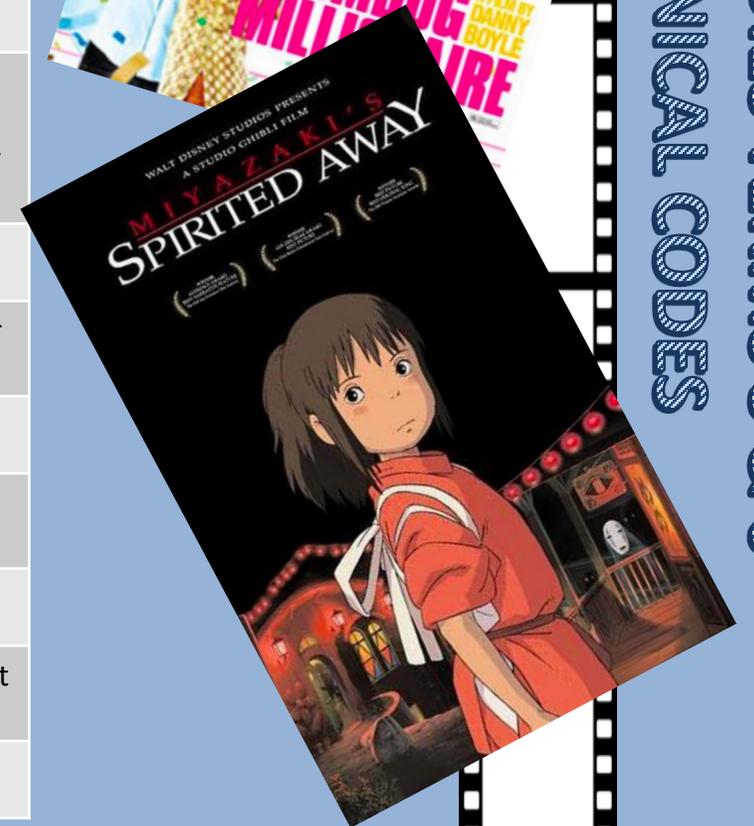
SCREENPLAY/SEQUENCE - GENRE OPENINGS

KEY TERMINOLOGY (GENERAL)	DEFINITION
GENRE	THE TYPE OF FILM EG. ROMANCE, COMEDY, SCIENCE FICTION, THRILLER
STEREOTYPES	WIDELY HELD BUT FIXED AND OVER SIMPLIFIED IMAGE OR IDEA OF A PARTICULAR TYPE OF PERSON OR THING
CONVENTIONS	AN ACCEPTED WAY OF DOING SOMETHING...THE ASPECTS OF A MEDIA PRODUCT THAT MAKE IT IDENTIFIABLE IN TERMS OF GENRE
ARCHETYPAL	VERY TYPICAL OF A CERTAIN KIND OF PERSON OR THING
TODOROV'S PARADIGM	TODOROV'S NARRATIVE THEORY – PLEASE REFER TO TERMS 1 & 2 KNOWLEDGE ORGANISERS
SOLVERS	THE PEOPLE WHO AIM TO SOLVE THE CRIME AND SEE JUSTICE IS DONE
COMMITTERS	THE PEOPLE WHO MASTERMIND/CARRY OUT THE CRIME
VICTIMS	THE PEOPLE ON THE RECEIVING END OF THE CRIME
PROTAGONIST	LEADING CHARACTER OR ONE OF THE MAJOR CHARACTERS
ANTAGONIST	A CHARACTER WHO IS ACTIVELY HOSTILE TO SOMEONE OR SOMETHING – AN ENEMY
MISE-EN-SCENE	THE ARRANGEMENT OF SCENERY, PROPS, LIGHTING, COSTUMES ETC
CINEMATOGRAPHY	THE ART OF PHOTOGRAPHY AND CAMERAWORK IN FILM-MAKING



FOR THIS PART OF THE COURSE, YOU WILL NEED TO BE ORGANISED, SELF-MOTIVATED AND INDEPENDENT. THIS PART OF THE COURSE IS VITAL AND NEEDS TO BE COMPLETED BY EVERYBODY. THERE IS NO PLAN B. THIS IS AN EXCELLENT WAY TO ENSURE THAT YOU ENTER THE EXAMINATION HALL IN YEAR 11 WITH EXCELLENT MARKS UNDER YOUR BELT.

TECHNICAL CODE	TERMINOLOGY	DEFINITION
<b>EDITING</b>  	<b>STRAIGHT CUT</b>	Smooth cut between one shot and the next
	<b>FADE</b>	Where a shot gradually turns black or white
	<b>DISSOLVE</b>	A technique that creates gradual fade from one image to another. Often used to connect images in some way.
	<b>WIPE</b>	Where one shot replaces another by travelling from one side of the frame to another
<b>LIGHTING</b>  	<b>HIGH KEY</b>	When bright colour is created through the use of lots of filler lights – few/no shadows
	<b>LOW KEY</b>	When fewer filler lights are used to help create pools of shadows
	<b>CHIAROSCURO</b>	An Italian term usually used in art to refer to the high contrast light and dark in paintings. Used in cinema to describe the use of high and low key lighting in film noir films (lots of dark shadows, city scapes, shadowy characters)
<b>SOUND</b>  	<b>DIEGETIC</b>	Sound that is part of the film's world e.g. birds singing, traffic passing
	<b>NON-DIEGETIC</b>	Sound that is not part of the film's world e.g. musical score or voice over narration
	<b>PARALLEL</b>	Music that matches the action on screen
	<b>CONTRAPUNTAL</b>	Sound that does not seem to 'fit' with the image on screen. It often works to add another layer of meaning or irony to what we see.
	<b>INCIDENTAL MUSIC</b>	Music used as a background to create /emphasise an atmosphere.
	<b>PLEONASTIC</b>	Emphasized sound to appeal to emotions or draw attention to significant action or prop eg. taking safety off a gun
	<b>DIALOGUE</b>	A conversation between two or more people



FILM STUDIES TERMS 5 & 6  
TECHNICAL CODES

TERM	DEFINITION
LINEAR NARRATIVE	Is a story that takes place in a sequential manner. Generally, starts with the beginning, moves to the middle and concludes everything at the end (with all loose ends tied up nicely).
NON-LINEAR NARRATIVE	Where events are portrayed out of chronological order or the logical order presented in a story. The pattern of events jumps around. Also known as disjointed narrative or disrupted narrative. Flashbacks a common theme.
OPEN NARRATIVE	Has no sense of ending and they can go on forever (eg a soap opera such as Eastenders or Hollyoaks. Have lots of characters)
CLOSED NARRATIVE	Where a story is when story is fully told and completed by the end of the film. Generally consists of clear beginning, middle and end.
MULTI STRAND NARRATIVE	Where a story is told from the points of view of several different characters.
DENOUEMENT	The final part of a play, film or narrative in which the strands of the plot are drawn together and everything is explained or resolved. Example would be at the end of every 'Death in Paradise' episode when all suspects are gathered together, the murderer is exposed and how they committed the crime is explained.
ENIGMA CODES	Not the WW2 film. This is simply the idea that a film text (does not have to be a film) portrays a mystery to draw the audience in and keeps them interested.
NARRATIVE FUNCTION	The importance of a particular type of character to the ways the story is told and understood (we can make predictions once we have identified their character type)



### TODOROV'S NARRATIVE STAGES

- **Equilibrium:** everything in the film world is normal (not necessarily good, but it is normal).
- **Disruption:** something happens (usually caused by the film's main antagonist) to disrupt normal life.
- **Recognition of disruption:** the protagonist/s realise that something is wrong in their world or discover the disruption.
- **Attempt to solve:** the main protagonist goes on a journey to solve the disruption.
- **New equilibrium:** the disruption is solved and a new normality occurs (things can never be the same as they were before the disruption, but a new 'normal life' is created).

### Propp's Character Theory

<http://foxhugh.com/literary-elements/character-theories-and-types/>

Vladimir Propp developed a character theory for studying media texts and productions, which indicates that there were 7 broad character types in the 100 tales he analysed, which could be applied to other media.

- 1) The (magical) helper (helps the hero in the quest)
- 2) The dispatcher (character who makes the lack known and sends the hero off)
- 3) The donor (prepares the hero or gives the hero some magical object)
- 4) The false hero (perceived as good character in beginning but emerges as evil)
- 5) The hero [AKA victim/seeker/paladin/winner, reacts to the donor, weds the princess]
- 6) The princess (person the hero marries, often sought for during the narrative)
- 7) The villain (struggles against the hero)



KEY TERMINOLOGY	DEFINITION
GENDER STEREOTYPING	What is expected of a man or woman in a particular society or culture
PROTAGONIST	An essential character in a story. A protagonist works towards the central story goals
ANTAGONIST	An essential character in a story. An antagonist works against the central story goals
CULTURE	The ideas, customs and social behaviour of a particular people or society
HERITAGE	Aspects of culture that are passed down and preserved for the future
CUSTOMS	A traditional and widely accepted way of behaving or doing something that is specific to a particular society
IDEOLOGY	A set of beliefs characteristic of a social group or individual.
ANIME	A style of Japanese film and television animation, typically aimed at adults as well as children.
THEME	An idea that pervades a work of art or literature
SYMBOL/MOTIF	A thing that represents or stands for something else (especially a material object representing something abstract).

## KEY TERMINOLOGY



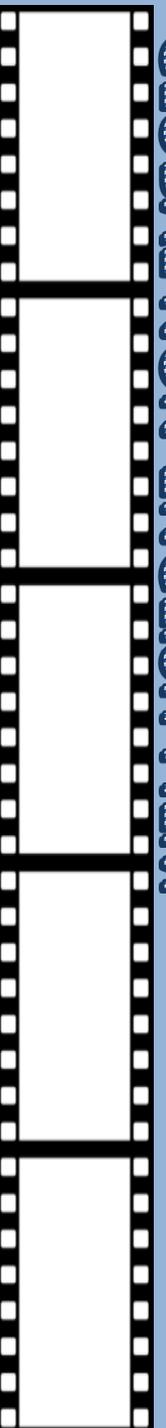
LEVI STRAUSS IDENTIFIED THAT SOCIETY IS BUILT UPON OPPOSITIONAL PERSPECTIVES. FILMS TEND TO USE THIS THEORY CALLED 'BINARY OPPOSITION'

EXAMPLES OF 'OPPOSITES' THAT CAN BE SEEN REGULARLY IN FILM TEXTS INCLUDE:

- GOOD V EVIL
- HERO V VILLAIN
- MAN V NATURE
- MAN V WOMAN
- CIVIL V SAVAGERY
- EAST V WEST
- RICH V POOR
- LOVE V HATE

YOU COULD PROBABLY NAME SOME EXAMPLES ALREADY!

## GLOBAL NON-ENGLISH FILM COMPONENT 2 SECTION B:



## WHAT IS ANIME?

Anime is Japanese for 'animation/cartoon'. Some anime is drawn by hand, but anime can also be made with CGI computer animation. There are many types of anime and Anime are shown on TV, on DVD and are used in video games.

Also, some anime cartoons are just movies, but they have cartoon characters and animation instead of real people and places. Anime is often based on Japanese comics that are called manga and graphic novels. Sometimes live action (not animation) movies and television series are based on an anime.

The history of anime begins around 1900, when Japanese filmmakers tried out ways of animation. The filmmakers in Japan did not have a lot of money to make their movies and not a lot of places where they could film their movies. Movie makers liked animation because then they could have an animator draw other places and people that could not be filmed in a normal movie, and the animators could be very creative with the cartoons they made.

During the 1970s, more and more people started to like manga. At the same time, manga were used as the starting point to make anime with the same characters and stories. Animators would take the drawings done by a manga artist and the stories the manga artist wrote, and turn them into the stories and characters of a similar anime. In the 1980s, anime became very popular in Japan, and saw an increase in production. There are a lot of different kinds of anime that many different kinds of people like and there are types of anime based on the age of the people.

In the late 1980s, lots of people in countries other than Japan started to like anime too. Today, many different kinds of anime are popular all around the [world](#). Anime helped spread in popularity thanks to the internet.

## HOW ARE THINGS PACKAGED FOR THE VIEWER?

ANALYSE THE  
RELATIONSHIP BETWEEN  
REPRESENTATION AND  
GENRE

HOW MUCH OF THE  
WORLD IS REPRESENTED  
THROUGH THE MEDIA?

HOW DO AUDIENCES  
READ REPRESENTATIONS  
DIFFERENTLY

LOOK AT HOW FILMS  
COMMUNICATE  
MESSAGES

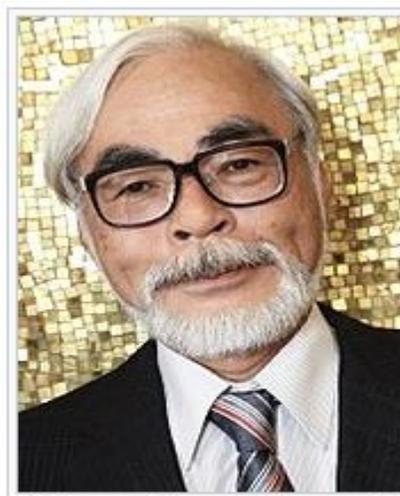
EXAMINE THE NEGATIVE  
AND POSITIVE ASPECTS  
OF STEREOTYPING



**STUDYING  
REPRESENTATION**



## SPIRITED AWAY – STUDIO GHIBLI



Writer and director Hayao Miyazaki used shōjo manga magazines for inspiration to direct *Spirited Away*.



I created a heroine who is an ordinary girl, someone with whom the audience can sympathize. It's not a story in which the characters grow up, but a story in which they draw on something already inside them, brought out by the particular circumstances. I want my young friends to live like that, and I think they, too, have such a wish.

— Hayao Miyazaki<sup>[22]</sup>

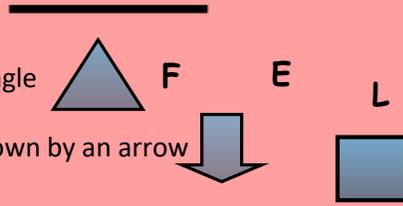
# Keywords

Lever: Is a bone and shown as a straight line

Fulcrum: Is a pivot or joint and shown as a triangle

Effort: Is a force provided by muscles and is shown by an arrow

Load: Is the weight of the body/ object being moved, it is shown as a square



# AQA GCSE PE

## Paper 1

### Chapter 2:

## Movement Analysis

### 2.1 Types of Levers

# Mechanical Advantage

<b>1<sup>st</sup> Class Lever</b>		<b>Advantage – High or Low</b> Will vary depending on the distance of the load and the effort from the fulcrum
<b>2<sup>nd</sup> Class Lever</b>		<b>Advantage - High</b> Able to lift heavier loads owing to its large effort arm
<b>3<sup>rd</sup> Class Lever</b>		<b>Advantage - Low</b> Provides speed and wide range of movement owing to a long resistance arm

# Lever systems

<b>1<sup>st</sup> Class Lever</b>		<b>The fulcrum is surrounded by the effort and the load</b>	 Heading a ball
<b>2<sup>nd</sup> Class Lever</b>		<b>The load is surrounded by the fulcrum and the effort</b>	 Calf raises
<b>3<sup>rd</sup> Class Lever</b>		<b>The load is surrounded by the fulcrum and the effort</b>	 Bicep curl

Each lever system can be identified by the component in the middle:

One  
F  
(fulcrum)

Two  
L  
(load)

Three  
E  
(effort)



Effort = Biceps  
Load = water  
Fulcrum = hand/oars  
1<sup>st</sup> class lever  
(fulcrum in the middle)



Effort = Triceps  
Load = Body weight  
Fulcrum = Feet  
2<sup>nd</sup> class lever  
(load in the middle)



Effort = muscles  
Load = bat/ball  
Fulcrum = shoulders  
3<sup>rd</sup> class lever  
(effort in the middle)

## 2.3 Planes of movement and Axes of rotation

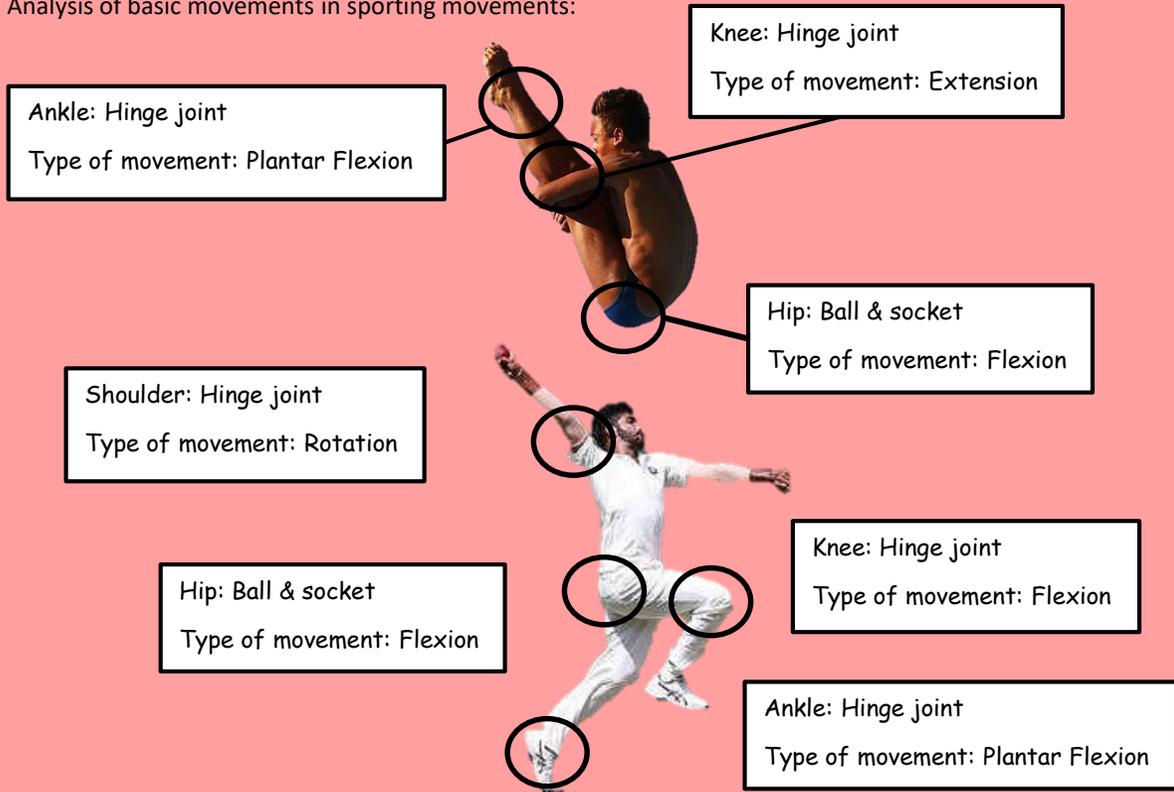
We move in planes around axes.

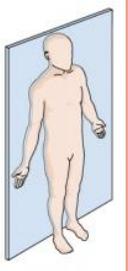
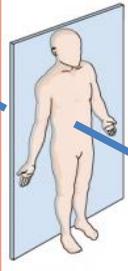
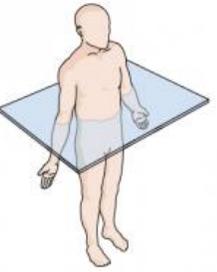
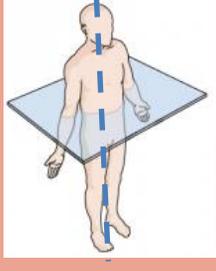
**Plane:** Is an imaginary line that movement direction occurs in

**Axis:** IS a line about which the body or boy part can turn.

## 2.2 Basic Movements

Analysis of basic movements in sporting movements:



Plane of movement	Axes of Rotation	Sporting example
 <p><b>Frontal Plane</b> Separates the front and the back of the body</p>	 <p><b>Sagittal Axis</b> Goes from the front to the back of the body</p>	 <p><b>Cartwheel</b> The only movements are abduction and adduction</p>
 <p><b>Sagittal Plane</b> Separates the left and the right side of the body</p>	 <p><b>Frontal Axis</b> Goes from one side to the other side of the body</p>	 <p><b>Somersault</b> The only movements are flexion and extension</p>
 <p><b>Transverse Plane</b> Separates the top and the bottom of the body</p>	 <p><b>Longitudinal Axis</b> Goes from the top of the body to the bottom of the body</p>	 <p><b>Full Twist</b> The only movements are rotating and twisting</p>

### Fitness Component Strength:

1. Pick one of the components of fitness that you feel is a strength.
2. Give a definition of this component.
3. Explain why it is important for **your** sport – when/why/how you use the fitness component when playing – specific skills or techniques it is important to – how it links to the success of your performance and the consequences if it is not successful
4. Give examples from at least 2 different recent matches/performances where this fitness component was important to your performance and the outcome/impact it had as a result of being a strength of yours.

*“in a recent game against ..... I was able to demonstrate ..... as in the match I was able to ..... This had an impact on myself and the team because.....”*

5. You must use specific terminology from your sport and link to your position.

### Fitness Component Weakness:

1. Pick one of the components of fitness that you feel is a strength.
2. Give a definition of this component.
3. Explain why it is important for **your** sport – when/why/how you use the fitness component when playing – specific skills or techniques it is important to – how it links to the success of your performance and the consequences if it is not successful
4. Give examples from at least 2 different recent matches/performances where this fitness component was important to your performance and the outcome/impact it had as a result of being a strength of yours.

*“in a recent game against ..... I was able to demonstrate ..... as in the match I was able to ..... This had an impact on myself and the team because.....”*

5. You must use specific terminology from your sport and link to your position.

# AQA GCSE PE Non-exam Assessment Analysis and Evaluation of Performance 25 marks

## Part 1 Analysis (15 marks)

### Skills/ Techniques:

#### Attacking skills:

- Passing
- Dribbling

#### Defending skills

- Marking a player, the ball, space

### Tactics:

- Set plays
- Awareness of opposition

### Fitness components:

- Agility
- Balance
- Cardiovascular endurance
- Coordination
- Flexibility
- Muscular Endurance
- Power
- Reaction time
- Speed
- Strength

### Skill/ Tactic Strength:

1. Pick one skill from your sport that is a strength *e.g. dribbling*
2. Explain what the skill is (describe the perfect model) and say why it is important for **your** sport.
3. Say why you think it is a strength – what is the outcome when performing the skill, for you and for your team mates and the impact on the game as a whole.
4. Give examples from at least 2 different recent matches/performances and explain these. This about what happened, how do you know it was good and what was the impact for you and your team.

*“in a recent game against ..... I was able to demonstrate ..... as in the match I was able to ..... This had an impact on myself and the team because.....”*

5. You must use specific terminology from your sport and link to your position.

### Skill/ Tactic Weakness:

1. Pick one skill from your sport that is a weakness *e.g. shooting*
2. Explain what the skill is (describe the perfect model) and say why it is important for **your** sport.
3. Say why you think it is a weakness – what is the outcome when performing this skill for you and for you team mates and the impact on the game as a whole.
4. Give examples from at least 2 different recent matches/performances and explain these. This about what happened, how do you know it was a weakness and what was the impact for you and your team.

*“in a recent game against ..... I was struggled with ..... as in the match I wasn't able to ..... This had an impact on myself and the team because.....”*

5. Explain the technique that you use. Say why it is wrong/why it doesn't work for you and say what the correct technique should be.
6. Say why improving this would help **you** in your sport.
7. You must use specific terminology from your sport and link to your position.

## Evaluation (10 marks)

Using appropriate theoretical content included in the specification, you should produce an action plan that suggests ways to improve upon the weaknesses identified in section A.

This plan of action must include:

Part 2 Evaluation

1. An appropriate training method to improve the fitness weakness
2. A full description of one training session that provides an example of what could be used
3. An explanation of how prolonged use of the training method could improve the fitness weakness
4. Another strategy other than a training method that could improve the skill weakness

Part 3 Evaluation

1. An explanation of how the additional specification content selected could lead to improvement of the skill weakness

### Plan of action:

Suggests ways to improve upon the weaknesses they have identified.

Part 2: Fitness Weakness

Part 3: Skill Weakness

## Part 2: Fitness component Weakness

### Appropriate Training Type:

1. Select a type of training that trains the fitness component weakness – advantages and disadvantages of this type of training
2. Explanation of the type of training – how it is carried out
3. Explanation and justification linked to you and your personal needs
4. Detailed and relevant safety considerations

### Training Session:

1. Description of one session
  - Thorough explanation of what will happen in the session
  - Training intensities (Aerobic / Anaerobic Training zones or One Rep Max) – linked to performance and improving the fitness component
2. Principles of training (SPORT/ FITT)
3. Injury prevention:
  - warm-up and cool down
  - match the type of training and the intensity to the performers individual needs
  - Wear appropriate clothing and footwear
  - Keep hydrated
  - Do not over train
  - Stretch
  - Always use the correct technique

### Long term benefits of this type of training:

If you complete the training for a prolonged period of time what will the improvement look like and how will you ensure you continue to improve as time progresses.

Progressive Overload – FITT Principle

### Types of Training:

1. Circuit training (All Fitness Components)
2. Continuous training (CV Endurance)
3. Fartlek Training (CV Endurance)
4. Interval/ HIIT Training (CV Endurance)
5. Plyometric Training (Power)
6. Static Stretching (Flexibility)
7. Weight Training (Muscular strength, power, muscular endurance – Sets/ Reps)

### Principles of Training:

1. Specificity – specific to the sport
  2. Progressive - gradual
  3. Overload – increasing the stress
  4. Reversibility – loss of gains
  5. Tedium – boredom
- FITT: increasing workload to achieve overload
1. Frequency – how often
  2. Intensity – how hard
  3. Time – how long
  4. Type - type of training

## Part 2: Skill/ Tactic Weakness

### Appropriate additional content from Specification:

1. Select the right theoretical content that will bring about improvement to the skill or tactic, explaining how this will happen:
  - Goal Setting
  - Information processing
  - Guidance and feedback on performance
  - Arousal
  - Aggression
  - Motivation

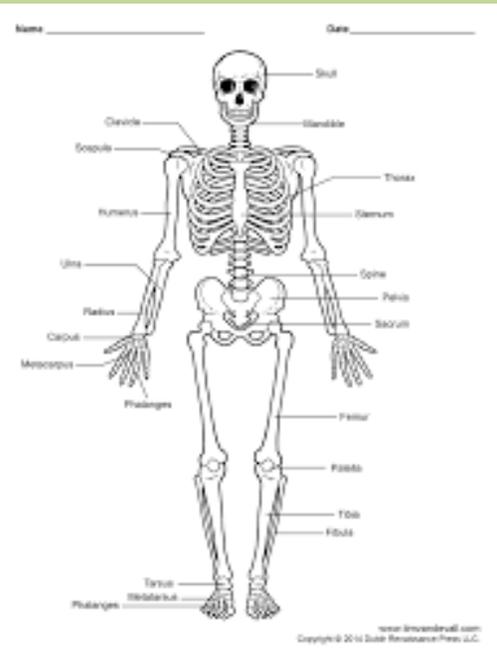
### Explanation of how this could lead to improvement:

How will your chosen area of theory content bring about the desired improvement – how will you use it to ensure your skill weakness improves?

**Skeletal System:**

- Human skeleton consists of over a hundred major bones that provide out bodies with general shape, such as height and build, and provide attachment for muscles so that we can move.

**Structure of the Skeletal System**

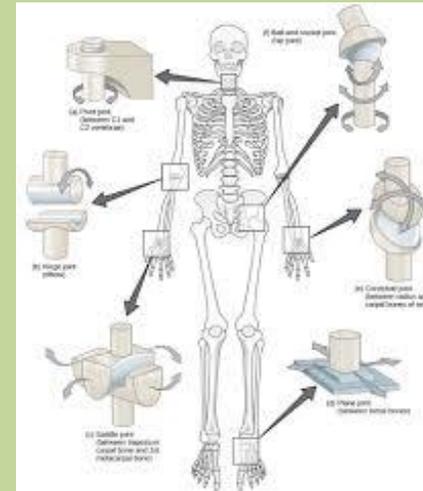


**Bones:**

- Cranium
- Ribs
- Sternum
- Vertebrae
- Clavicle
- Scapula
- Humerus
- Radius
- Ulna
- Carpals
- Metacarpals
- Pelvic girdle
- Femur
- Tibia
- Fibula
- Patella
- Tarsals
- Metatarsals

**Synovial Joints:**

A synovial joint joins together with a cavity that encloses the ends of the bones. The cavity is filled with fluid that allows the joints to move freely.

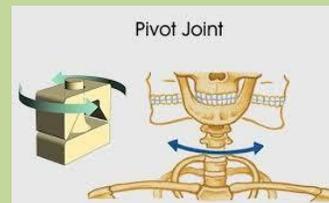
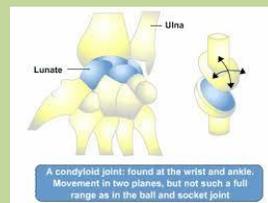
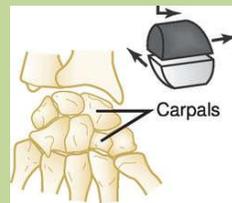


Joint	Location
Ball and socket	Hip, Shoulder
Hinge	Knee, Elbow
Gliding	Carpals
Pivot	Neck
Saddle	Thumb
Condyloid	Wrist



**Function of the Skeletal System**

- Five major functions:
  - Provides shape and support
  - Enables movement
  - Protects internal organs
  - Produces blood cells
  - Stores certain materials until they're needed by the body.



**Connective Tissue**

Ligaments – connect bone to bone

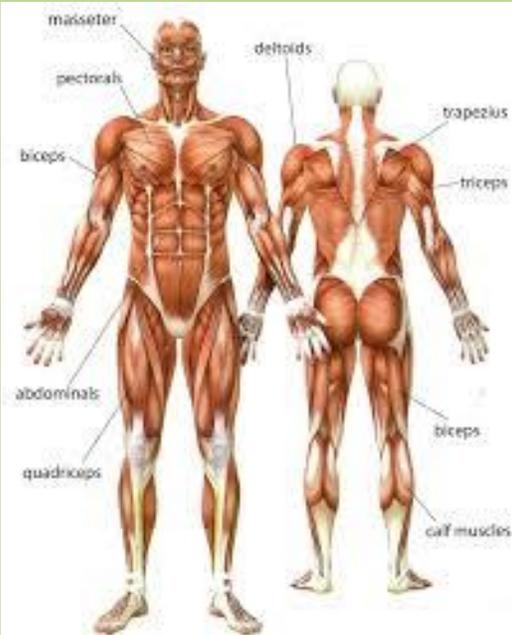
Tendons – connect muscle to bone

Cartilage – provides protection and cushioning

**Muscular System:**

- Bones move because groups of skeletal muscles pull them.

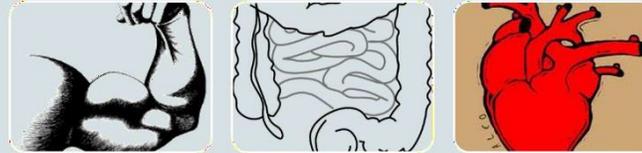
**Structure of the Muscular System**



**Muscles:**

- Deltoids
- Trapezius
- Latissimus dorsi
- Pectorals
- Gluteals
- Hamstrings
- Quadriceps
- Gastrocnemius
- Soleus

**Types of Muscles**



**Voluntary muscles** enable movement throughout the body.

**Involuntary muscles** are essential in maintaining healthy body systems.

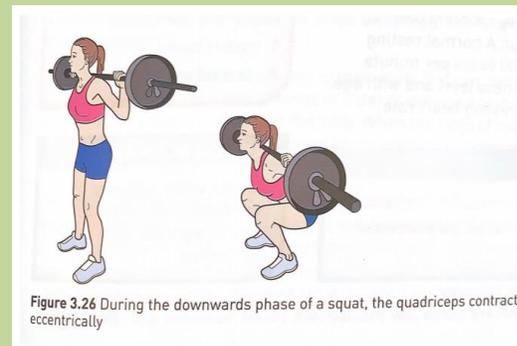
**Cardiac muscle** is vital in sport because it makes the heart pump. Fitness training will strengthen cardiac muscle making the heart more efficient at pumping blood around the body.

**Types of movement:**

- Flexion – movement where the angle between two bones decreases.
- Extension - movement where the angle between two bones increases
- Abduction – movement of a part of the body away from the midline of the body
- Adduction – movement of a part of the body towards the midline of the body
- Rotation – turning or twisting movement
- Circumduction – conical movement of a limb extending from the shoulder of the hip

**Muscle Contractions:**

Isotonic contractions	Isometric contractions
Muscle stays the same length	When the muscle contracts and changes length



**Antagonistic pairs** - Muscles are arranged in antagonistic pairs.

As one muscle contracts (shortens) its partner relaxes (lengthens) *i.e. Biceps and Triceps*.

**Flexion at the elbow:**



**Extension at the elbow:**

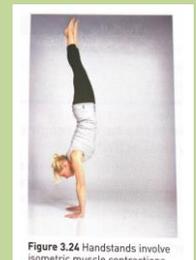
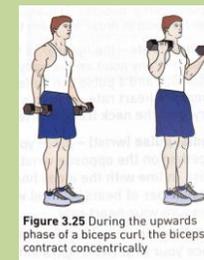


**Agonist:** the muscle that contracts to produce the movement.

**Antagonist:** the muscle that relaxes to allow the movement to occur.

**Examples in the body:**

- Biceps & Triceps
- Quadriceps & Hamstring
- Hip Flexor & Gluteus Maximus
- Tibialis Anterior & Gastrocnemius



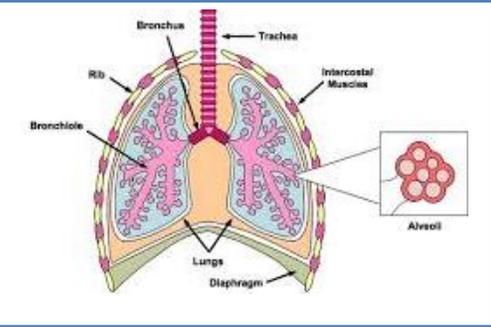
**Respiratory System**

**Functions of the Cardio-respiratory System**

- Taking air into the lungs and then taking oxygen from the lungs into the blood.
- Moving oxygenated blood from the lungs into the body, while at the same time moving deoxygenated blood from the body back to the lungs via the heart.
- Distributing nutrients to the cells around the body.
- Removing waste products, such as carbon dioxide, from muscles to other groups.
- Regulating body temperature by absorbing and redistributing heat through blood flow to the skin.
- Transporting hormones, enzymes and other chemicals around the body.
- Preventing dehydration by keeping fluid volume constant.

**Internal respiration:**

Basic function of the lungs and alveoli is to exchange gases – movement of oxygen from the lungs into the blood and carbon dioxide from the blood into the lungs.



**Breathing mechanism:**

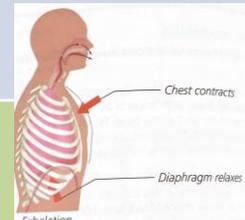
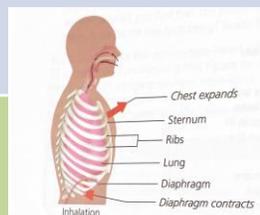
- 2 stage process
  - Inhalation – intake of air into the lungs – increasing the volume of the chest cavity
  - Exhalation – expulsion of air from the lungs – reducing the volume of the chest cavity

**Inhalation**

- Contraction of the dome-shaped diaphragm causes it to flatten – enlarging the chest cavity
- Contraction of the intercostal muscles causes the ribs to rise
- Chest cavity expands = volume increases
- Reducing the pressure in the chest cavity and air is sucked into the lungs

**Exhalation**

- Breathing muscles relax
- Diaphragm returns to its dome shaped
- Weight of the ribs causes them to descend
- Chest volume decreases
- Reduction in the size of the chest cavity forces air out of the lungs

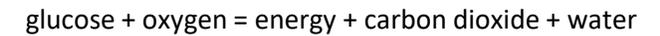


**Aerobic and Anaerobic respiration:**

When exercising you need to supply energy for muscle contraction

**Aerobic**

- Usually supplied by breaking down glucose using oxygen
- Used at low to moderate levels of exertion
- Walking and jogging are good examples of activities where the energy for muscle contractions is provided aerobically



**Anaerobic**

- Used for activities lasting less than a minute
- Lactic acid is produced as a waste product
- Sprinting and shot putt are examples of activities where the energy is provided anaerobically.
- No oxygen is used – glucose is converted into lactic acid while producing the energy needed for the activity
- Build up of lactic acid in muscles causes fatigue and eventually pain



**Pathway of Air**

Mouth or Nose

↓  
Trachea

↓  
Bronchi

↓  
Bronchioles

↓  
Alveoli

### Cardiovascular System

#### Structure of the heart

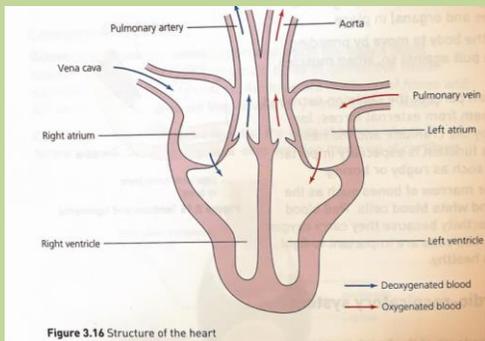
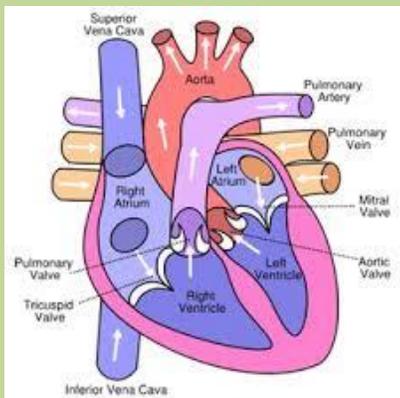
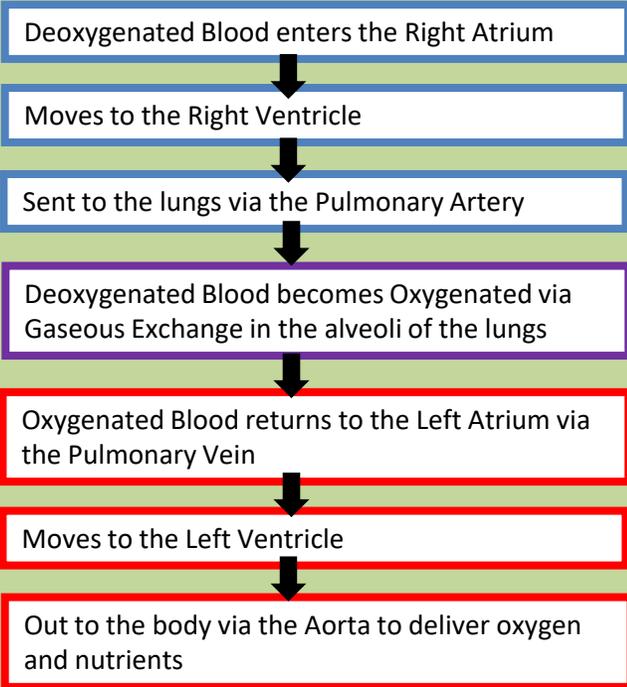


Figure 3.16 Structure of the heart



#### Pathway of blood

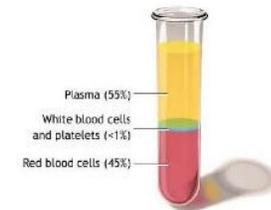


#### Blood:

- Specialised body fluid
- Made up of plasma, red blood cells, white blood cells and platelets
- Function of the blood is:
  - Transporting oxygen and nutrients to the tissues
  - Protecting the body by forming blood clots to prevent excess blood loss and carrying cells that fight infection
- Transporting waste products, such as carbon dioxide to the lungs
- Transporting blood to the kidneys and liver which filter and clean the blood
- Regulating body temperature

#### Platelets & Plasma

Platelets **clot blood** and form a scab around the site of injury.



Plasma is the **liquid/fluid** part of blood that allows it to flow.

#### Red blood cells

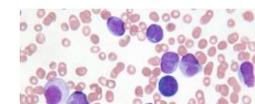
Carry oxygen from the lungs to the working muscles + Removes CO<sub>2</sub>.



**Haemoglobin** binds the oxygen

#### White blood cells

Are part of the immune system and **fight disease** and infection.



#### Arteries

1. Away from the heart
2. Oxygenated blood (except pulmonary artery)
3. Thick/elastic walls
4. High pressure
5. Small lumen



#### Veins

1. Back to the heart
2. Deoxygenated blood (except pulmonary vein)
3. Thin walls + larger lumen
4. Lower pressure
5. Valves



#### Capillaries

1. In the tissue
2. Site of gaseous exchange
3. Very thin walls



#### Vascular shunting:

Increased demand for oxygen – Blood flow to the working muscle groups – Vasoconstriction/ Vasodilation – Redistribution of blood flow during exercise

Vasoconstriction – **NARROWING**



Vasodilation - **EXPANDING**



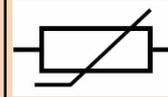
## Design and Technology

Electronic systems can have singular or multiple input and output devices, and sometimes they have a controller between them. The system reads the input signals and controls the output signals according to the instructions in the program it has been given: INPUT DEVICE - CONTROL - OUTPUT DEVICE For example, when you use a computer you move a mouse or press buttons on a keyboard. These are input devices that give information to the computer. The computer controller reads the inputs, and its program tells it what to do. The output devices could be the screen, a printer, a laser cutter, or a very complicated robot in a huge factory. To design an electronic system, you need to know about the input devices and output devices you could use.

Sensors A sensor is affected by the conditions around it. Sensors are good input devices because they can give an input signal to an electronic system.

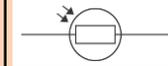
A **thermistor** is a temperature-dependent resistor. Its resistance changes with temperature.

- When it is hot, the resistance is low.
- When it is cold, the resistance is higher. Some electronic thermometers use a thermistor. As the temperature changes, the system measures the resistance of the thermistor and turns it into a number to display on a screen.



**Light-dependent resistor**  
When light falls on the sensing area of a light-dependent resistor (LDR) its resistance changes:

- In the light resistance is low, so electricity flows.
- In the dark resistance is high, so not much electricity flows.



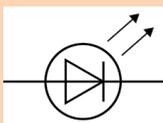
## Key terms

**Input device:** something that can give an input signal to the system.  
**Output device:** something that responds to an instruction of change in control elements.  
**Input signal:** information given to the system by an input device.  
**Output signal:** an instruction the system gives to an output device.  
**Program:** a set of instructions the system controller has been given to make the electronic system do what it is supposed to do.  
 If a transistor is used, there is no program, just a simple switching action due to the rise in voltage on the base of the transistor above 0.6 volts.  
**Resistance:** an electrical quantity that is a measure of how the device or wire reduces the electric current flow through it.

Outputs In an electronic system, output devices are controlled by the system. They can be simple things like lights that are turned on and off or complex things like computer screens that output a lot of information.

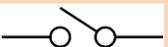
Buzzer A buzzer makes a sound. Buzzers can be useful in a sensing device to give people a warning that something needs their attention.

Light-emitting diodes A light-emitting diode (LED) gives out light when electricity is passed through it. LEDs can be small coloured indicator lights or bright enough to light up a room in a house.



Control devices and components.  
As well as sensors, there are some other components that can be used to give an input signal to an electronic circuit.

A single-throw switch has a button that switches between on and off. It is a simple control device that the user can operate to turn a circuit on or off.

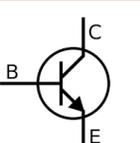


A resistor is a component that can be added to a circuit to change its resistance. This means it can Limit the flow of electricity through part of the circuit. Resistors can be used to:

- protect delicate components by stopping too much electricity flowing through them
- help control the flow of electricity around a circuit.



A transistor acts like a tiny electronic switch. It has three connections. A small voltage at the base connection turns it on and lets a larger current flow into the collector and out of the emitter. Transistors are useful in sensing circuits to amplify (make bigger) the small current you get from some sensors. A transistor is a semi-conductor that acts Like an electronic switch depending upon the voltage across the base and emitter. You can get a single transistor to build into your own circuits. Transistors can be made extremely small by etching them onto silicon wafers known as silicon chips.



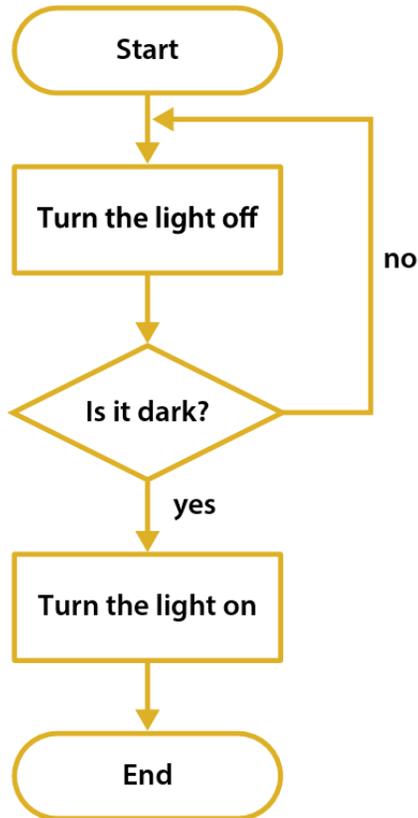
Programmable components are used in a variety of applications, for example alarm systems. In school they allow you to add intelligence to your projects. There are many types of PIC (Programmable Interface Controllers) micro-controllers available, for example the GENIE range. These are programmed and tested by software that makes use of flowcharts.

- A flowchart is a good way to plan a computer program.
- A flowchart uses instructions and yes/no questions to create a program.
- Analogue inputs give a range of values to the controller.
- Time delays and counts are useful in a program.
- Feedback loops allow a program to monitor a sensor.

comes on in the dark.  
gets light.

A rectangular box is an instruction, so it tells the program to do something.

A diamond-shaped box is a question, so the program can decide something.



### Inputs and decisions: switching outputs on or off.

An electronic system uses the questions in its program to make decisions. These decisions tell its output devices what to do. When the control program detects an input, it moves to the next part of the program, and follows the instructions to make an output happen. It is important for a designer to know exactly what they want a product to do, and then break it down into a set of simple steps that can be put into a flowchart.

### How to process and respond to analogue inputs

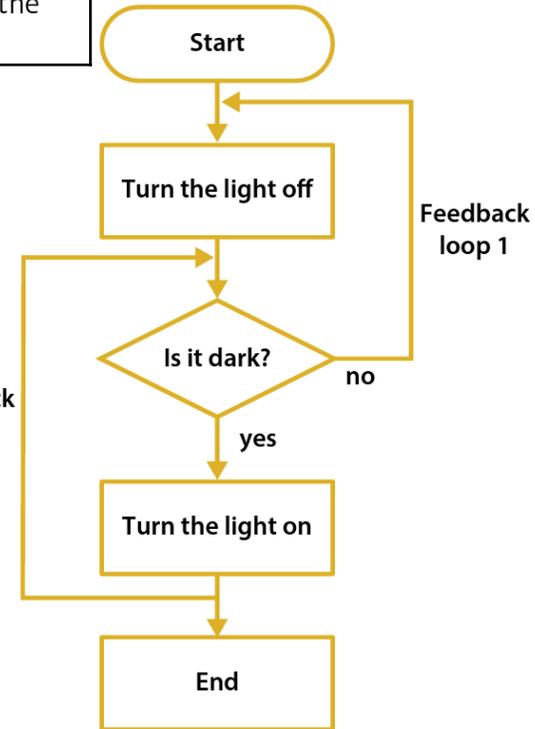
Some sensors give out an analogue signal. This means they can give a range of values. LDRs and thermistors are analogue devices. Their resistance goes up and down as Levels or temperatures change. This means a system can be programmed to respond to different Levels. The outside light has a variable resistor that lets you change the light level at which the Light turns on.

### How to use simple routines to control outputs

There are some simple routines that can be added to a program to change what happens:

- **Time delay.** A program instruction that says 'wait 10' means the program will wait 10 seconds then go on to the next instruction. You could use this to make a light flash on and off as quickly or slowly as you want.
- **Count.** A program can be told to count how many times it gets an input, and perhaps give an output every ten pushes of a button.
- **Feedback loop.** This sends the program back to an earlier point to do the same thing repeatedly. This is how a system monitors a sensor - it goes around in a loop asking the same question until the answer changes. The flowchart below shows a second feedback loop added to the circuit. Now the light comes on in the dark and goes off when it gets light.

Feedback loop 2



**Figure 1.7.1** A flowchart for a simple outside light that comes on in the dark. The light is off to start with, comes on when it gets dark and just stays on forever

NEA - Investigating
Identify a design problem
Identifying user requirements
Investigating existing products
Research
Design brief
Specification



NEA – Design
Initial design ideas
Review of initial design ideas
Developing your design idea

You will undertake a project as part of your **non-examination assessment**, which is 50% of your GCSE grade.

The project will test your skills in investigating, designing, making and evaluating a prototype of a product that will allow you to apply the skills you have acquired and developed throughout your study.

The exam board provide three themes, each with two contextual challenges. You are required to choose one of these challenges and analyse it on an individual basis.

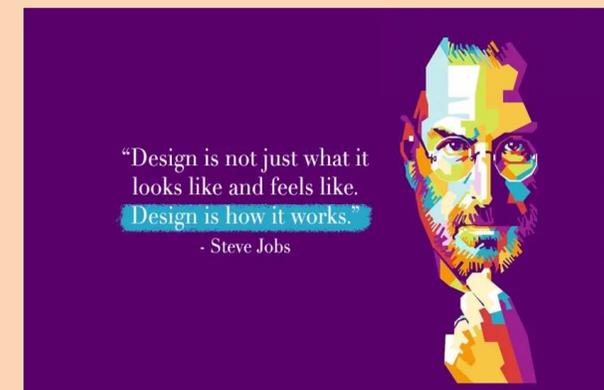
Having selected a contextual challenge to work within, you should develop a range of potential ideas and then realise one through practical making activities.

The project must allow you to apply knowledge and understanding in a product development process to investigate, design, make and evaluate your prototype.

This project will require you to follow an iterative design process rather than a linear process requiring you to continually test, evaluate and refine ideas.

The content and assessment criteria are set out in a linear format to show what is required at each stage of the total project, but following an iterative process you will do work on different stages at a variety of points throughout your project.

NEA - Making
Manufacturing
Material selection
Manufacturing processes
Planning your manufacture
Manufacture log
Safe manufacture
Quality assurance



NEA - Evaluate
Analysis against specification
User requirements
Testing to ensure fitness for purpose
Sustainability – life cycle analysis

# PATTERN INFORMATION

The back of a pattern envelop will give you lots of information to help you work out the size of the garment you need to make as well as how much fabric to buy and any other components you will need.

**18 PIECES/PIEZAS**  
Métrages et Instructions de couture en Français à l'intérieur de l'enveloppe.

UNISEX FIVE SIZES IN ONE						
Sizes	XS	S	M	L	XL	
Bust/Chest	30-32	34-36	38-40	42-44	46-48	In
Hip	31-32½	35-37	39-41	43-45	47-49	*
<b>A- Sized for stretch knits only</b>						
60***	1%	1%	1%	1%	1%	Yd
<b>B- Sized for stretch knits only</b>						
60***	1	1	1	1	1	Yd
<b>Contrast- ¼ yd. of 60***</b>						
<b>C - worn 1" below waist</b>						
45***	2½	2½	2½	2½	2½	Yd
60***	1¾	1¾	2½	2½	2½	*
<b>D</b>						
45***	3¾	3¾	3¾	4	4	Yd
60***	2¾	3	3¾	3¾	3¾	*
<b>Interfacing- 1½ yd. of 20" to 25" lightweight fusible, such as Pellon®</b>						
<b>GARMENT MEASUREMENTS</b>						
A,B Bust/Chest	34	38	42	46	50	In
C Hip	34¾	38¾	42¾	46¾	50¾	*
D Bust/Chest	39	43	47	51	55	*
C Side Length	40	40½	41	41½	42	*
<b>Finished back length from base of neck:</b>						
D	39	39½	40	40½	41	In
C Leg Width	17½	18½	19½	20½	21½	*
<b>SUGGESTED FABRICS</b>						
A,B Sized for stretch knits only: Cotton Interlock and Jerseys. See Pick-A-Knit Rule®. C,D in Flannel, Laundered Cottons, Chambray, Cotton and Cotton Blends. D also in Silks and Silk Types, Fleece, Velour. Allow extra fabric for matching plaids or stripes.						
<b>REQUIREMENTS</b>						
A,B: One pkg/ of hem tape. C: 2¼ yd. of ½" wide twill tape, 1½ yd. of 1¼" wide elastic.						

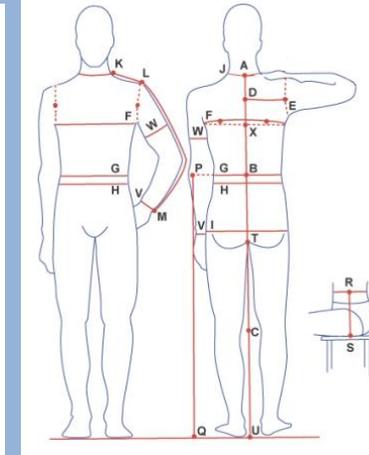
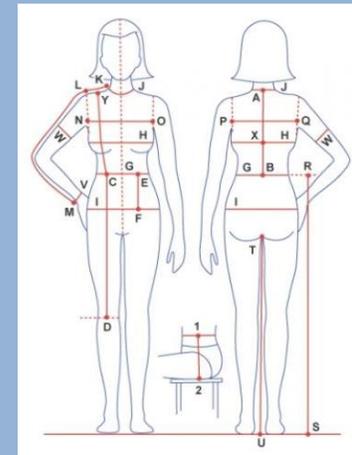
**6233**  
SIZE / TAILLE / TALLA  
U.S. XS-XL  
FR. TP-TG  
EURO. XP-XG  
**A**

This shows the **SIZE** and how it corresponds with the **AMOUNT** of fabric required for the product you are going to make. It is in **YARDS**.

**UNISEXE: PATRON CINQ TAILLES**  
**UNISEXO: PATRÓN CINCO TALLAS**

Tailles / Tallas	TP/XP	P	M	G	TG/XG	
Poitrine / Pecho	76-81	87-92	97-102	107-112	117-122	cm
Hanches / Caderas	79-83	89-94	99-104	109-114	119-124	"
<b>A- En Jerseys extensibles seulement / A- En Mallas estirables solamente</b>						
150cm**	1.20	1.30	1.30	1.30	1.40	m
<b>B- En Jerseys extensibles seulement / B- En Mallas estirables solamente</b>						
150cm**	0.90	0.90	0.90	0.90	0.90	m
<b>Parties Contrastantes- 0.80m de 150cm** / Partes Contrastantes- 0.80m de 150cm**</b>						
<b>C- se porte à 2.5cm sous la taille / C- se lleva 2.5cm debajo de la cintura</b>						
115cm**	2.30	2.30	2.30	2.40	2.60	m
150cm**	1.60	1.70	2.00	2.00	2.10	*
<b>Entoilage- 1.40m de 51cm à 64cm, léger, thermocoillant tel que Pellon®</b>						
<b>Entretela- 1.40m de 51cm à 64cm, ligera, adhesiva como Pellon®</b>						
<b>TISSUS SUGGÉRÉS</b>						
A,B En Jerseys extensibles seulement: Coton Interlock et Jerseys fins. Voyez la Règle Pour choisir un Jersey®. C,D en Flanelle, Cotons prélavés, Chambray, Coton et Cottonnades. D en Soie et Tissus Soyeux, Mollipon, Velours de Coton aussi. Prévoyez davantage de tissu pour raccorder les écossais ou les rayures.						
<b>MERCERIE</b>						
A,B: Un paquet de d'extra fort pour ourlet. C: 2.00m de talonnette de coton de 1.3cm de large, 1.30m d'élastique de 3.2cm de large.						
<b>TELAS SUGERIDAS</b>						
A,B En Mallas estirables solamente: Algodón Interlock y Mallas finas. Vea la Regla Para escoger Mallas®. C,D en Flanela, Algodones lavados, Chambray, Algodón y Mezclas de Algodones. D en Seda y Telas sedosas, Muletón, Terciopelo de Algodón también. Se necesita tela extra para casar cuadros o rayas.						
<b>MERCERIA</b>						
A,B: Un paquete de cinta para dobladillo. C: 2.00m de galón asargado de 1.3cm de ancho, 1.30m de elástico de 3.2cm de ancho.						

This shows the **SIZE** and how it corresponds with the **AMOUNT** of fabric required for the product you are going to make. It is in **CMs**.



You need your body measurements to work out what size pattern pieces you need.

There are many body measurements you can take - **CHEST, WAIST** and **HIP** measurements are most commonly used.

You cannot take them yourself. Ask a friend to do it for you.

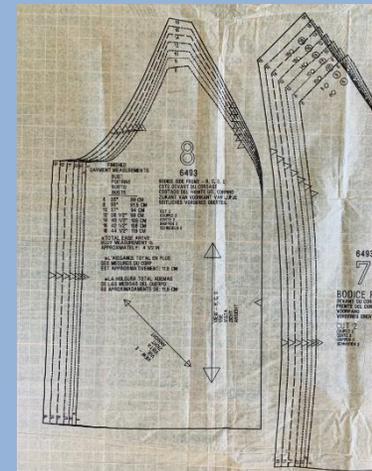
Use your **BODY MEASUREMENTS** and the information to the **PATTERN ENVELOPE** to work out what size. The sizing on a pattern envelope **ARE NOT** the same as on 'Ready to Wear' (**RTW**) garments you would buy in a shop.

**COMMERCIAL PATTERN TEMPLATES** are used and cut for accurate assembly and construction. Pattern pieces are labelled with their name and size as well as pattern markings.

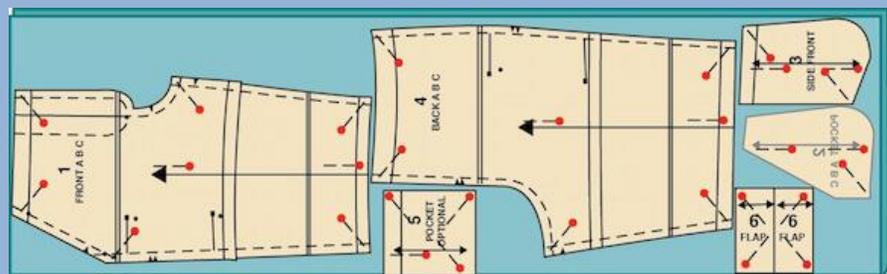
Most paper pattern templates **INCLUDE SEAM ALLOWANCE** – usually 1.5cm.

The Layplan/Layout will also take into account any **DIRECTIONAL PATTERN** on the fabric so that all the pieces are cut the same way. It will also allow for the **PILE** or **NAP** of the fabric such as corduroy or velvet. You will need to **ALLOW EXTRA FABRIC** for directional patterns/checks.

**NAP**: the 'pile' or raised surface of certain kinds of materials with the raised 'napped' fibres going in the **SAME DIRECTION**. Examples are velvet, corduroy, terry cloth or velour.



# LAYPLAN/LAYOUT

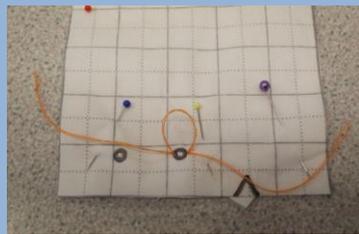


**A LAYPLAN/LAYOUT** shows how to position pattern templates onto fabric in the **MOST ECONOMICAL WAY**. This **PREVENTS WASTAGE** of fabric and ensures the garment is as cheap as possible to make.

## PATTERN MARKING SYMBOLS

**PATTERN MARKING SYMBOLS** are used to help you achieve accurate results when cutting fabric, matching the pieces and sewing them together.

Symbol	Name	What it is used for
	Grainline	To position template along the straight grain of the fabric
	Place to fold	Place this edge of the template along the fold of the fabric
	Balance mark	Helps positioning of pockets, darts, gathers etc.
	Notch	These help match the correct templates together
	Button position	Shows where to position and sew on the button
	Button hole	Shows the positioning of the button holes
	Zip	Shows where the zip will be positioned
	Cutting line	These are lines that you will need to cut along
	Centre line	This shows the centre back, front etc.
	Pleat	This shows both the depth and direction of the pleats



**TAILOR TACKS** are loose, looped, hand sewn stitches that are used for marking specific points from the pattern pieces onto the fabric.



Pattern markings need to be transferred onto the fabric. This can be done in a number of other ways: **TAILOR'S CHALK**, **CARBON PAPER** and **TRACING WHEEL** and **AQUA PEN**.

## INTERFACING

Interfacing is used to give **STRENGTH**, **STABILITY** and **SUPPORT** to areas of a garment that need a bit of extra structure or firmness.

It is used to stiffen: **COLLARS**, **CUFFS**, **BUTTONHOLES**, **POCKETS** and **WAISTBANDS**.



You can get lots of different types of interfacing – **IRON-ON** or **SEW-IN**; **WOVEN** or **NON-WOVEN** or **KNIT**; **BLACK** or **WHITE**; **LIGHTWEIGHT** to **HEAVYWEIGHT**; in packs or by the metre.

Your choice of interfacing will depend on what fabric you're using. Ensure is that the interfacing is a similar weight to the fabric.

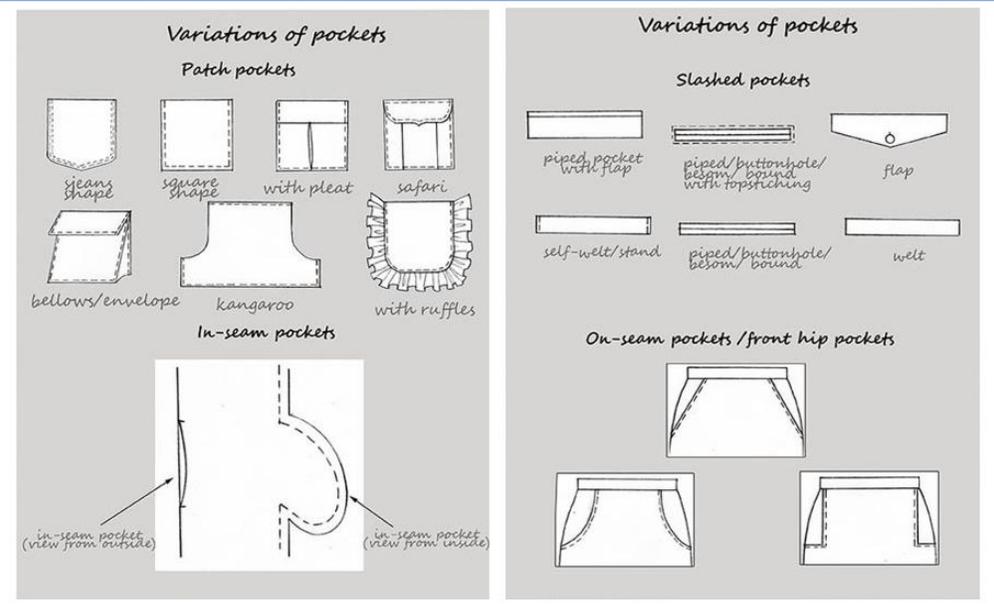


Iron-on interfacing is easy to use. It has a 'sticky' side - with little blobs or lines of glue on it. The 'sticky' side is ironed onto the **WRONG** side of the fabric.

On the **SELVEDGE** of the interfacing are printed instructions telling you what temperature you need to set the iron and how long you need to press it for.



## POCKETS



You can see below the ways different pockets are used on a variety of garments.



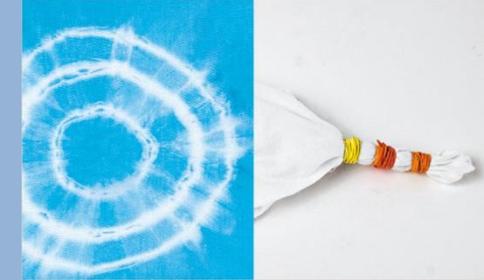
## ADDING COLOUR AND PATTERN TO FABRICS

Colour and pattern are major **AESTHETIC** considerations when consumers select textile products for particular uses. Textile dyeing involves permanent application of colour to fibres and fabrics.

The strength with which the dye is held in the fibres and fabrics is called **COLOUR FASTNESS**. Fabrics may need to have 'fastness' so that the colour 'stays put' when being washed, when in sunlight and when it is being rubbed.



**RESIST DYEING:** allows patterns to be made with dyes using a coating such as wax, or a barrier such as elastic bands to prevent dye reaching certain parts of the fabric.



**BATIK** Resist dyeing is a good way to add **COLOUR** and a **UNIQUE PATTERN** to fabric but the pattern could not be mass produced.

**TIE-DYE**



**ICE DYEING**



**PRINTING FABRICS:** printing is a method of applying a coloured pattern to fabric and has some advantages to dyeing:

**MORE COLOURS** can be used.  
**MORE COMPLICATED DESIGNS** can be produced.



**SCREEN PRINTING**



**DIGITAL PRINTING**



**BLOCK PRINTING**

# AQA Design and Technology Textiles 8552 – NEA Controlled Assessment

This project work is the coursework for your GCSE. It covers 50% of your GCSE marks and gives you the opportunity to show your ability to design and make a high quality product in answer to a specific design brief. The controlled assessment is split into three parts, AO1 (research) is 20% of the grade, AO2 (designing, modelling and making) is 60% and AO3 (evaluating) is worth 20%.

Your project will involve **a lot** of work. 30-35 hours in total in class time, plus you will need to put in time after school and at home on your folder work. It is therefore important that you choose to make a product you are interested in. It is expected that you plan and organize your time wisely during lesson time and for homework.

The assessment criteria for the NEA are split into six sections as follows.

	Section	Criteria	Maximum marks
AO1 (Phase 1) Identify, investigate & outline design possibilities	A	Identifying & investigating design possibilities	10
	B	Producing a design brief & specification	10
A02 (Phase 2) Design & make prototypes that are fit for purpose	C	Generating design ideas	20
	D	Developing design ideas	20
	E	Realising design ideas	20
A03 (Phase 3) Analyse & evaluate	F	Analysing & evaluating	20
Total			100

Each section of your coursework folder is worth a different amount of marks.

As you can see, the sections in AO2 covering the Development of your design and the practical (Making) are worth almost  $\frac{2}{3}$  of the overall folder grade.

REMEMBER: you should only have 20 pages in your folder so **WHAT you include** in your folder is important.

You can use the coursework guide to help you present your work. The following symbols

## HOW TO USE THE GUIDANCE TEMPLATES:

What do the symbols mean on each slide?

Red text must be read then deleted.



Each page will have guidance for you to follow. They will include **details of what to include** in your work. They will always be written in red and **MUST** be deleted.



This icon indicates that you must **add an image, graph or photograph** to help illustrate your work. You **MUST** add appropriate labels to whatever you use.



This icon is used to highlight sections of the project that require **feedback** from your client.



This icon is used to indicate which pages require a **summary / conclusion** needs to be added.

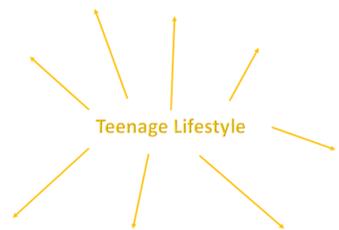


This icon is used to indicate which sections you have sought **inspiration** from other designers on.

# AO1: Investigating the Design Context

## Contextual challenges:

1. Multifunctional living
2. Teenage lifestyle
3. Nature and the environment



**WHAT'S THE PROBLEM?** Now describe several potential design possibilities that may exist within that area (For each possibility describe what they would do and how they may benefit the user). What problems exist for the client / user. Focus on the problems not the solution.

1. Create a mind-map of your first thoughts.
2. **Describe your potential user.**
3. Make a list of ideas for potential products.
4. **Make a list of things you need to think about before you start the project.**
5. How can the work of others influence you? Who will you choose?
6. **Create a Research Plan. Make a list of research tasks you need to complete.**
7. Make a list of questions you need to ask your user.

These are the things I need to think about in my project:

- How much space will it take up?
  - How hard will it be?
- Is there a power outlet nearby?
  - What's the scoring system?
  - How will you make it fun?
    - How durable is it?
    - Component cost?
- What are the available materials?
  - How safe will it be?
  - What is the set up time?
- What are the key game aesthetics?
  - What is the cost to use the game?
- What are the tools required to make the game?
  - How much power is required to run?
    - What is the weight?
  - What are the colour schemes?

You will be choosing **ONE** of these contextual challenges as the basis of your coursework so consider:

- What sorts of textiles do **YOU** like designing/making most? (Fashion? Furnishings? Toys?)
- What products are **YOU** good at making?
- Cost – **YOU** will be designing and making the product for quite a while. What will you parents want you to make and what can they afford? **YOU** will need to provide materials and components.
- Which target groups do **YOU** find most interesting to design for? (Teenagers, Men, Women, Children, Elderly?)

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

## FEASABILITY STUDY

### Problem Outline

Begin by describing the context that you intend to investigate in order to bring improvement to it. Then describe several potential design possibilities that may exist within that area (For each possibility describe what they would do and how they may benefit the user).

State the area or project you have chosen. Give a detailed description of what your client or user would do in this situation if they have **not got** the product you are about to design. What problems exist for the client / user. Focus on the problems not the solution.

### Client Profile

Explain who your product is going to be designed for. State their age range and gender as well as their interests. Give as much detail as possible e.g. why do they need you to design a solution?

AND  
OR

### User Profile

Explain who, specifically your product is going to be used by. State their age range and gender as well as their interests. Give as much detail as possible e.g. disposable income available.

1. Read through the list of the 3 Contextual Challenges.
2. **Think** about them and what you believe each one means. Consider:

**Key words**...What is each **CONTEXTUAL CHALLENGE** asking you to do?

**Initial Thoughts**...What is interesting you about them?

**Images**...What colours, shapes, patterns, and images could be linked to the challenges?

3. Once you have had a really good think, create a mind-map of your thoughts about each one. You can keep adding to the mind-maps as more thoughts occur.



PICTURE OF PROBLEM



PICTURE TO ILLUSTRATE TYPICAL USER

# AO!: Identifying the needs of the user

You should have a collection of **primary** and **secondary** research.

**Primary research is information you have gathered yourself**, e.g. interviews/questionnaires, evaluating existing products, visits, exhibitions, emails/letters.

**Secondary research is information that has already been collected by someone else**, e.g. trend predictions, books, Internet, magazines.

- One of the most important pieces of research a designer does at the beginning of a project is to investigate the client.
- This is a very **influential piece of research** as the client is the person they are making the product for so they **need to know exactly what the client wants** the product to be like.
- They **continue to have contact** with the client **throughout the project**.
- You will work in the same way as a designer, so the first piece of work you will do is a case study/client profile.
- A case study/client profile is a piece of **primary research**.

Customer/Client Profile:

This is an interview or an overview of your intended user. If you are making a costume it should be focused at the theatre your costume is for.



Decide:  
 What do you need to find out?  
 What questions do you think you need to ask to get the information to help you progress further?  
 What type of questions can you ask?



- A **CASE STUDY/CLIENT PROFILE** looks in detail at the person/people you are making the product for.
- It is a way of gathering information that will help the designer make sure they **MEET THE CLIENT'S NEEDS**.
- One product might have a **VARIETY OF CLIENTS**, e.g. a designer designing a product for a theatre production might have to consider the actor, the director as well as the audience!

To make it easier to remember all the areas you might need information on, use **ACCESS FM** to help you...

- Aesthetics**
- Cost**
- Customer**
- Ergonomics**
- Size**
- Safety**
- Function**
- Materials**
- Manufacture**

Consider how you will take the survey. How are these two examples presented?

### Survey

This is a questionnaire for a bag designed for holding personal items.

Question:		Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
What colour would you want the main part of the bag to be?	Black Blue Green Red white						
How would you like to dispose of the bag when you no longer want it?	The bin Charity shop/ textile bank Pass down to family or friend						
Where would you use/ wear the bag?	Shopping Parties Gatherings Visiting attractions						
How much would you pay for a bag?	£15 £20 £30 £40 £50 £60+						

### Pyjama Questionnaire:

Please could you answer the following questions:

1. What age are you?  
 15-16yrs  17-18yrs  19-20yrs  21-22yrs
2. Where do you wear pyjamas most?  
 In bed – just to sleep in  On the sofa – for lounging around in  For sleep overs
3. What time of year would you wear pyjamas the most?  
 All year round  Autumn/Winter  Spring/Summer
4. Which era are you most influenced by?  
 1920s    1940s  

### CLIENT / USER INTERVIEW

#### Introduction -

Explain why you are going to carry out an interview with your chosen client (Primary research).

Use the headings below to help you structure your questions.

#### Function -

- What do you want it to be able to do?
- Where?
- How often?
- How many should it hold?
- Storage issues?
- Is weight important?
- Desirable features?

#### Aesthetics -

- Preferred styles / things it should match?
- Generic / bright / warm colours?

#### Cost -

- Price range you might expect?

#### Size -

- Things it needs to fit?

#### Other -

- What else is important that you need to ask about?

### Client / User -

Name the person /persons you interviewed and state why you chose them.

### Answers -

Write down the answers that your client / user gave to your questions. The more detail they give the better.

### Summary

Summarise what you have learnt in this space.

# AO1: Investigating Existing Products

Product Analysis involves 'disassembling' an existing product to identify its key features.

## Analyse

- The function.
- The aesthetics.
- Key design features.
- Construction methods.
- Fibres.
- Environmental issues.

## Assess

- The ergonomics of the product.
- The size.
- Component parts.
- Method of manufacture.
- Cost.

Look at the examples of existing product analysis sheets. How do they compare?

IMAGE	SHOP/DESIGNER	PRICE (£)	PRODUCT DESCRIPTION	MATERIALS	SIZES	SUSTAINABILITY	ASPECTS I LIKE	ASPECTS I DISLIKE
	Louis Vuitton	£975.00	Silver coloured hardware - Natural cowhide leather handles - Zipped closure - Removable shoulder strap - Interior flat pockets - Burgundy textile lining	Leather	12.6 x 13.78 x 4.33 inches (length x height x width)	Natural material, more durable good for nature.	It's a strong material and will last a long time. It's not a throw away fashion.	The price is very high, some people may not afford it.
	Louis Vuitton	£1,060.00	- Rounded leather handles for a more comfortable grip - Adjustable and removable shoulder strap - Removable name tag - Padlock for extra security - Internal D-ring for attaching keys - Cabin size	Leather	21.7 x 12.2 x 9.4 inches (length x height x width)	Natural material, more durable good for nature.	It's a strong material and will last a long time. It's not a throw away fashion.	The price is very high, some people may not afford it.

## Existing product analysis



## Young girls age 6-7 summer dress -

My existing product is a child's dress age 6-7 it is medium length, light weight and flowing, it fits nicely at the top and flows out at the waist, the dress is gathered from the bottom of the waist. It is a sleeveless dress which insures the child is cooler in the hot weather. It has a large collar which is hemmed with a white bow at the front of the neck, this is for decorative purposes and give more shape to the neck of the dress.

The bottom of the skirt is hemmed and dress has an inside lining this is to provide more comfort for the child as if there was no lining the fabric where the seams have been sewn would rub against their skin causing irritation, especially when the child is running around. The dress is fastened with buttons at the back of the garment this is in order to prevent choking hazards as the child cannot pull the buttons off as they are unable to reach the back whilst they are wearing the dress, However the dress is easy to take on and off.

The care label shows the temperature at which it can be washed at, where it is made, where it was purchased, if it is flammable, the age, whether you need to wash it inside out or not, what material it is made from and if it can be ironed. This garment is made from 100% cotton, this means the child will not get too hot as it does not contain fibres like polyester. It shows the product is best to be washed at 30 degrees, this is sustainable as it is a climate wash meaning it uses less energy.

### What is it made of?

100% cotton

## Existing Product Analysis

To get a better understanding of what is available on the market today, I am going to investigate and look at different soft furnishings and consider their target audience, function, cost, ergonomics and anthropometrics and suitability for use.

I went to visit Dunelm to look at soft furnishings, as it is a popular 'high street' chain, and found that cushions were really popular and they had many different ones in stock. Cushions are a popular choice for soft furnishings as they can be practical and decorative. They can be used around the home in a variety of ways; in living rooms, bedrooms, conservatories and can make the user more comfortable as well as complementing the interior decor of the users home.

This cushion is rectangular, it is made from soft luxurious velvet and has a decorative beaded peacock feather design on the front. The most popular shape on display was square so this stood out from the others available making it more unique.



The cushion cover is fastened with a zip. Zips are a good practical way of fastening products and are easy to use. Although this zip matches the fabric colour, there is a facing which hides it and as well as hiding the zip this also stops it from being a finger trap hazard - important around young children. Having a fastening means that the cushion cover is removable for washing or changing the cushion pad.



This cushion cost £22. It is quite expensive so would not appeal to all customers users on a budget. It could be given as a gift for birthdays or young professionals/new homeowners.



The front of this cushion had a decorative beading/stitch design inspired by peacock feathers. This explains the high cost as this feature would take time to apply is very intricate. The colours harmonise well together and match the gold fringing around the edge of the cushion. The beaded design would mean that this cushion would probably be more decorative and the beads could be a choking hazard and could be swallowed by young children.



There is gold fringing around the edge of the cushion which adds extra decoration and complements the peacock feather design on the front. This type of feature adds elegance.

I think that this cushion is very decorative and I like unique shape and design. I like the complimenting colour scheme and beaded feather design. I think it would appeal to young professionals/new home owners or to be given as a gift because of the price. The intricate beading detail is also reflected in the cost. The materials are sophisticated, luxurious yet hardwearing and the lining adds to durability meaning that it will last a long time and not become a fast-fashion/throwaway item. Because it cannot be machine washed it makes it impractical to care for and this can be off putting. I really liked the fringing and think that having detail around the edge completes the product.



The cushion measures 30cm x 50cm. It is made from a mix of synthetic and natural materials - viscose and cotton and has a polyester lining. I can see that it is not able to be machine washed. The care label also informs the user that they must keep the cushion away from fire meaning that this product is potentially flammable.

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

## EXISTING PRODUCT ANALYSIS

Introduction - Explain here you are going to do and state why you will need to know about it during your project.



FULL PICTURE OF PRODUCT

### Function

Describe what it does, then describe the features that make it work well.

### Aesthetics

Describe the features that make it look good. Why is it / that part that shape? Why is it / that part that colour? Will it blend in or stand out.

### Materials

Name the specific materials used and describe the properties that make them suitable. (Strong, tough, hard, durable, malleable, etc.)

### Ergonomics & Anthropometrics

Describe the features that make it easy or difficult to use by people. Focus on the position and size of parts. Describe how it has or hasn't been made safe. (Sharp corners, finger traps, small parts that could get swallowed, etc.)

### Cost

State how much it costs. In your opinion is this expensive or cheap? Do you think it gives the user value for money? Why?



FULL PICTURE OF PRODUCT

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Describe what it does, then describe the features that make it work well.

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Describe the features that make it look good. Why is it / that part that shape? Why is it / that part that colour? Will it blend in or stand out.

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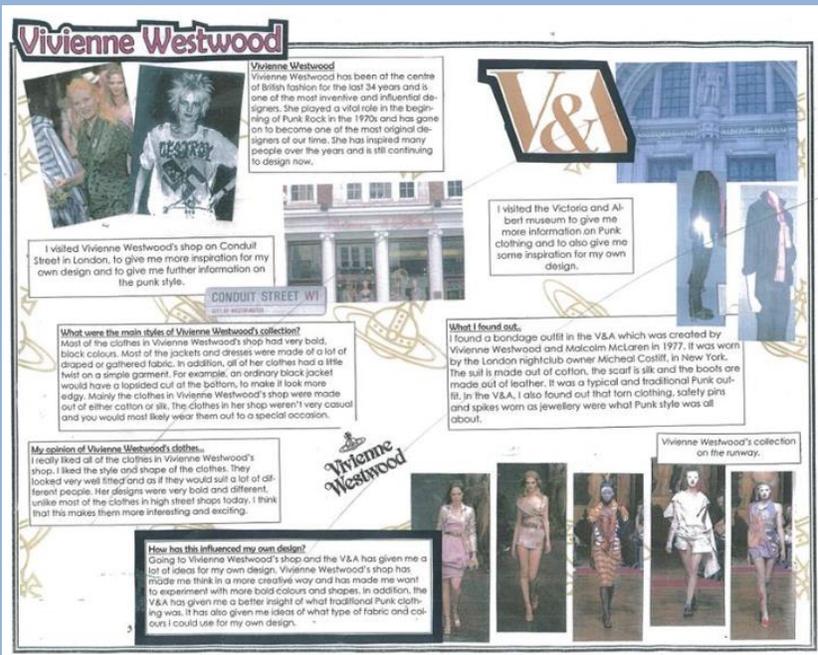
### Cost

State how much it costs. In your opinion is this expensive or cheap? Do you think it gives the user value for money? Why?

Summary Summarise what you have learnt in this space.



# AO1: Further Research



Look at the work of others and investigate how they were influenced. It is worthwhile researching other designers and organisations and how they have developed. You can link this back to your client – who appeals to them.

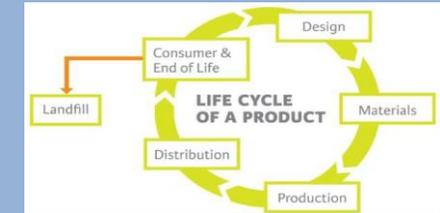


Think about the 6 R's of sustainability – explain how they can be incorporated into your product:

- Recycle
- Reuse
- Rethink
- Refuse
- Reduce



**Discuss Social, Moral and Ethical Implications of your product.** Consumer values and choices are influenced by societal, cultural, moral and environmental issues. Societal, cultural, and moral factors that impact on textile design.



## Ways to be more sustainable:

Use less material: *can you make things smaller, thinner lighter or with less parts?*

Use renewable material/energy: *materials that can be regrown or recycled easily like wool or steel. Solar or wind power, no batteries.*

Be more eco-friendly: *Reuse old materials, recycle waste, and refuse polluting materials.*

Be very aware of what is acceptable and what is not acceptable in society.

Issues with making products: Most people would prefer the products they want to be low cost and good quality.



Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

## FURTHER RESEARCH

Introduction - Explain here what further research you need to do and state why you will need to know about it during your project.

Environment



PICTURE ILLUSTRATING FACTOR

Description – Get a picture(s) of what your design has to fit. Add the sizes - cms, Explain why this will have an impact on your design.

Properties

Description – Describe the main properties that will be needed and why. The main ones are, for example:

- Strength
- Toughness
- Durability

Anthropometrics



PICTURE ILLUSTRATING FACTOR

Description – Insert a table of the important human sizes your project needs and highlight the specific sizes in the table. Use this information to decide on a size, (or range of sizes) for specific parts of your project, state the size and say why?

Social Impact

Description – Explain the benefits that owning this product will bring to peoples lives. Eg. -

- Helps the user achieve a task quicker/easier/safer.
- Enjoy a task more improving quality of life.
- Helps them stay healthy.

Economic Impact

Description – Explain how this product may save the user money in the long run. Eg.

- Items may not get damaged / lost and need replacing.
- A bird box would stop birds nesting in gutters which would then need a tradesman to be hired to come and clean it out.

Summary



Summarise what you have learnt in this space.

# AO1: Design Brief and Specification

Write your brief as a short paragraph. It should include what you intend to make, the context you are working in and the benefits it will bring to the clients. Start it with the phrase below.

I am going to design and make a...

## Design Brief Examples:

### Design Brief

Many young people choose to express their individuality through the clothes they wear, the accessories they use and the products they decorate their rooms with. Alternative, offbeat, unusual, out of the ordinary, the 'in thing', the chic, a new trend and street style are all words that inspire our nations up and coming textile designers.

I will **DESIGN** and **MAKE** a textile product suitable for the **18-23 YEAR AGE RANGE** taking your inspiration from **'THE AGE OF PUNK'** and **VIVIENNE WESTWOOD**.

If the product is successful it will form part of a **LIMITED RANGE** to be sold at **MUSIC FESTIVALS** throughout the country.

I am going to design and make a pair of shorts for teenagers to wear when they go to the beach.

When teens go to the beach they like to be cool, so I will use lightweight fabrics. Beach wear is usually bright as you are outside so the shorts will be bright and colourful and will have a pocket so that the wearer can keep small things such as money safe. They will have a drawstring waist to hold them up.

I have 9 weeks to design and make my shorts. The final product must fit well and be wearable.

## Specification Examples:

Name/type of product	Skateboarding Specified Hoodie
Function: what does the product need to do?	The product needs to improve comfort when skateboarding. It also needs to symbolise skateboarding, it needs to be obvious that it is a skateboarding hoodie.
Situation/occasion when product will be used	The product will be used when the client wearing is skateboarding in colder and unpleasant weather. Also the product might be worn to protect their upper body if they are attempting something risky and they are concerned that their upper body might get injured.
Aesthetics (theme)	The aesthetics of the hoodie will be shown in the logo on the front of the hoodie. I am hoping to fabric paint 'The Evolution of The Skateboarder' logo on the front of my hoodie.
Sizes	The hoodie will be Medium/Large. I thought this would be a suitable size, because I am going to make the hoodie baggy, so if someone who is Extra Large is wearing the hoodie then it should fit them too, and if someone is small then the hoodie will be baggy on them, but still seem stylish.
Fabrics and components	I am going to attempt to make my product 100% cotton. This would be the best material, because it is eco-friendly and also it can be durable and warm. I am going to have different components on my hoodie, for example: a hood, a pocket on the front and strings to tighten the hood.
Target market and customer profile	My target market is teenagers around 16 years old who are passionate skateboarders. My customer profile is of a boy who is 16 and skateboards.
Minimum/maximum cost	The minimum cost will be £20 and the maximum cost will be £40. I have chosen these prices as the boundaries, because my customer said that he will buy clothing costing £20-£40.
Decorative techniques	For my decorative technique I am going to fabric paint a logo on the front of the hoodie, as mentioned previously in the 'Aesthetics' section.
Social, moral and ethical issues related to product	To avoid social issues I will have to make sure that the people who acquired the materials were paid fairly. I will not be making my product out of an animal, this means that there will be no moral issues. I will not use material that has been made with chemicals that will damage the planet this will avoid ethical issues.
Life expectancy	My product should last around two years. If the client starts to skateboard a lot more and falls off more frequently, then the product might not last as long as a year.
Other information	The hoodie will be black. I want it to be black, because I have found out in my research that most skateboard hoodies are dark colours. I also want to make my hoodie black, because I want the white logo that I am putting on the front of it to stand out.

The statements in your SPECIFICATION need to be justified so you will need evidence that they are required and meet the needs and wants of the user/client.

## Design Criteria/Specification

### Function:

The function of my garment primarily is to be a costume for a modern show of 'The Snow Queen' to be featured in the first half of the show. The dress must be floor-length and have a small train. It must also include a fitted corseted bodice with boning to give shape, fit and easy access in and out. The skirt should include layers of dark and sinister colours to show the fate of the character later on in the show. The garment could include beading to give the illusion of ice and snow glinting in the light. The garment must be durable so it can go through several shows and can be adapted for a different show.

### Aesthetics:

My final garment must have the colours and feel of ice/snow and unknown danger. It must have the heir of elegance as the character is a royal and high status. The bodice must be ridged and have harsh lines but must flow into a silky and watery skirt. The skirt should be layered with dark colours to show the fate that will befall the character. The dress should contain illusion on the bodice and sleeves and neck that is a translucent off white or bright white colour. The bodice could contain intricate bead work to give the feel of ice and snow glinting in the light.

### Size:

The garment must be bespoke to the actress wearing the garment.

### Target market:

My target market is the Apollo Victoria Theatre, London. They require high quality garments to fit their standards.

### Minimum and maximum cost:

After looking at a range of garments that represented the quality of the garment and found that they ranged from £100-£500. To deduce the cost of my garment I intend to try and find local resources for the fabric and make it not too complicated to reduce labour costs.

### Decorative techniques:

If I have time I intend to include decorative elements on the bodice. By doing this it will glitter in the stage lights and imitate the look of ice and snow.

### Social, Moral and Ethical issues relating to products:

My garment needs to be long lasting, made from locally sourced materials to reduce the carbon footprint. By being well made it will also be able to be used for many productions reducing the need for costumers to remake the garment and lessening the need for the use of more fabric and resources.

### Life expectancy:

My garment will be used for my adaptation of the 'Snow Queen' primarily but after its been used for that show it will be reused and adapted to fit other shows. The garment will have a life span of about 5 years with added adaptations that have been from other productions.

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

## DESIGN BRIEF

Write your brief as a short paragraph. It should include what you intend to make, the context you are working in and the benefits it will bring to the clients. Start it with the phrase below.

I am going to design and make a...

## SPECIFICATION

- Use bullet points under the headings below to state the criteria that your final design must meet.
- Justify each of your statements.
- 2 or 3 points should have numbers in so they are measurable.
- Make reference to your 3 research sections (Client/User Interview, Product Analysis and Environment Considerations) at appropriate points to reach the higher grades.

### Use

- Give several bullet points with as much detail as possible about each of the things it should be able to do, drawing on the information in your research. Start each with - The product should be able to .... because ...  
Eg. Where should it go? What should it store and how many? Should it be portable? Where will it be stored, What desirable features should it have? Etc.

### Aesthetics (appearance)

- How important is the style and colour of the project and why? Will it need to match or compliment any of its surroundings?
- Should it be made available in a range of colours or a generic colour?
- Can colour and style make it more appealing to your target population?

### Ergonomics

- What features need considering which will make your solution as easy to use and safe as possible. Eg. Easily accessed / filled / fitted / carried / cleaned / stable / stored / etc.
- Including no sharp edges or parts that may trap fingers etc.

### Anthropometrics

- Are there any parts of the project that need to be an appropriate size to fit people or parts of people, eg. size of hands for handles etc. State the size (or size range needed) and where appropriate use sketches to explain.

### Properties

- What properties do you need from the materials you make it from and why? The main properties are strength, durability, toughness, aesthetics and cost.
- Eg. The materials will need to be tough as the ..... is likely to be roughly handled.

### Cost

- What would be a reasonable price range for the solution bearing in mind the client / user interview question.

## Types of establishment

Commercial – Residential (A place that you can stay at overnight)	Commercial – Non – Residential (A place you cannot stay overnight)	Non-commercial (non-profit) (Providing a service rather than trying to make money)
Hotels Guest houses Bed and breakfasts Farmhouses Motels Holiday parks Some public houses	Restaurants Fast food outlets Public houses Bars Delicatessens Take away outlets School meals Burger vans	Hospitals Prisons Meals on wheels Residential care homes Armed services

**Head Chef: The boss.** The head chef is responsible for menu planning, food production, costing and purchasing, staff work rotas and training, hygiene of the kitchen and staff, stock control

**Sous Chef** - The Sous chef (sous=under in french) is directly in charge of food production, the minute by minute supervision of the kitchen staff, and food production

**Pantry chef** - aka garde manger - A pantry chef is responsible for the preparation of cold dishes, such as salads and pâtés

**Pastry chef** - aka le pâtissier - The King or Queen of the pastry section; baked goods, pastries and desserts are this chefs forte.

**Sauté chef** - aka saucier or sauce chef - They're responsible for sautéing foods, but their most vital role lies within the creation of the sauces and gravies that will accompany other dishes.

**Soup Chef** - aka le potager - Responsible for making soups and preparation of accompaniments for the dishes

**Vegetable Chef** - aka le légumier - The vegetable chef prepares all vegetables for dishes, in smaller restaurants the vegetable chef would also make soups.

**Fish chef** - aka le poissonnier - An expert in the preparation of fish dishes, and often responsible for fish butchering as well as creating the appropriate sauces.

## Styles of service

TABLE SERVICE	COUNTER SERVICE	PERSONAL SERVICE
<p><b>Plate:</b> Pre-plated meals from the kitchen. Can be a basic plated meal or a decorated nouveau cuisine style</p> <p><b>Family:</b> Dishes are put on the table where spoons are provided and the customers serve themselves. Suited to ethnic restaurants such as Indian, Chinese and Spanish tapas</p> <p><b>Silver:</b> Food is served by the staff using spoon and fork</p> <p><b>Gueridon:</b> Food is served from a side table or a trolley using a spoon and fork. Sometimes dishes are assembled or cooked in front of the customer</p>	<p><b>Cafeteria:</b> A single long display counter but can sometimes be multiple counters</p> <p><b>Buffet:</b> Set up in a room usually along one long table. It can be self service or staff can serve customers. Carvery service is where joints of meat are carved in front of customers and plated</p> <p><b>Fast Food:</b> Takeaway with eat-in areas where customers collect food from one small counter</p>	<p><b>Tray or Trolley:</b> An assembled meal provided or a choice of food and drink from a trolley</p> <p><b>Vending:</b> Sold from a machine</p> <p><b>Home Delivery:</b> Delivered to house individually or on a round</p>

Suppliers to the hospitality and catering industry:

- Specialist markets – e.g. butchers, fish markets. Some deliver
- Local suppliers – local deliveries are better for the environment but might not have a wide selection of stock
- Equipment suppliers – provide equipment and appliances to the catering industry
- Large wholesalers – large quantities of stock, can buy premade and proportioned food but can be expensive
- Independent suppliers

**Hotel job roles**  
Hotel manager  
Barmen/maids  
Supervisor  
Waiter/waitress  
Housekeeper  
Chambermaid  
Receptionist  
Porter  
Concierge

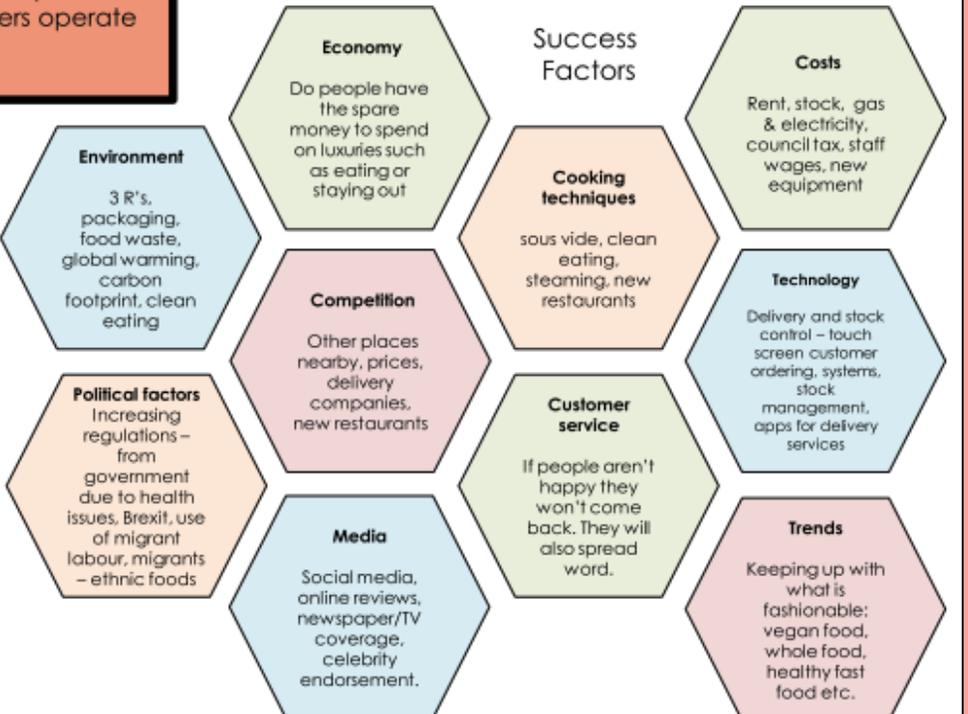
### Minimum Wage

21-24 £7.70 p/h  
18-20 £6.15 p/h  
16-17 £4.35 p/h  
Under 19 £3.90 p/h

LO1 The environment in which hospitality and catering providers operate



Permanent (Over 36hrs a week)	Part time (4-36 hrs)
Have permanent jobs and work all year. Contract explaining the terms of their employment. They may work set shifts or have shifts that change daily/weekly/monthly. Entitled to sick pay and holiday pay. Entitled to maternity pay	Have permanent jobs and work all year. Contract. They will work mostly at the busiest times of the day/week including weekends. Entitled to sick pay and holiday pay (in proportion) Entitled to maternity pay
Temporary	Casual
Employed for a specific length of time such as the summer tourist season or the month of December. Temporary staff have the same rights as permanent staff for the duration of their contract. Temporary staff employed for longer than 2 years become permanent by law	Work for specific functions and can be employed through an agency. They do not have a contract or set hours of work. They are needed at busier times of the year e.g. At Christmas or for weddings, New years eve



## Key questions to check your learning for Learning Objective 1:

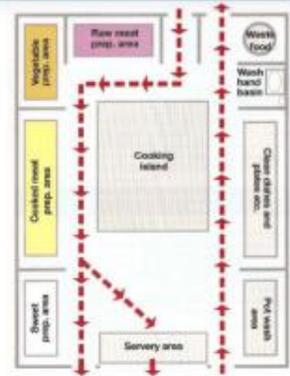
- Racap what makes a business successful e.g. social media, prices of food, customer service and the atmosphere of the restaurant
- What are the different salaries for jobs in the H&C industry?
- What are the different types of service available?
- What is the difference between commercial and non commercial?

Kitchen

Front of House

Documentation					
Temperature charts: fridge, freezer, display, point of sale. Taken at least twice per day.	Time sheets: logging staff working hours	Accident report forms: used to report any accidents and near misses	Food safety information: blast chill records, food related incidents and cleaning rotas	Equipment fault reports: What was the issue and how was it dealt with.	Stock usage reports: order books, stock control sheets, invoice, delivery notes
Bookings/reservations: Electronic booking system, electronic reservations system, diary with bookings and reservations Feedback forms	Personnel records: Hours worked, personal details, Wages, Taxation, National insurance, Training, Accidents, Staff rotas and timetables	Financial records: Incomings and outgoings for Income tax, VAT, Wages, Insurance, Profit & loss, Staff costs, Heating, lighting	Health and safety: Fire certificate, Staff training records, Accident book, Food hygiene checks, Cleaning checks, First aid records	Purchasing: Food and drink orders Packaging orders, equipment Tables, chairs etc, Consumables and disposables, Cutlery and crockery, Staff uniforms	Stock control: Monitor stock levels for re ordering, Decide frequency of stock check, First in First out for items with a shelf life

Documents should be:  
Legible (readable)  
At correct interval (daily, hourly), completed accurately.  
Signed and dated.  
**Remember**  
Some information is confidential or sensitive i.e. staff personal information. There is a legal requirement under the data protection act to store this type of information securely



**Kitchen Workflow**  
Workflow in the kitchen should follow a logical process by using different areas so that the clean stages in food production never come into contact with the "dirty" stages

1. Delivery
2. Storage
3. Food preparation
4. Cooking
5. Holding
6. Food service area
7. Wash up
8. Waste disposal

Customer needs

Local Residents	Business Customers	Leisure Customers
<ul style="list-style-type: none"> <li>• Value for money</li> <li>• Good standard of customer service so they return</li> <li>• Catering for local needs (culture, religion)</li> <li>• Consistent dishes served</li> <li>• Loyalty schemes</li> <li>• Recognised by staff- feel welcome</li> <li>• Menu specials</li> <li>• Theme nights</li> <li>• OAP discount day</li> <li>• Child friendly</li> <li>• Entertainment</li> <li>• Mailing list or email for special offers</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated corporate (business) contact at establishment</li> <li>• Discounted rates</li> <li>• Meeting rooms</li> <li>• Water, juice on tables</li> <li>• Presentation equipment, projector, tv,</li> <li>• Office facilities- printer, phone, fax, internet, stationery</li> <li>• Tea and coffee for breaks</li> <li>• Lunch or other meals- buffet or restaurant</li> <li>• Accommodation if attendees are from a long distance</li> <li>• Quick service for lunch meetings</li> </ul>	<ul style="list-style-type: none"> <li>• Value for money</li> <li>• Good facilities</li> <li>• Families want child menus, play area, child friendly</li> <li>• Tourists want local food, easy to communicate</li> <li>• Older people may want more formal service</li> <li>• Good customer service</li> <li>• Varied choice of menu</li> <li>• Dietary needs eg allergies, intolerances, vegetarian catered for without having to ask for special foods</li> <li>• Facilities for physically impaired customers</li> </ul>

LO2 Understand how hospitality and catering provisions operate



Sous Vide



Blender



Oven



Hot plate



Bain Marie



Fryers



Blast Chiller



Grill



Percolator



POS Till Point

Customer Rights

1. The right to be protected (against hazardous goods)
2. The right to be informed (about quality, quantity, allergies etc)
3. The right to have their complaints be heard
4. The right to seek redressal (compensation.)
5. the right to receive satisfactory goods that match their product description

DRESS CODE:  
White shirt  
Formal trousers  
Formal shoes  
Apron  
Tie



DRESS CODE:  
Chef's jacket  
Chef's pants  
Hat  
Neckerchief  
Apron  
Hand towel  
Slip-resistant shoes

**Key questions to check your learning for Learning Objective 2:**

1. What documentations are used in an establishment by law?
2. What is the workflow of a kitchen?
3. What are the different types of customers you may come across in an establishment and what do they require?
4. What are customer rights?
5. What is a correct dress code to have when working in a kitchen?

### HASAWA – Health and safety at work act

- Employers must:
- To protect the health, safety and welfare of staff
  - Carry out risk assessments
  - To provide and maintain safe equipment and safe systems of work
  - Safe use, handling, storage and transport of articles and substances
  - Provide a safe workplace with a safe entrance and exit
  - Provide information, instruction, training and supervision on how to work safely
  - Provide a written safety policy
  - Make sure there are toilets, places to wash and drinking water for workers
  - Make sure that there is first aid provision
  - Provide PPE for jobs if needed
  - Have insurance to cover injury or illness at work
  - Ventilation lighting and emergency exits
  - Provide a health and safety law poster entitled "Health and Safety law: What you should know" displayed in a prominent position and containing details of the enforcing authority.

### COSHH – control of substances hazardous to health regulations

#### SUBSTANCES COVERED BY COSHH:

- Chemicals including cleaning chemicals
- Micro-organisms
- Dusts
- Medicines, pesticides, gases
- HSE list (Health and safety executive)

#### Employees must:

- Use control measures and facilities provided by the employer
- Ensure equipment is returned and stored properly
- Report defects in control measures
- Wear and store personal protective equipment (PPE)
- Removing PPE that could cause contamination before eating or drinking
- Proper use of washing, showering facilities when required
- Maintaining a high level of personal hygiene
- Complying with any information, instruction or training that is provided

### RIDDOR – Reporting injuries, disease and dangerous occurrences regulations

RIDDOR is the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013. The law requires employers and other people in control of work premises (known as the 'responsible person') to report to the Health and Safety Executive (HSE) and keep records of the following:

- Death
- Injuries resulting in over 7 days off work (7 day injuries)
- fractures (except fingers, thumbs and toes);
- amputation of limbs or digits
- loss or a reduction of sight;
- crush injuries
- serious burns (over 10%)
- unconsciousness caused by a head injury or asphyxia;
- any other injury needing admittance to hospital for more than 24 hours.
- Hypothermia

### Manual handling operations regulations

- Require you to avoid any manual handling operations at work which involve a risk to health – so far as reasonably practicable.
- If it is not reasonably practicable to avoid any manual handling operations, you must carry out a manual handling risk assessment to identify how the risk is caused, so each factor can be addressed and measures taken to control the risk.
- Provision of information, instruction and training to staff are legal requirements

#### What is manual handling:

Any transporting or supporting of a load by hand or bodily force  
Lifting, putting down, pushing, pulling, carrying or moving

### PPER – Personal protective equipment at work regulations

PPE is equipment that will protect the user against health or safety risks at work. Includes clothing and other items worn by staff to protect themselves from work hazards

It can include items such as Gloves, goggles, hard hats, hearing protectors, warm clothing (in cold conditions), safety shoes or boots, respirators etc  
Hearing protection and respiratory protective are not covered by these Regulations there are specific regulations that apply to them. these items need to be compatible with any other PPE provided.

#### PPE could include:

- non-slip shoes where there is a slipping risk;
- 100% cotton garments (for example, chefs' whites) where there is a risk that the material may aggravate burns in the event of a fire
- where caustic cleaning substances are used, long-sleeved vinyl gloves, goggles, a visor and possibly respiratory equipment.

*Key questions to check your learning for Learning Objective 3:*

*Can you recap all of the different health and safety requirements for each of these*

- HASAWA
- COSHH
- RIDDOR
- Manual handling operations
- PPER
- What is a risk assessment?
- What are security hazards?

### LO3 Meeting health and safety requirements

#### Security hazards

Workers can be at risk from security hazards in the same way they are from safety hazards. Security risks include

- Disagreements between customers
- Customers being intoxicated (alcohol)
- Customers who have used drugs
- Verbal abuse
- Physical assaults

#### Prevention

- Brightly lit areas
- CCTV
- Easy escape routes
- Area for handling larger sums of money
- Appoint more senior staff to deal with problems and complaints
- Train staff to diffuse angry customers
- Contact local police if necessary
- Make sure lone workers are aware of risks
- Keeping doors and windows secure and locked

#### RISK ASSESSMENTS:

When you carry out a risk assessment you need to think about how likely it is to happen and what the consequence might be if it did. E.g. A spillage is very likely to happen in a restaurant kitchen.

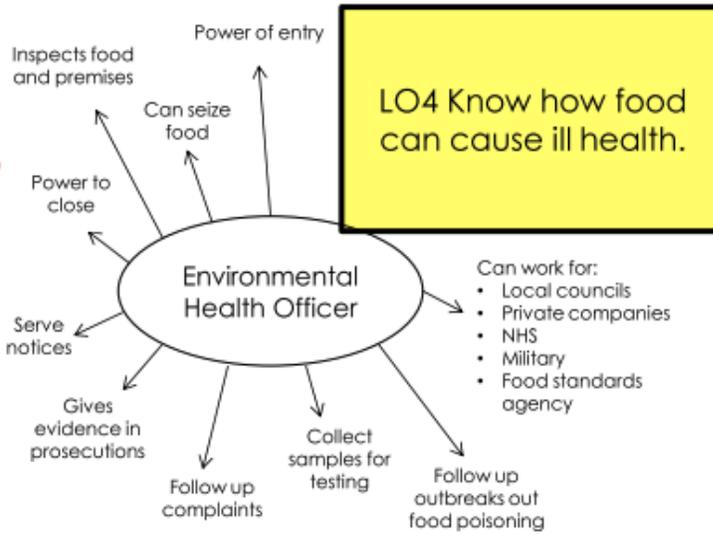
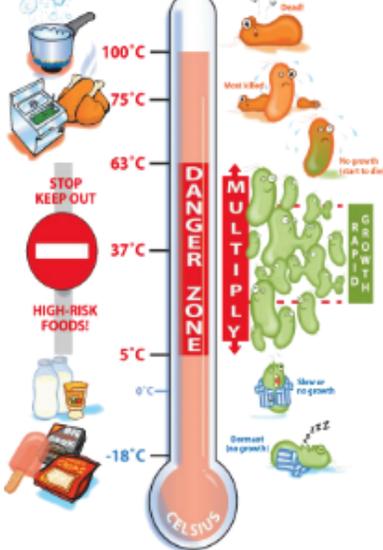
	Probability	Severity
1	Not very likely to happen	1 If it did happen the harm would be minimal and could be dealt with by an untrained person (e.g. might just need a plaster)
2	1 in 4 (25%) chance	2 Might need to visit a professional for advice or treatment (e.g. might need stitches)
3	2 in 4 (50%) chance	3 Would take a few weeks to heal, but not a serious injury.
4	3 in 4 (75%) chance	4 Could cause serious injury or damage, but would eventually be resolved (e.g. broken leg)
5	Very likely to happen	5 The result could be permanent disability, destruction of a building or in extreme cases, death.

**Allergies**  
A food allergy is a rapid and potentially serious response to a food by your immune system. It can trigger classic allergy symptoms such as a rash, wheezing and itching. Anaphylaxis is most commonly caused by food allergies, but can also be caused by other things, such as insect bites and drug allergies.  
Wait staff should have a good knowledge of which allergens are present. When using pre prepared ingredients, kitchen staff should check the labels carefully to identify any allergens



**Intolerances**  
Food intolerances are more common than food allergies. The symptoms of food intolerance tend to come on more slowly, often many hours after eating the problem food.

- Lactose intolerance**
- Avoid milk and milk products
  - Experience nausea, bloating, pain in the abdomen and diarrhoea
  - Eat lactose-reduced products or alternatives such as goats cheese, soya milk, feta cheese, rice milk
- Coeliac disease/gluten intolerance**
- Causes diarrhoea, anaemia, weight loss
  - Gluten is found in many cereals plants primarily wheat, rye, barley and some oats
  - Avoid pasta, bread, cereals flour based foods
- Yeast intolerance**
- Yeast is present in a variety of foods, commonly bread, baked products and alcoholic beverages. Very ripe fruits contain natural yeasts
  - Symptoms include flatulence, bad breath, fatigue, irritability, cravings for sugary foods, stomach cramps, bad skin and indigestion.
  - Fermented foods e.g. vinegar, wine, salad dressing



**LO4 Know how food can cause ill health.**

	Found In	Symptoms	Onset	Duration
Campylobacter	Poultry, raw meat, unpasteurised milk products, water	Headache, abdominal pain, bloody diarrhoea	2-5 days after infection	Up to 10 days
Salmonella	Raw meat, unwashed vegetables, eggs undercooked chicken	Fever, diarrhoea, vomiting, abdominal pain, blood in poo	12-72 hours	4-7 days can be up to 3 weeks
E-Coli	beef, chicken, lamb, unpasteurised milk cheese, spinach, salads, raw veg	Abdominal cramps, bloody diarrhoea, nausea	Up to 24 hours	Up to 24 hours
Clostridium perfringens	Undercooked meats, large volumes of food, casseroles, gravies	Stomach cramps, fever, diarrhoea (not usually vomiting)	6-24 hours	4-7 days can be up to 3 weeks
Listeria	Raw foods, fridge temperatures, unpasteurised milk, cheese, smoked salmon, pate, raw sprouts	Headache, stiff muscles, confusion, fever, convulsions	3-70 days (21 typical)	3 weeks
Bacillus cereus	Rice, leftover food, foods at room temperature, sauces and soups	1) Watery diarrhoea, cramps, 2) vomiting and nausea	1) 30 min-6 hrs 2) 6-15 hours	24 hours
Staphylococcus aureus	Foods made by hand and no additional cooking Salads, ham, tuna chicken, cream pastries, sandwiches, dairy products, meat, eggs	Projectile vomiting, diarrhoea, abdominal cramps, fever	1-6 hours	24-48 hours

**Food related causes of ill health**  
Microbes - Some microorganisms cause food borne illness which is not classified as food poisoning because of other symptoms they cause. The two main ones are: Norovirus From leafy greens such as lettuce, fresh fruits and foods that are not washed before eating and Toxoplasmosis From infected meat (also cat poo but you wouldn't eat that)

Chemicals - Some chemicals can end up in our food and potentially make us ill. These chemicals could come from: hormones, pesticides, fertilizer, packaging additives, cleaning fluids

Metals - When ingested metals can be extremely harmful to the body. Some metals can be found in food because they occur naturally, they enter the food chain or residues of metals can be found in food.

Poisonous plants - Some plants can be poisonous when eaten, these could be contaminants such as weeds or naturally occurring foods such as rhubarb leaves, raw potatoes and uncooked kidney beans.

**Food Safety Act**  
Food businesses:  
- Must ensure that the food served or sold is of the nature, substance or quality which consumers would expect  
- Ensure that the food is labelled, advertised and presented in a way that is not false or misleading, e.g. photos on menus that do not look like the dishes served to customers

**Food Safety (General Food Hygiene Regulations)**  
- Food premises  
- Personal hygiene of staff  
- Hygienic practices  
Food businesses must:  
- make sure food is supplied or sold in a hygienic way;  
- identify food safety hazards;  
- know which steps in your activities are critical for food safety;  
- ensure safety controls are in place, maintained and reviewed.

**Food Labelling Regulations**  
This information is required on packaging by law:  
• the name of the food  
• weight or volume  
• ingredient list & allergen information  
• genetically modified ingredients  
• date mark and storage conditions  
• preparation instructions  
• name and address of manufacturer, packer or seller & place of origin  
• lot (or batch) mark  
• nutrition information

**Key questions to check your learning for Learning Objective 4:**

1. Name at least 4 different types of food poisoning bacteria, give the symptoms and where they are found
2. What does it mean to have an intolerance and what foods can this be for?
3. What is the Food safety act?
4. What are the food related causes of ill health?
5. What is an allergen? Name some
6. What is the danger zone?