

The Trafalgar School at Downton

# Knowledge Organiser

Year 10: Terms 3 and 4



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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.

## 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 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)**

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 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 a two and then three word sentence:**

It hurt. I was dying!

Snow fell. Flakes floated precariously.

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.)**

**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 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,

**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.

**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 paired adjectives to describe a noun:**

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

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

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

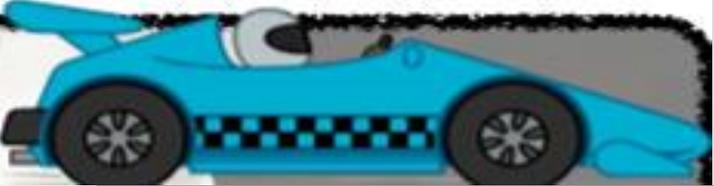
**Use a present participle - 'ing' start:**  
**Whistling** to himself, he walked down the  
 road.

**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*.

# 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:

bullet points

- 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;

## 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!"

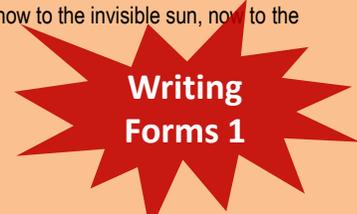
"I will not talk to you," he answered, "until you visit me."

"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**

**Writing Forms 2**

35 Hibiscus Crescent  
Andover  
Hants  
SP10 3WE

writer's address

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

date

221B Bakers Street  
London  
NW1 6XE

reader's address

Dear Sir or Madam

Formal Salutation: Sir/Madam/Mr Roderick/Mrs Roderick

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.

fluently sequenced paragraphs

Furthermore, ...

Yours faithfully  
Sherlock Holmes

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.'

Thank you.

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

**Article**

**Andy Murray's Appliance of Science**

clear/apt/original title

By Jim White

by-line

**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.**

strapline

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!

sub-headings

**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 in 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.

introductory (overview) paragraph

fluently sequenced paragraphs

**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 offering Himalaya of fried starch, Murray will have eaten yogurt, fruit and a bagel smeared in peanut butter ...

**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)

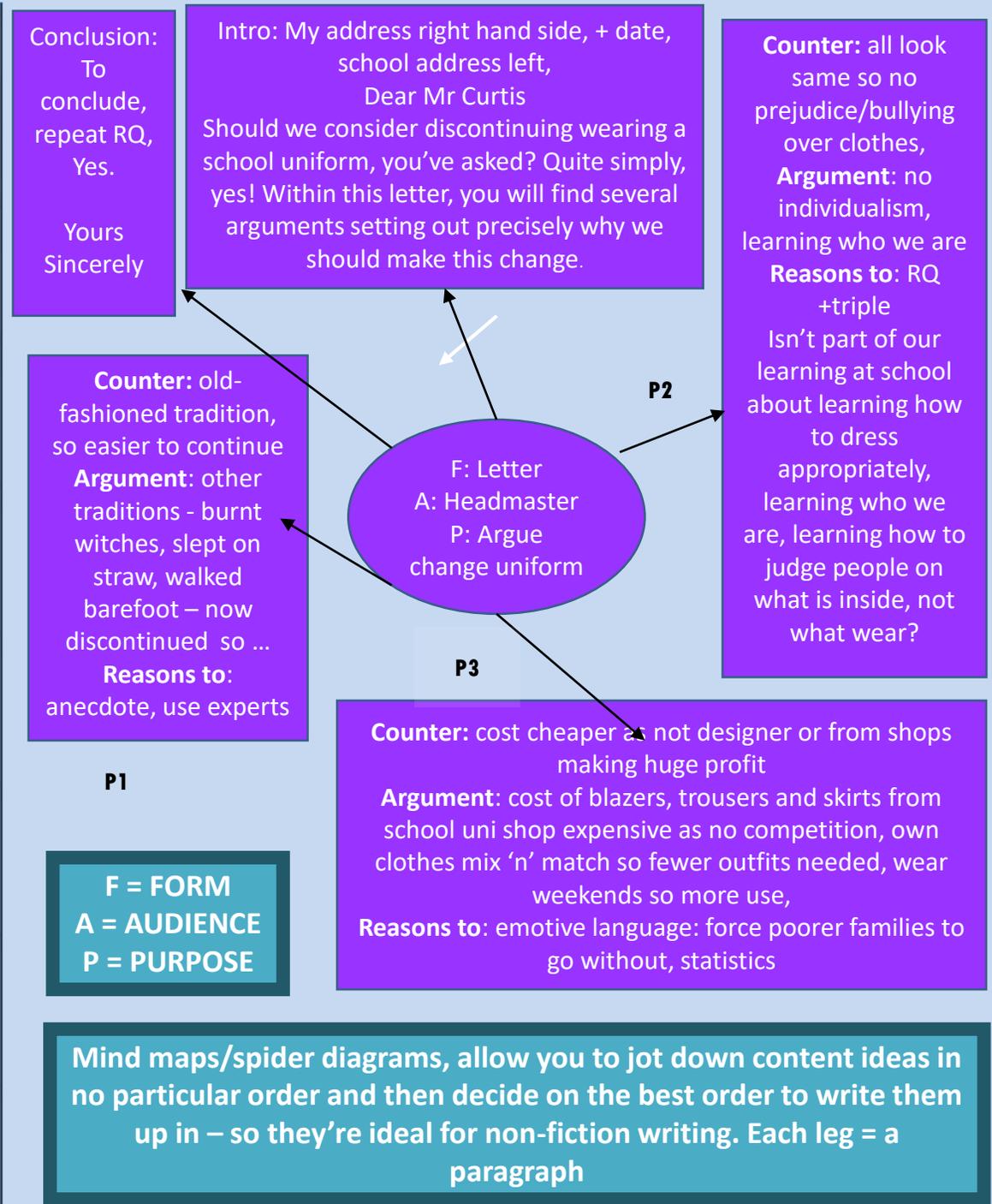
In conclusion, a zoo's only purpose is to make as much money as possible by showing thousands of people per day to gawk at animals and spend far too much money on souvenirs and junk food. Zoos do not protect or help to repopulate animals, nor do they educate people on the specifics of these animals,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

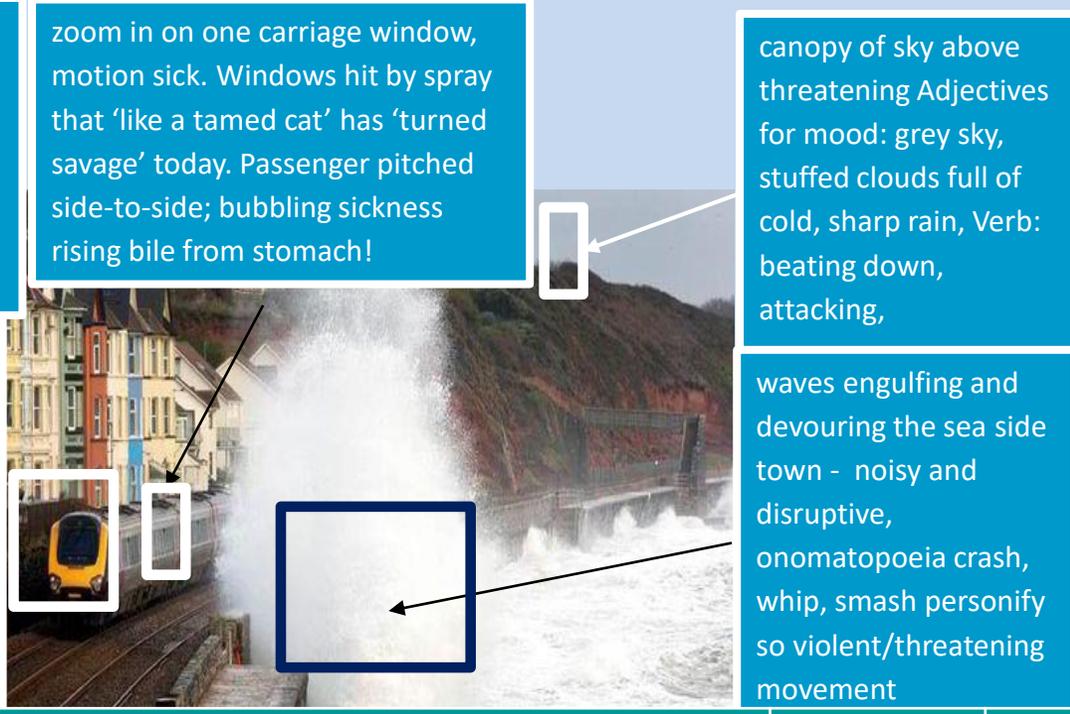
The Grid Plan is good for making sure you include lots of different methods, or to compare two/more things side-by-side. Each row/column = a paragraph.

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	... ;

## KEY THINGS TO CONSIDER ABOUT THE SOURCE YOU ARE GIVEN...

**Genre:** What type of story is it? Is it horror? Romance? A mystery? What conventions does the story include that make it fit into that genre? Why has the writer chosen this genre?

**Reader:** How is a reader supposed to respond to this text? Are they meant to be scared? Happy? Confused? How does the writer achieve this?

**Atmosphere:** What type of mood or tone does the writer create in their story? How do they achieve it?

**Names:** Which characters are named? What are they called? Which characters are **not** named? Why not this be? Why might these names be important?

**Dialogue:** Do characters speak to each other? Why? Why do they talk about? What does this tell us about character, theme or plot?

**Description of character:** How are the characters described? What does this information reveal to us about them?

**Archetypes:** What **types** of characters do we have in this story? Villains? Heroes? Antiheroes? Comedic characters?

**Description of setting:** How is the setting described? Why is this important? Is setting more important than character?

**KNOW YOUR BASICS!** Noun/verb/adverb/adjective/ simile/metaphor/question/ alliteration/ onomatopoeia/5 senses/listing/personification/ repetition

## PACE AND TONE – HOW SENTENCES HAVE AN IMPACT ON THE READER...

Sometimes students can feel a little confused when asked to consider ‘sentence forms’ in Q2, but there is an easier way to look at them. Every writer wants to establish a **pace** and a **tone** to their writing. Pace is how fast or slow a text is meant to be read, and tone is the kind of sound or mood you want to give to a piece of writing.

If you use lots of short sentences together it can build tension, but it can also speed up a text as a reader becomes more desperate to find out what happens as tension builds. Alternatively short sentences can make a reader stop and reflect on specific ideas.

Longer, more complex sentence forms can be used to aid description or to help a reader build up an understanding of character.

So when you read the exam text, think about what kind of tone and pace is created and how the writer uses sentences to achieve that effect on the reader.

## LANGUAGE FEATURES

SIMILE

Similes help readers to picture a particular object, person or place by **comparing something they don’t know to something they do**. They can also be used for **exaggeration**.

METAPHOR

Metaphors help readers to picture a particular object or place by **transforming them into something they understand better**. They can also be used for **exaggeration**.

PERSONIFICATION

Where an inanimate object/thing is given human characteristics

ALLITERATION

Alliteration creates a memorable sound in the readers’ head that means they notice that particular line more or they can remember it quite well. **This means it can be used to emphasise a particular point, idea or feeling.**

NOUNS AND VERBS

Nouns are people, places or objects. Verbs are actions or ‘doing words’. **Both can be used carefully to evoke or give off certain emotions or feelings.**

ADJECTIVES AND ADVERBS

Adjectives are words that **describe nouns**. Adverbs are words that describe **verbs**. These are both used to add to **descriptions** and help **build specific images or feelings in the readers’ heads**.

**STRETCH YOURSELF!** Embed quotations/ Look at the bigger picture – not just individual quotes/ Consider genre and form/narrative voice/use terms: implies/ illustrates

THE DESCRIPTIVE 'RULES'
No names for people
At least 3 zoom-ins
No person described for more than a paragraph
Minimum 3 senses
1-3 sentences of direct speech (if cannot be avoided)
Maximum 1 exclamation mark
3 <sup>rd</sup> person
No thoughts
Present or past tense (not both)
Move the camera – like a film. Tell your reader through the viewpoint what you want them to focus on.

<b>Symbolism</b>	A literary device that contains several layers of meaning, often concealed at first sight, and is representative of several other ideas. Writers often use symbolism to convey a message to readers in a more subtle or personal way.
<b>Motif</b>	In narrative, it is a repeated sign which can help create mood or theme. Colours are often used in this way as is light & dark – <i>think of the colours used in film to represent good or bad characters</i>
<b>Contrast (technique)</b>	A rhetorical device through which writers identify differences between two subjects, places, persons, things, or ideas. Simply, it is a type of opposition between two objects, highlighted to emphasize their differences. All the best writing is based around the use of contrast so you should always look for it.
<b>Imagery</b>	Includes simile, metaphor & personification - sometimes called 'figurative language'. Essentially this is where a writer uses language visually – to create an image by suggesting a connection between ideas that the reader can then 'see'.

THE EXAM
<b>45 minutes - 1 task - 40 marks</b> (1 from a choice of 2 - usually 1 descriptive <u>or</u> 1 narrative...but could be 2x narrative or 2x descriptive)
Step one: read & highlight key words in question (including PURPOSE, AUDIENCE, LANGUAGE & FORM)
Step two: Study the stimulus (picture) then choose one of the two questions
Step three: Plan 6 -8 things you can include, then put them in order (Steps 1 to 3 = 10 mins)
Step four: Write it' (Step 4 = 30 mins) <input type="checkbox"/> Should be lots of crossing out to show 'crafting' <input type="checkbox"/> Should be 2 sides approx

THE BASICS
Capital letters
Full stops
Question marks
Commas
Apostrophes
Consistent tense
Paragraphs
Homophone spellings
Connectives
Semi-colons
Colons
Hyphens
Parenthesis (...)
Topic sentences
Vary sentence starts/lengths
Vary paragraph lengths

**DESCRIPTION**  
 Write 3-4 sides  
 Use the photo/picture as a springboard but it is there to inspire not limit you  
 Use the 6 camera method for this too?  
 Watch 'how to cheat the description Q' (Mr Salles)

**Mr Salles Method for planning stories [The 6 Camera Method]**  
 1. Zoom out: viewpoint 1  
 2. Motif: symbol or image (repeating)  
 3. Zoom in: viewpoint 2  
 4. Motif: symbol or image (repeating)  
 5. Zoom out: viewpoint 1 (again) or 3  
 6. Final Zoom in + Motif: viewpoint

**IF TIME AT THE END OF THE EXAM, ALWAYS CHECK YOUR Q5 RESPONSE FIRST FOR SPAG.**

**6 RULES FOR WRITING STORIES**  
 Start every sentence with a new word  
 Include the word 'choreography'  
 Have a long sentence – 30 words plus  
 Include a list  
 Have a sentence with 4 verbs  
 End a paragraph with a short sentence  
 Use **CONTRAST** in every sentence

SENTENCE STARTS
Verb – <i>Running quickly, she .....</i> (make sure you finish sentence)
Adverb – <i>Darkly, the night sky....</i>
Adjective – <i>Red light filled the ...</i>
Preposition – <i>Down there, all.../Next to...</i>
Discourse Markers – <i>However, his life...</i>
<b>ISPACED...VARIETY!</b>

**BE AMBITIOUS WITH YOUR VOCABULARY!**

**DO Q5 FIRST!**

**PAPER 1 LANGUAGE - READING CREATIVE TEXTS - 60 mins (25% GCSE) - One literary fiction text. 4 Qs.**

**REMEMBER YOU SHOULD HAVE ALREADY DONE Q5 - you are going to work backwards through the Qs**

**QUESTION FOUR**

Statement written. How far do you **AGREE**?

- 20 marks
- Bullet points guide your answer
- AO4 – Evaluate

**To answer: Read and highlight key words in the question**

Two stages: recognising **how** the writer tries to achieve effects and deciding **how effectively** this has been done.

- The best answers *mostly* agree with the statement
- “I agree with ... except when ...”
- “Although I agree that... it is also possible that ...”
- Methods** means **CONTRAST** – how does the writer use this? (it will always be there)
- + Narrative voice – Who is talking? Why this person/viewpoint?
- Use this phrase to frame your answer: *The writer uses the...*
- Then add: *the word/phrase/personification/metaphor/simile/alliteration...*
- Then add a **quotation**
- Then add: *This method shows that/suggests/implies ...*
- End by evaluating: *although/however/but ...*
- Then: **repeat** until you run out of time (literally repeat the above frame)

**MAKE SURE YOU HAVE SOME HIGHLIGHTERS! USE A DIFFERENT COLOUR TO HIGHLIGHT THE INFORMATION FOR EACH QUESTION IN SECTION A**

**QUESTION THREE**

How has the writer **STRUCTURED** the text to...?

- 8 marks
- You need to consider the **WHOLE** text.
- Bullet points guide your answer
- AO2 – Structure

**To answer:**

- Read and highlight key words in the question**
- Leave 3 lines at the top of your answer for a summary statement** – do it at the end though because by then you will have worked out what it is

**The 5Cs of Q3 + HOW & WHY**

- Construction** – how has the writer ‘built’ the text? Is it simply **chronological** or more **complex** – flashbacks, single/multiple narratives, repetition, patterns, motifs...
- Contrast** = again, no.1 structural technique...it will always be there so learn what to say about it! Light/dark; small/big; 1 person/crowds of people; day/night; etc
- Camera + Cinematic** – where are we positioned? What do we see?
- Circular** = if they can find a circular narrative, the examiners will use it so look for this – it means we start & end in a similar place but something has changed – what?
- Changes in focus = changes in perspective = changes in paragraphs!** Look at each paragraph – **how** has it changed? **why** has it changed? [TiPToP]
- Summary statement = the examiners want this for the higher marks = one sentence overview of how the structure changes across the text – you’ve left 3 lines for this!
- Always write about the ending
- Check you’ve commented on each change of focus/perspective/paragraph
- Consider **coherence**, (connections and links across paragraphs, links within paragraphs, topic sentences.)

**Top Tips:**

**Comment in the writer’s techniques like a film makers using phrases like: focusing, zooming, narrowing, widening, introducing, developing, changing focus, concluding, foreshadowing, contrasting. E.G. ‘We start to see things through the father’s eyes as if we are searching with him’ or ‘We go from a wide viewpoint to a close-up focus if we are getting inside the father’s mind’**

**DO NOT ANALYSE LANGUAGE IN Q3!**

**IN WHICH ORDER SHOULD I TACKLE THE QUESTIONS?**

- Q5 – 45 MINS (40 MARKS)
- Q4 – 30 MINS (20 MARKS)
- Q3 – 12 MINS (8 MARKS)
- Q2 – 12 MINS (8 MARKS)
- Q1 – 6 MINS (4 MARKS)

**Q3: STRUCTURE**

- Narrative perspective/voice
- Flash-forward/ Flash-back
- Dialogue
- Topic sentence
- Discourse markers
- Ellipsis
- Foreshadowing
- Focus/Narrowing
- Contrast/ juxtaposition

**PAPER 1 LANGUAGE - READING CREATIVE TEXTS - 60 mins (25% GCSE) - One literary fiction text. 4 Qs.**  
**REMEMBER YOU SHOULD HAVE ALREADY DONE Q5 - you are going to work backwards through the Qs**

**QUESTION TWO**

How does the writer use **LANGUAGE** to.....?

- 8 marks
- Extract re-printed on your answer page.
- Bullet points guide your answer
- AO2 – Language

**To answer:**

- Read and highlight key words in the question**
- ‘Analysis of Language’ in Q2 means you **must** write about **SYMBOLISM**
- Pick your quotations **first** then consider devices

- CONTRAST** is the number 1/most important language technique – it is always in all good writing/extracts – so always look for this & comment on it
- There are 10 key terms to learn for Q2:**
- Imagery** = Simile, metaphor, personification, alliteration, Adjective, adverb, verb,
- Motif** – repeated images or patterns – often colours or ideas – freedom/flight/light
- And the phrase ‘*perhaps...*’ (allows you to speculate & offer alternative ideas)
- And also the phrases: ‘*the effect of this is...*’ & ‘*the effect of the motif is...*’ (don’t be afraid of sounding repetitive, the marks are for comments on ‘effect’ ...not for style!)
- +There will always be at least one complex sentence used as a list - always find this and refer to it – you don’t need to comment on sentence forms in any other way.

**Top tips:**

***Pick out individual words afterwards and discuss their effect (not meaning). When you pick out a word/device underline it – so the examiner knows you know which word is the ‘verb’ etc. Track through the extract from start to finish.***

**QUESTION ONE**

- 4 marks
- LIST** 4 things in lines .....
- Must be in selected lines
- AO1 - Locate

**To answer:**

- Read and highlight key words in the question**
- Simply select the correct lines from the passage
- Write four short points in spaces A-D for 4 marks

**Top tips:**

***This is not a trick question. It is easy. Be brief but accurate. Re-read the correct lines from the text.***

**Q2: LANGUAGE**

- Pronouns
- Direct speech
- Terms of address
- Noun phrase
- Subordinate/ main cause
- Narrative voice
- Simple/compound /complex sentences
- Accent /Dialect
- Utterances
- Ellipsis
- 1<sup>st</sup>/3<sup>rd</sup> person
- Hyperbole
- Imperatives
- Exclamations

**REMEMBER SOAPAIMS?**

**YOU MAY HAVE BEEN TAUGHT TO USE SOAPAIMS IN YOUR RESPONSE TO Q5...THESE ARE THE TECHNIQUES (METHODS) THAT YOU CAN LOOK FOR AND COMMENT UPON IN QUESTIONS 4 & 2**

**SOAPAIMS.....SIMILE, ONOMATOPOEIA, ALLITERATION, PERSONIFICATION, ADJECTIVES, IMAGERY, METAPHOR, SENSES**

<b>THE EXAM</b>
45 minutes – 2 tasks – no choice
Question one – 30 mins Question two – 15 mins
Step one: read & highlight key words in question one
Step two: read the first poem at least twice & <b>highlight</b> devices
Step three: Write a mini-intro (what the poem is about) then as many analytical paragraphs as possible (use PEETWE/TWE). – name <b>devices</b> /pick out <b>words</b> ( <b>but do not simply technique spot – instead talk about impact</b> )
Step four: read the second poem at least <b>twice</b> & highlight devices
Step five Write a mini-intro (what the main difference between the two poems is) then as many ‘PEE/PEA/Compares’ as you can - name <b>devices</b> or pick out <b>words</b> . Plus – use <b>connectives</b> : also/additionally/both/whereas/ however/ meanwhile

**DO NOT FORGET TO LOOK AT THE TITLE – SOMETIMES THIS CAN BE VERY IMPORTANT BUT IS OFTEN OVERLOOKED!**

**DO NOT FORGET YOUR HIGHLIGHTERS FOR THIS QUESTION!**

## UNSEEN POETRY

*Example question and how to get top marks (20% of final English Literature GCSE)*

**Both unseen poems will be printed on the question paper.**

**Q1** - In ‘To a Daughter Leaving Home’, how does the poet present the speaker’s feelings about her daughter? ( 24 marks)

**Q2** - In both ‘Poem for My Sister’ and ‘To a Daughter Leaving Home’ the speakers describe feelings about watching someone they love grow up. What are the similarities and/or differences between the ways the poets present those feelings? (8 marks)

AO1 (Question one only)	<input type="checkbox"/> Critical, exploratory conceptualised response to task and text <input type="checkbox"/> Judicious use of precise references to support interpretation(s)
AO2 (Question one and two)	<input type="checkbox"/> Analysis of writer’s methods with subject terminology used judiciously <input type="checkbox"/> Exploration of effects of writer’s methods on reader

### POETRY DEVICES – STRUCTURE

(DEVICES IN BOLD = PASS. OTHER DEVICES WILL SET YOU ON THE PATH FOR A STRONGER PASS)

<b>Chronological</b>	In order of time
Caesura	A big break in the middle of a line
<b>Enjambment</b>	<b>A sentence runs over more than one line</b>
Iambic pentameter	5 sets of weak/strong beats in a line
<b>Juxtaposition</b>	Two opposites
<b>Layout</b>	Position of lines/words on the page
Anaphora	Repeated first few words at start of lines
Oxymoron	Two opposite words next to each other
Rhyme scheme	The organisation of the rhyme
<b>Rhyming couplet</b>	Two lines that rhyme next to each other
Rhythm	The beat
<b>Stanza/Verse</b>	A paragraph in a poem
Volta	The turning point of a poem
<b>Repetition</b>	<b>Something repeated</b>

**POETRY DEVICES – LANGUAGE**  
*(DEVICES IN BOLD – FOR A PASS)*

<b>Abstract</b>	An idea rather than a real thing
<b>Alliteration</b>	<b>Repeated first letter or sound</b>
Antagonist	Evil main character
Assonance	Repeated vowel sound – soft sounds
Authentic	Seems genuine/truthful
Cliché	Over-used phrase
Consonance	Repeated consonant sound
<b>Concrete</b>	<b>A solid/real example</b>
Colloquial language	Local/casual language
<b>Emotive</b>	<b>Makes you feel emotional</b>
Euphemism	Alternative words to make something nasty sound more pleasant
Extended metaphor	A series of metaphors all relating to each other
Half rhyme	Nearly rhymes – indicates that something is not quite right
<b>Hyperbole</b>	<b>Exaggeration</b>
<b>Imagery</b>	<b>Something used to describe something else</b>
Internal rhyme	Rhyme that is on the same line
Irony	Sarcasm
<b>Metaphor</b>	<b>Something is described as being something else</b>
<b>Mood</b>	<b>Atmosphere</b>
Onomatopoeia	A verb sounds like what it does
Personification	A non-human thing is given human qualities

**DO NOT MIX THESE WORDS UP:**  
 Poet/speaker/  
 narrator/persona/ writer/  
 character

**POETRY DEVICES – LANGUAGE (continued)**  
*(DEVICES IN BOLD – FOR A PASS)*

Plosive	Alliteration using letters p/t/k/b/d/g. Harsh sounds.
Protagonist	Good main character
<b>Question</b>	<b>Asks something – usually rhetorical question</b>
<b>Rhyme</b>	<b>Words that sound the same</b>
Semantic field	Words that are about the same thing
Sibilance	A repeated s sound (hissing sound)
<b>Simile</b>	<b>Something is described as being like/as something else to describe it</b>
<b>Symbol/ symbolism</b>	<b>Something that represents something else</b>
<b>Tone/Voice</b>	<b>Emotion</b>
<b>POETRY DEVICES – FORM</b>	
Auto-biographical	About the poet
Ballad	Story poems– often 4 lines stanzas
Blank verse	Verse with no rhyme – usually 10 syllables
Dramatic monologue	A character speaks to the reader
Epic	Tragic/heroic story poems
Free verse	No regular rhyme/rhythm
Lyrical	Emotional and beautiful
<b>Narrative</b>	<b>A story</b>
Ode	Lyrical poem often addressed to one person
Phonetic spelling	Written like it sounds
Sonnet	14 lines, ababcdcdefefgg, Often love poem

# Maths Term 3 and 4: Working in 2D

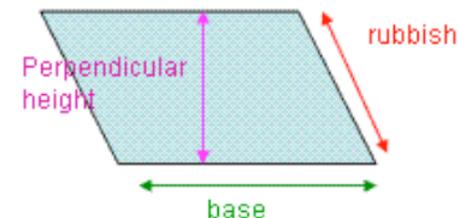
## What do I need to be able to do?

- Use standard units of measure (mm, cm, m, km)
- Measure line segments and angles accurately
- Use scale drawings and bearings
- Know and apply formulae to calculate the area of triangles, parallelograms, trapezia and composite shapes
- Identify, describe and construct reflections, rotations, translations and enlargements
- Identify and apply circle definitions, properties and formulae

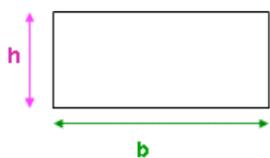
**NEVER FORGET** every time you work out an area, give your answer as **SQUARED UNITS**  
e.g. m<sup>2</sup>, cm<sup>2</sup>, km<sup>2</sup>, mm<sup>2</sup> etc

## The Importance of Perpendicular Height

- As you will see, most of the formulas for area involve multiplying the base of the shape by its height... but it's not just any old height!
- The height must be **perpendicular to the base!**



### 1. Rectangle

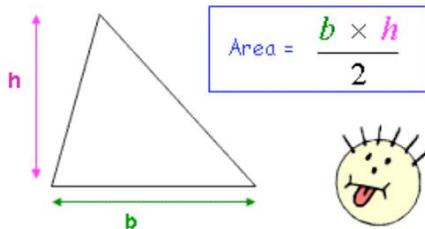


$$\text{Area} = b \times h$$

What to do: Multiply the base by the height!

HegartyMaths clip 554

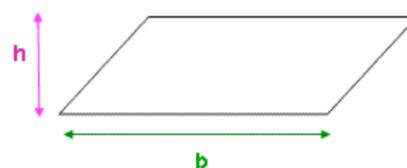
### 2. Triangle



What to do: Multiply the base by the (perpendicular) height and remember to divide your answer by 2!

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### 3. Parallelogram

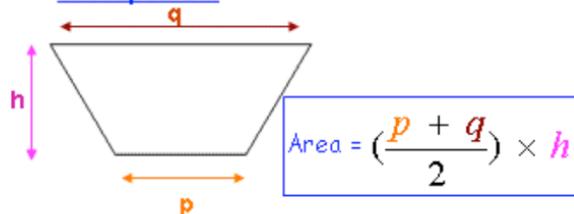


$$\text{Area} = b \times h$$

What to do: Multiply the base by the perpendicular height... definitely not the slanted height!

HegartyMaths clip 556

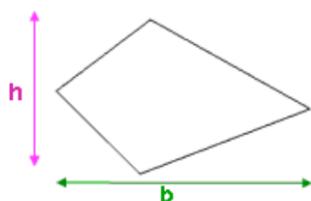
### 4. Trapezium



What to do: Add together the lengths of your two **parallel sides** and divide the answer by 2. This gives you the average length of your base. Then multiply this by the vertical height!

HegartyMaths clip 559

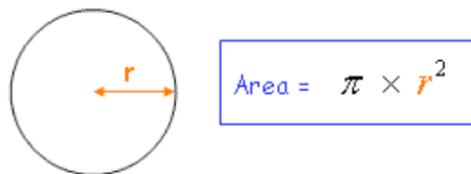
### 5. Kite



$$\text{Area} = \frac{1}{2} b \times h$$

What to do: The base and height in a kite are just the two diagonals from point to point... so multiply them together!

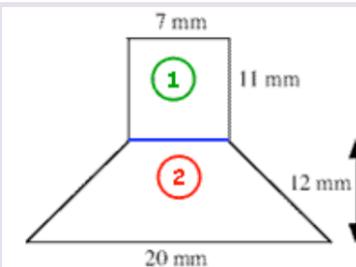
### 6. Circle



What to do: Find the radius of your circle (if you are given the diameter, just halve it!). Square the radius, and multiply your answer by pi!

HegartyMaths clip 539

## Compound Area



I have chosen to split this shape up into a **rectangle** and a **trapezium**. It is also possible to split it up into rectangles and triangles. It is completely up to you!

1 **Rectangle**

$$\text{Area} = b \times h$$

$$\text{Area} = 7 \times 11 = 77 \text{mm}^2$$

2 **Trapezium**

$$\text{Area} = \left(\frac{p + q}{2}\right) \times h$$

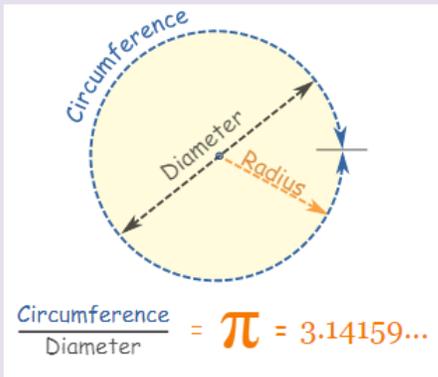
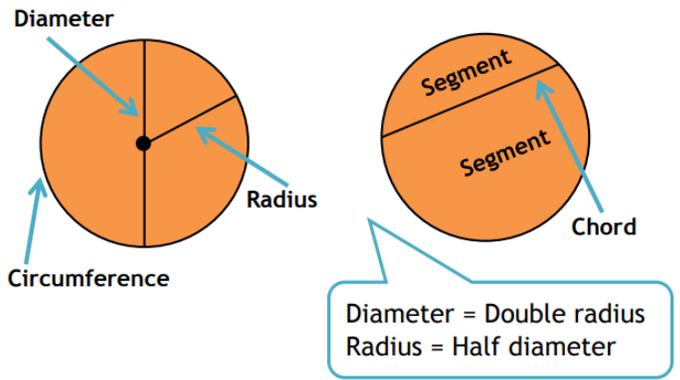
$$\text{Area} = \left(\frac{20 + 7}{2}\right) \times 12 = 162 \text{mm}^2$$

**Total Area**

$$77 + 162 = 239 \text{mm}^2$$

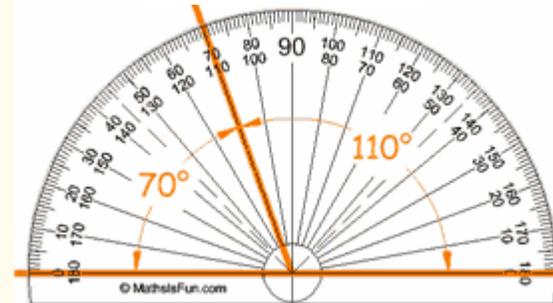
HegartyMaths clip 555

# The circle



HegartyMaths clips 534 to 547

## Measuring



Protractors usually have two sets of numbers going in opposite directions.

Be careful which one you use!

When in doubt think "should this angle be bigger or smaller than 90°?"

HegartyMaths clips 458 to 460

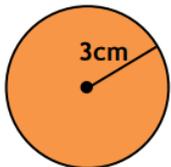
Area:  $A = \pi r^2$

Circumference:  $C = \pi d$

Diameter = Double radius

Radius = Half diameter

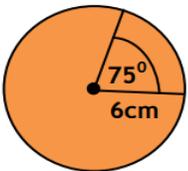
$A = \pi r^2$   
 $A = \pi \times 3^2$   
 $A = \pi \times 9$   
 $A = 28.3 \text{ cm}^2$   
 $(A = 9\pi \text{ cm}^2)$



$C = \pi d$   
 $C = \pi \times 6$   
 $C = 18.8 \text{ cm}$   
 $(C = 6\pi \text{ cm})$

### Sector area

$S = \frac{75}{360} \pi r^2$   
 $S = \frac{75}{360} \times \pi \times 6^2$   
 $S = \frac{75}{360} \times \pi \times 36$   
 $S = 23.6 \text{ cm}^2$   
 $(S = 7.5\pi \text{ cm}^2)$



### Arc length

$A = \frac{75}{360} \pi d$   
 $A = \frac{75}{360} \times \pi \times 12$   
 $A = 7.9 \text{ cm}$   
 $(A = 2.5\pi \text{ cm})$

An arc or sector is just a fraction of a whole circle

## Length

We measure lengths in millimetres, centimetres, metres and kilometres

**10mm = 1cm**

**100cm = 1m**

**1000mm = 1m**

**1000m = 1km**

kilo (1000)

cent (100)

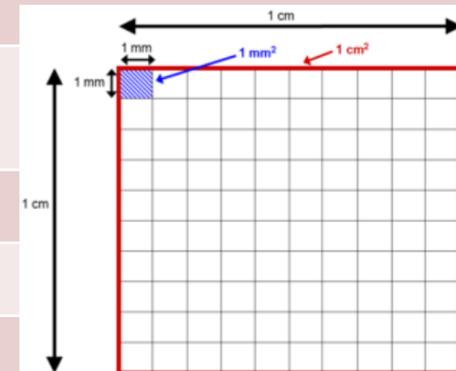
milli ( $1/1000$ )

## Area

Although there are 10mm in 1 cm, there are 100mm<sup>2</sup> in 1cm<sup>2</sup>

**1cm x 1cm = 1cm<sup>2</sup>**

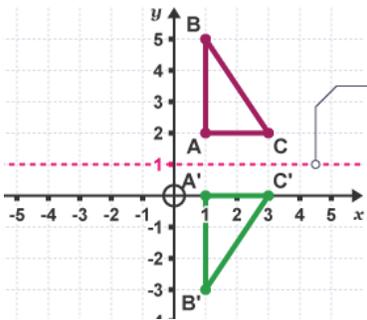
**10mm x 10mm = 100mm<sup>2</sup>**



# Transformations

## Reflection

A reflection is when you create a mirror image across a line. The image should be the same distance away from the mirror line.



Shape A'B'C' is a reflection of the shape ABC in the line  $y=1$

### Describing Reflections

If a shape has been reflected, you must state it has been reflected and give the equation of the line it has been reflected in (mirror line)

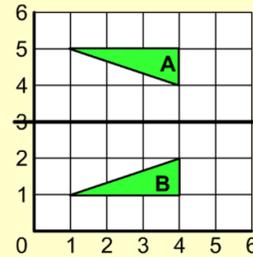
Example: Describe the transformation of the shape A to shape B

Step 1: Find the equation of the mirror line

Equation is:  $y=3$

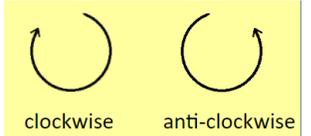
Answer is:

A reflection in the line  $y=3$



HegartyMaths clip 639, 640, 641

## Rotation



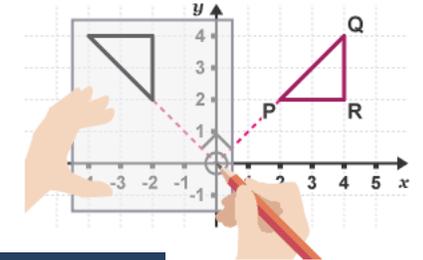
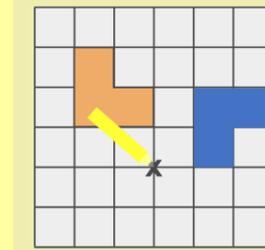
Rotating a shape means you are turning it around a point. You need 3 things:

- 1) Angle of rotation
- 2) Centre of Rotation (usually a co-ordinate)
- 3) Direction – Clockwise or Anti-clockwise

$90^\circ$  means a quarter turn  
 $180^\circ$  means a half turn  
 $270^\circ$  means a 3 quarters turn

Example: Rotate the shape 90 degrees about point marked x

- Step 1: Place tracing paper over grid
- Step 2: Copy the shape on the tracing paper
- Step 3: Place your pencil on the marked point
- Step 4: Rotate the shape
- Step 5: Copy the shape onto the grid



HegartyMaths clips 648,649

## Translation

A translation is when you move or slide a shape without changing it in any other way.

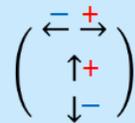
### Translations with Vectors

Vectors are used to describe translations

The top number tells you how far to move left or right

The bottom number tells you how far to up or down

A positive number corresponds to right/up and negative left/down



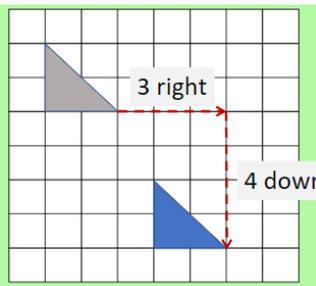
$\begin{pmatrix} 6 \\ 3 \end{pmatrix}$  means: right 6 and up 3

$\begin{pmatrix} -2 \\ 8 \end{pmatrix}$  means: left 2 and up 8

$\begin{pmatrix} 0 \\ -3 \end{pmatrix}$  means: left 0 and down 3

Translate Shape A by the vector  $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

This means 3 right and 4 down

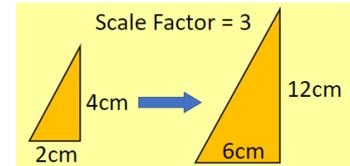


To describe a translation, you must state it has been translated and give the vector translation.

HegartyMaths clip 637,638

## Enlargement

An enlargement is when you change the size of a shape using a scale factor. The scale factor tells you how many times bigger the shape is.



HegartyMaths clips 642 to 647

### Enlargements from a Point

When a shape is enlarged from a point, the distance from the point is also enlarged

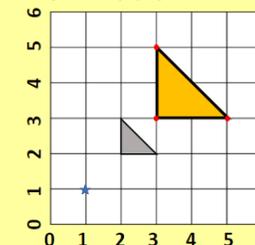
Example: Enlarge by a scale factor of 2 from the point (1,1)

Step 1: Pick up a point and see how far away it is from the centre of enlargement

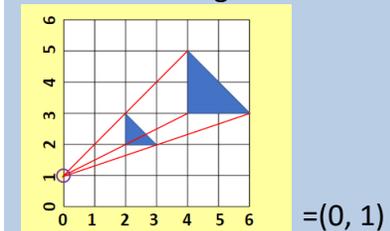
Step 2: Multiply the distance of both horizontal and vertical by the scale factor, and mark the new point

Step 3: Repeat for all corners of the shape

**Draw the shape !**



You can find the centre of enlargement by joining up the corresponding corners of the shapes. The point where the lines intersect is the centre of enlargement.



$=(0, 1)$

Remembering the details:

Transformation TERRACES: **T**ranslation; **E**nlargement; **R**otation and **R**eflection

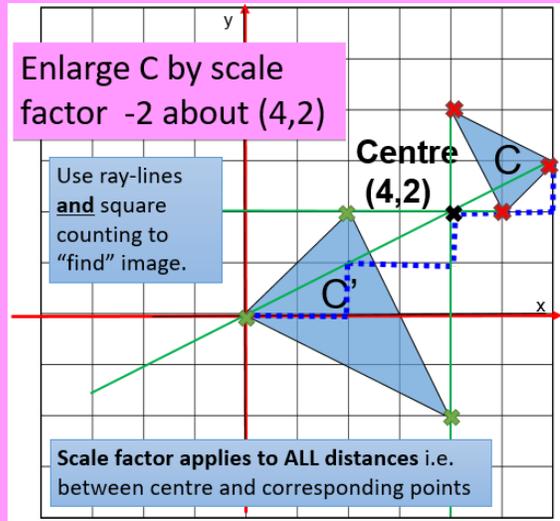


# Transformation TERRACES

Transformation	Effect	Needs...	Remember...
<b>T</b> RANSLATION	Moves	1) Vector (horizontal movement vertical movement)	Congruent image in same orientation Count movement from single point and then draw in shape
<b>E</b> NLARGEMENT	Grows or shrinks	2) Centre Scale factor (as multiplier)	Similar Image SF = $\frac{NEW}{OLD}$ >1 -> bigger 0-1 -> smaller <0 -> inverts
<b>R</b> OTATION	Turns	3) Centre Angle Direction	Congruent image turned clockwise anticlockwise Use tracing for idea but check by counting squares
<b>R</b> EFLECTION	Flips (Back to front)	1) Mirror line (perpendicular bisector)	Flipped congruent image Horizontal $y = \dots$ Vertical $x = \dots$ +ve diagonl $y = x$ -ve diagonl $y = -x$

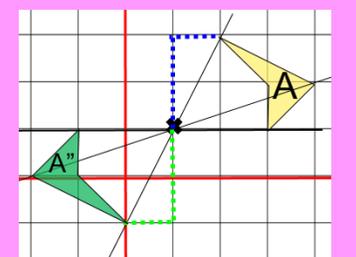
## Enlarging by a **Negative** Scale Factor

A **negative scale factor** means that the image is **INVERTED** and on the **OTHER** side of the centre.



## Enlarging by a **Scale Factor -1**

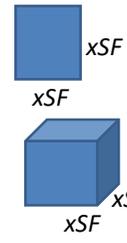
Has the same effect as **ROTATION by 180°** with the same centre



## Effect of Scale Factor on Area and Volume

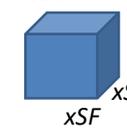
A scale factor is applied only to **LENGTH**  
Its effect on area and volume will be magnified by the number of **dimensions** the scale factor is being applied.

For **AREA**: scale factor applied to length in **2 dimensions**  
Effect is **SQUARED**



For any similar object and image :-  
Object  $\rightarrow$  Image  
Length  $\times$  Scale Factor  
Area  $\times$  Scale Factor<sup>2</sup>  
Volume  $\times$  Scale Factor<sup>3</sup>

For **VOLUME**: scale factor applied to length in **3 dimensions**  
Effect is **CUBED**



So to find the scale factor from ...

Area:  $SF = \sqrt{\frac{Area\ Image}{Area\ Object}}$

Volume:  $SF = \sqrt[3]{\frac{Volume\ Image}{Volume\ Object}}$

Combining Transformations:	<b>Translation</b> T + T $\rightarrow$ T T + Rot <sup>n</sup> $\rightarrow$ Rot <sup>n</sup>	<b>Rotation</b> R + R $\rightarrow$ R R + T $\rightarrow$ R	<b>Reflection + rotation</b> $\rightarrow$ Reflection Ref + Ref In parallel lines $\rightarrow$ Translation Ref + Ref In perpendicular lines $\rightarrow$ Rotation
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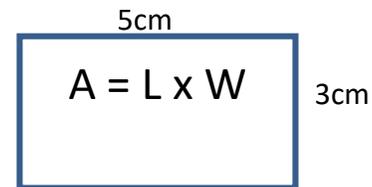
## Year 10 Maths Term 3 and 4: Functions and Formula

<b>Example:</b>	<b>Glossary : Key terms and concepts explained</b>
<b>a, b, x, y</b>	are <b>variables</b> i.e. letters used in algebra to represent numbers.
<b>4a + 2b</b> <b>xy</b> <b>5(x + 3)</b> <b>x<sup>2</sup> - 4</b>	are <b>EXPRESSIONS</b> . Expressions are formed from variables and numbers combined with operation signs and brackets. Each part of an expression is called a <b>TERM</b> . In the expression $3n + 5$ the <b>terms</b> are $3n$ and $5$ and the operation is $+$ . <b>An expression does NOT have an equals sign.</b>
<b>A = <math>\frac{1}{2}xy</math></b> <b>5(x + 3) = 8</b> <b>x<sup>2</sup> - 4 = 0</b>	are <b>EQUATIONS</b> . Equations are mathematical statements showing that two expressions have equal value as indicated by the equals symbol =. For example, in the equation $5x + 4 = 29$ , the = symbol shows that $5x + 4$ has the same value as $29$ . <b>An equation MUST have an equals sign</b> and equations containing only one variable <b>may be "solved" to find the value of the unknown number.</b>
<b>a &lt; 2</b> <b>5(x + 3) &gt; 8</b> <b>x<sup>2</sup> - 4 ≤ 0</b>	are <b>INEQUALITIES</b> . Inequalities are mathematical statements showing the comparative value of one expression to the other: namely whether it is bigger than (>); bigger than or equal to (≥), smaller than (<); or smaller than or equal to (≤) the other. Like equations, inequalities containing only one variable may be "solved" but unlike equations, <b>the solutions of an inequality will be a range of possible values</b> . For example, the inequality $a < 2$ indicates that the variable $a$ may take any value as long as it is less than $2$ .
<b>d = 2r</b> <b>A = <math>\frac{1}{2}xy</math></b> <b>v = u + at</b>	are <b>Formulae</b> . A <b>FORMULA</b> is an equation linking at least two variables and explains the relationship between them. For example the formula $d = 2r$ has two variables and explains that the diameter of a circle ( $d$ ) is equal to twice the value (length) of the radius ( $r$ ) <b>Formulae cannot be solved without substituting in known values</b> . For instance, the formula $v = u + at$ , has 4 linked variables ( $v, u, a, t$ ). Only if the values of three variables are known, can the fourth value be calculated.
<b>ab ≡ ba</b> <b>x + 2 ≡ 2 + x</b>	are <b>Identities</b> . Identities are expressions which are <i>identically equal</i> (in other words the same just written in a different way). Such expressions are linked with the symbol $\equiv$ . <b>Identities cannot be solved</b> as both expressions will be equal whatever value is given to the unknown.

## Substitution into Expressions and Formula

**Substitution** is when an unknown (the variable) is replaced with a known value (number). For example, you are asked to find the area of this rectangle....

You know the formula for area: Area = Length x Width  
 You now know actual values: (L) = 5cm (W) = 3cm  
 So you can substitute these in... A = 5 x 3  
 ... and calculate the Area: A = 15cm<sup>2</sup>



Things to note when substituting:

- **Be careful of algebraic notation** – remember number problems need multiplication signs!
- Be careful when substituting **negative numbers** – it is best to write them in a bracket particularly if you are going to use a calculator
- **Write out the new calculation in full** replacing the variables with their new known value
- When calculating the final answer, **follow BIDMAS rules** for order of operations

Examples: if **a = 2**, **b = 3** and **c = -5**, find the value of the following expressions:

<b>abc</b> $\Rightarrow 2 \times 3 \times (-5)$ $= -15$	<b>a - b - c</b> $\Rightarrow 2 - 3 - (-5)$ $= 2 - 3 + 5$ $= 4$	<b><math>\frac{ab + c}{2}</math></b> $\Rightarrow \frac{2 \times 3 + (-5)}{2} = \frac{1}{2}$	<b>ac<sup>2</sup></b> $\Rightarrow 2 \times (-5) \times (-5)$ $= 2 \times 25$ $= 50$	<b>(ac)<sup>2</sup></b> $\Rightarrow 2 \times (-5) \times 2 \times (-5)$ $= -10 \times -10$ $= 100$
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## Real life formulae and substitution examples

Example 1: Using given formula

$$F = \frac{9C}{5} + 32$$

This is the formula to change degrees Celsius (°C) to degrees Fahrenheit (°F).  
Use the formula to convert 21°C to °F

Substitute in **C = 21**:  $F = \frac{9 \times 21}{5} + 32$

$$F = \frac{189}{5} + 32$$

$$F = 37.8 + 32$$

Temperature of 21°C is equal to **69.8 °F**

Example 2: Writing formula

The cooking time for a turkey is 35 minutes per Kilogram plus an extra 20 minutes.

- Write a formula for this problem
- Use your formula to calculate the cooking time for a turkey weighing 5kg in hours and minutes

Define variables: Cooking Time (C); Weight (W = 5)

Write formula: Cooking Time = 35 x Weight + 20

a) Formula: **C = 35W + 20**

b) Substitute: C = 35 x 5 + 20

$$C = 195 \text{ minutes}$$

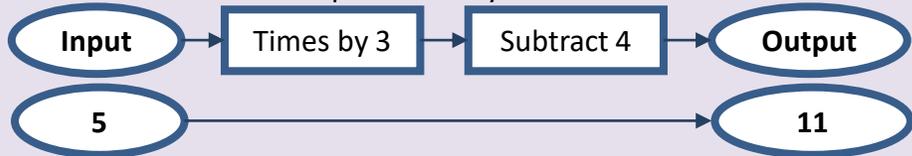
**C = 3 hours and 15 minutes**

## Functions

**A function links two variables. When you know one, you can work out the other.**

There are three elements to a function: the input, the relationship and the output.

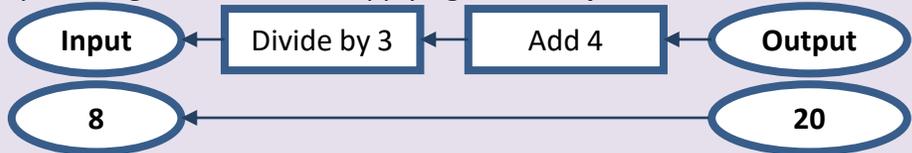
These elements can be represented by a **function machine**:



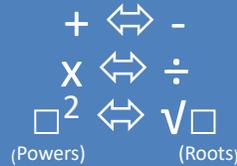
A true function must produce only one output for each input.

... so an input of 5 into this function machine would produce an output of 11  $(5 \times 3 - 4)$

Once a function has been understood it can be “undone” by working backwards and applying **inverse operations**.



### Inverse operations



... so an **output** of 20 from this function could only have resulted from an input of  $(20+4) \div 3 = 8$ .

## Functions, Equations and Formula

Many equations and formula are functions and can be represented using a function machine:

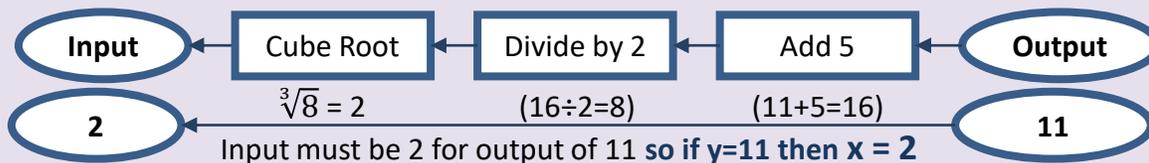
**Example: (i) Create a function machine for the equation  $y = 2x^3 - 5$**

The **subject** of a formula is the variable on its own on one side of the formula before the equals sign - and is the **output** of a function machine. So here, “y” is the output, which means “x” will be the input. To work out what process turns the input value “x” into output “y”, look what is around “x” - there is a times 2 (remember algebraic notation), a cube “x”, and a subtract 5. Following BIDMAS means the indices (cubing) needs to be done before the times and lastly the subtraction....



**Example: (ii) Use your function machine to find the value of x when y = 11**

If a function is understood, it can be reversed with inverse operations.....



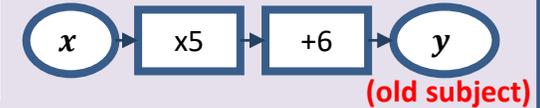
HegartyMaths clips 278 to 286

## Changing the subject of a formula or equation

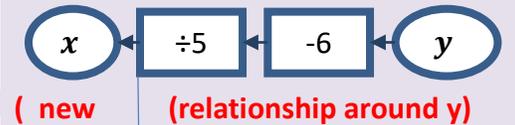
This method - creating functions machines and their inverses - can help in rearranging (or changing the subject of) a formula.

**Examples: (1) Rearrange the equation  $y = 5x + 6$  to make x the subject**

**Step 1: create the Function machine. Remember start with x and build to y**



**Step 2: reverse the Function machine applying inverse operations**



**Step 3: follow the reversed function to write the new relationship around y which is equal to the new subject x**

$$x = \frac{y-6}{5}$$

**(2) Rearrange the equation  $y = \frac{1}{2}x^2 - 5$  to make x the subject**



$$x = \sqrt{2(y+5)}$$

$$= \sqrt{2y+10} \quad \text{(Simplify if necessary)}$$

Once you are confident that you know how to “unpick” a function accurately, an alternative way to set out your workings is similar to that for solving equations:

**(3) Rearrange these formula to make x the subject**

	<b>(i) <math>y = mx + c</math></b>		<b>(ii) <math>y = \frac{x}{2} - b</math></b>
(-c)	$y - c = mx$	(-c)	$y + b = \frac{x}{2}$
(÷m)	$\frac{y-c}{m} = x$	(÷m)	$2(y+b) = x$
	$x = \frac{y-c}{m}$		$x = 2(y+b)$

Finally remember to write your final answer with x as the subject at the start ...

## Function Notation

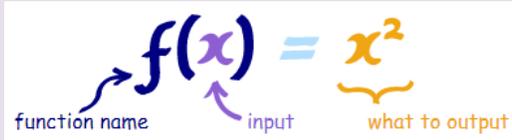
More mathematically, a function is a relation between a set of **INPUTS** (the “**DOMAIN**”) and a set of **OUTPUTS** (the “**RANGE**”) such that each input is related to an output.

Functions can be named. The most common name is “f”, but others, “g”, “h” etc can be used to distinguish between different functions in a problem.



Here the function “f” has been applied to the input  $x$  producing the result  $f(x)$  which can be said “f of x”. As you can see, we are using  $f(x)$  where previously we have used  $y$  to represent the output ... the two are EXACTLY THE SAME – it’s just using different notation!

More commonly, functions are written:



..and just like functions machines, we may be given different parts (input or output) of the problem and asked to find the other – the trick is to work out which you have been given...

Example 1: Given that the function  $f(x) = x^2 + 1$

- (i) Find  $f(3)$  and (ii)  $f(-2)$

The values given are **INSIDE** the bracket. They are the **INPUTS** into the function. **SUBSTITUTE** to find the output

- (i)  $f(3) = 3^2 + 1$   
 $f(3) = 10$   
 (ii)  $f(-2) = (-2)^2 + 1$   
 $f(-2) = 5$

Example 2: Given that the function  $f(x) = 2x + 7$

- (i) Find  $f(x) = 3$  and (ii)  $f(x) = (-2)$

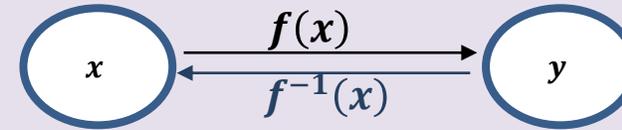
The values given are **OUTSIDE** the bracket. They are the **OUTPUTS** of the function. **SOLVE** the equation to find the input

- (i)  $f(x) = 3 \Rightarrow 2x + 7 = 3$   
 $2x = -4$   
 $x = -2$   
 (ii)  $f(x) = (-2) \Rightarrow 2x + 7 = -2$   
 $2x = -9$   
 $x = -4.5$

Get into the habit: Remember negatives in brackets may be a **MUST** if you are **SQUARING** using your calculator!

## Inverse Functions

The inverse of a function  $f(x)$  is written  $f^{-1}(x)$



If a function maps the input  $x$  to an output  $y$  then the inverse function will map the output  $y$  to the input  $x$

Given the function  $g(x) = 4x - 3$

Find  $g^{-1}(x)$

$$g(x) = 4x - 3 \Rightarrow y = 4x - 3$$

$$y + 3 = 4x$$

$$\frac{y+3}{4} = x$$

$$\Rightarrow g^{-1}(x) = \frac{(x+3)}{4}$$

Rewrite your answer using  $x$  as the input for the new function

To calculate the inverse function of  $f(x)$ , remember “ $f(x)$ ” is the same as “ $y$ ”, so simply rewrite the function as an equation and rearrange to **make  $x$  the subject** of the formula. However, using function notation, the inverse function  $f^{-1}(x)$  will still need  $x$  as the named input variable so rewrite your answer simply **replacing “ $y$ ” with “ $x$ ”**

**Note** : Most be not all functions will produce different inverse functions. Exceptions:

- A function can be its own **self inverse** for example if  $f(x) = \frac{1}{x}$  then  $f^{-1}(x) = \frac{1}{x}$
- A function may not have an inverse function without further definition. For example, if  $f(x) = x^2$  then the inverse would  $\pm\sqrt{x}$  but a function is such that each input must map to a single output... with two possible outputs from square rooting this would not be the case. Therefore, it is sometimes important to “restrict the domain” for inverse function i.e. here for  $f(x) = x^2$  then  $f^{-1}(x) = \sqrt{x}$  where  $x \geq 0$

Given the function  $h(x) = \frac{1}{x}$

Find  $h^{-1}(x)$

$$h(x) = \frac{1}{x} \Rightarrow y = \frac{1}{x}$$

$$xy = 1$$

$$x = \frac{1}{y}$$

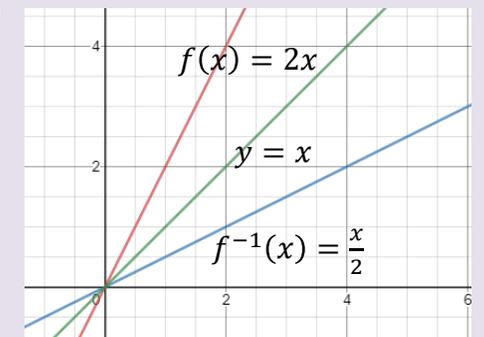
$$\Rightarrow h^{-1}(x) = \frac{1}{x}$$

Rewrite using  $x$  as the input

### Identifying inverse functions graphically

For any given function  $f(x)$  and its inverse  $f^{-1}(x)$ , the graph of

$f^{-1}(x)$  is a reflection of  $f(x)$  in the line  $y = x$



# Composite Functions

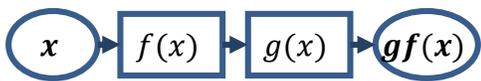
Composite functions are a combination of functions where the output of the first function applied becomes the input to the second; the relationship between original input and final output can then be simplified into a single composite function. The order in which the functions need to be applied are shown in the composite function notation – simply put, work back way from the input (x)...

Examples: Given that  $f(x) = x^2$  and  $g(x) = 2x + 1$ , ....

HegartyMaths clips 293, 294

## a) Find $gf(x)$

( $\Rightarrow$  apply "f" first then "g" to its output)



The output of  $f(x)$  is  $x^2$ . This becomes the input for  $g(x)$  so...



$$\Rightarrow gf(x) = 2x^2 + 1$$

Number in bracket  $\Rightarrow$  input

## b) Find $gf(5)$

If  $gf(x) = 2x^2 + 1$ , then

$$gf(5) = 2 \times 5^2 + 1$$

Check:

$$f(5) = 5 \times 5 = 25$$

$$g(25) = 2 \times 25 + 1 = 51$$

Number outside bracket  $\Rightarrow$  output

## c) Find $gf(x) = 19$ where $x \geq 0$

If  $gf(x) = 2x^2 + 1$ , then

$$2x^2 + 1 = 19$$

$$2x^2 = 18$$

$$x^2 = 9$$

$$x = 3$$

Check:

Substitute answer into functions...

$$f(3) = 3 \times 3 = 9$$

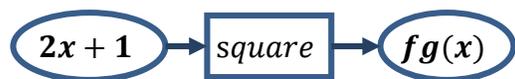
$$g(9) = 2 \times 9 + 1 = 19$$

## (1) Find $fg(x)$

( $\Rightarrow$  apply "g" first then "f" to its output)



The output of  $g(x)$  is  $2x + 1$ . This becomes the input for  $f(x)$  so...



$$\Rightarrow fg(x) = (2x + 1)^2$$

$$\Rightarrow fg(x) = (2x + 1)(2x + 1)$$

$$\Rightarrow fg(x) = 4x^2 + 4x + 1$$

## (2) Find $fg(-2)$

If  $fg(x) = 4x^2 + 4x + 1$ , then

$$fg(2) = 4 \times (-2)^2 + 4 \times (-2) + 1 = 9$$

## (3) Find $gf(x) = 36$ where $x \geq 0$

If  $gf(x) = 4x^2 + 4x + 1$ , then

$$4x^2 + 4x + 1 = 36$$

$$(2x + 1)^2 = 36$$

$$2x + 1 = 6$$

$$2x = 5$$

$$x = 2.5$$

Example: Given that  $f(x) = 2x - 3$  and  $g(x) = x^2 + 1$

Solve  $gf(x) = 2fg(x)$

Step 1: Find  $gf(x)$   $\Rightarrow gf(x) = (2x - 3)^2 + 1$

$$\Rightarrow gf(x) = (2x - 3)(2x - 3)$$

$$\Rightarrow gf(x) = 4x^2 - 12x + 10$$

Step 2: Find  $2fg(x)$   $\Rightarrow fg(x) = 2(x^2 + 1) - 3$

$$\Rightarrow fg(x) = 2x^2 + 2 - 3$$

$$\Rightarrow fg(x) = 2x^2 - 1$$

$$\Rightarrow 2fg(x) = 4x^2 - 2$$

Step 3: Form and solve equation  $\Rightarrow 4x^2 - 12x + 10 = 4x^2 - 2$

$$(-4x^2) \Rightarrow -12x + 10 = -2$$

$$(-10) \Rightarrow -12x = -12$$

$$(\div -12) \Rightarrow x = 1$$

$gf(x) \Rightarrow$  apply "f" first then "g" to its output. The output of  $f(x)$  is  $2x - 3$ . This becomes input for  $g(x)$  so  $(2x - 3)$  needs to be squared then 1 add

$fg(x) \Rightarrow$  apply "g" first then "f" to its output then times 2. The output of  $g(x)$  is  $x^2 + 1$ . This becomes input for  $f(x)$  so needs to be  $x^2$  then subtract 3. Finally  $2fg(x)$  means  $2 \times fg(x)$ ...

## Functions and Graphs

All straight line graphs with Linear equations in the form

$$y = mx + c$$

are functions as they represent the relation between a single  $x$ -coordinate and a single  $y$ -coordinate

Every straight line has an equation in the form of:

$$y = mx + c$$

the steepness of the line

The **GRADIENT**

where the line cuts the  $y$  axis

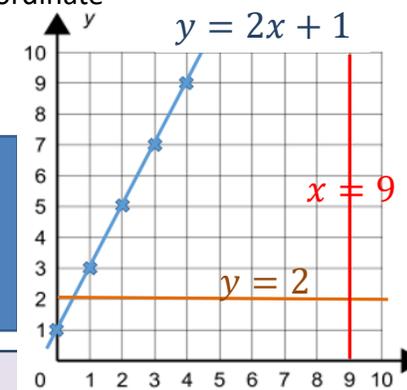
The **y-INTERCEPT**

To plot functions, substitute your inputs into the function to generate linked coordinate pairs. Record your pairs in a table of values: **example:** for  $f(x) = 2x + 1$

$x$	0	1	2	3	4	5	6
$y = x + 3$	1	3	5	7	9	11	13

(0, 1) (1, 3) (2, 5) (3, 7) (4, 9) (5, 11) (6, 13)

Remember  $f(x)$  and  $y$  mean same thing – the final output value



The **Vertical line test:** If an equation (relationship) produces a vertical line for any part of the line – it is **NOT** a function as it has produced MORE THAN ONE output value for an input so  $y = 2$  IS a function but  $x = 9$  IS NOT a function

## Sequences

A sequence is a series of numbers (or pictures) that follows a pattern or rule.

Each number or item in a sequence is called a **term**.

**Term-to-Term rule** – the “rule” that gets you from one number in a sequence to the next.

**Position-to-Term** – the “rule” that enables you to calculate the **value** of a term **at any given position** or place in the sequence. It is sometimes called the **general rule** or, most commonly, the  **$n^{\text{th}}$  term rule**.

“**n**” is the **position of a term** in the sequence it must **ALWAYS** be an **integer**

### Types of sequence:

HegartyMaths clips 196 to 198, 247, 261, 263. 919 to 922

There are different types of sequence each of which is identified by how their pattern continues:

- **Linear (or arithmetic) sequences**
- **Quadratic sequences**
- **Geometric sequences**

Common special sequences include:

- **Fibonacci** – type sequences
- Sequence of **Squares** (quadratic)
- Sequence of **triangular numbers** (quadratic)

Examples:

Linear    2, 4, 6, 8, 10, 12, 14  
Quadratic    1, 4, 9, 16, 25, 36

Geometric    2, 6, 18, 54, 162  
Fibonacci    1, 1, 2, 3, 5, 8, 13, 21, 34, 55

## LINEAR / ARITHMETIC SEQUENCE

Key property: linear sequences increase or decrease by the same amount each term.

So to get from one term to the next you will **add or subtract the same amount**.

All the multiplication times-tables are linear sequences.

To find nth term rule of a linear sequence:

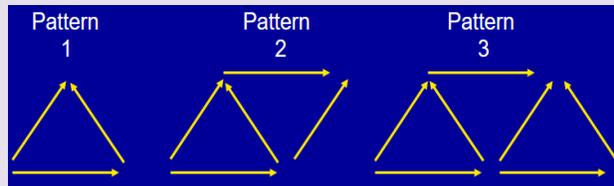
- 1) Find the **common difference** (“**d**”) – the same amount added or subtracted each time.
- 2) This is the base times-table – so the nth term rule will include “**dn**”
- 3) Adjust to the sequence you want: what do you need to add or subtract from **1d** to get the starting number?

eg **3, 5, 7, 9** => adjustment  $1 \times 2 = 2$  so must  $+1 \Rightarrow 2n + 1$  and **7, 5, 3, 1** => adjustment  $1 \times (-2) = -2$  so must  $+9 \Rightarrow -2n + 9$  (or  $9 - 2n$ )

HegartyMaths clips 196 to 198

## UNDERSTANDING PICTURE PATTERNS

Reduce a picture pattern to numbers  
– use a table of values to help you e.g.



Pattern Number (n=...	1	2	3	4
Total arrows (Sequence=...	3	5	7	?!)
nth term rule => $2n + 1$				

## USING THE Nth term RULE

**What is the difference between the 6<sup>th</sup> and 8<sup>th</sup> term of the sequence  $5n - 2$ ?**

Remember: for linear sequences (**d**) (difference) is always the same:– here **d=5** as sequence is based on the 5x table.  
There are two “jumps” from 6<sup>th</sup> to 8<sup>th</sup> term so difference between their values will be  **$2 \times 5 = 10$**

**A sequence has a rule:  $5n - 2$   
Is the term 72 in the sequence?**

Remember: for **any** sequence “**n**” represents a term’s position and **MUST be an integer**.  
Form and solve an equation ie.:  
Here **n is not an integer so 72 is not a term**

$$\begin{aligned} 5n - 2 &= 72 \quad (+2) \\ 5n &= 74 \quad (\div 5) \\ n &= 14.8 \end{aligned}$$

# QUADRATIC SEQUENCES

Key property: quadratic sequences increase or decrease by a different amount each term – but the difference between the differences is always the same....so to get from one term to the next you will **add or subtract the previous difference plus a same extra amount** each time.

The “base” quadratic sequence is the sequence of square numbers: 1, 4, 9, 16.....

To find nth term rule of a linear sequence:

- 1) Find 1<sup>st</sup> and then 2<sup>nd</sup> differences between the terms  
- if the 2<sup>nd</sup> difference is the same  
the sequence is quadratic and rule will include  $n^2$
- 3) Half the 2<sup>nd</sup> difference to get coefficient (number) of  $n^2$
- 4) Subtract each term of the new  $n^2$  sequence from the original
- 5) Find the nth term rule of the adjustment
- 6) Combine both elements for final rule

HegartyMaths clips 247 to 250

Example: **Foundation**

Find the nth term rule of the sequence: 2, 5, 10, 17, 26.....

Original	2	5	10	17	26
1 <sup>st</sup> difference	+3	+5	+7	+9	
2 <sup>nd</sup> difference		+2	+2	+2	
2 <sup>nd</sup> difference is same so sequence is quadratic ( $n^2$ ) Half of second difference is 1: rule must include $1n^2$					
$n^2$	1	4	9	16	25
Adjustment (Original – new)	+1	+1	+1	+1	+1

The nth term of the original sequence must be  $n^2 + 1$

Example: **Foundation / Higher Crossover**

Find the nth term rule of the sequence: 0, 6, 16, 30, 48....

Original	0	6	16	30	48
1 <sup>st</sup> difference	+6	+10	+14	+18	
2 <sup>nd</sup> difference		+4	+4	+4	
2 <sup>nd</sup> difference is same so sequence is quadratic ( $n^2$ ) Half of second difference is 1: rule must include $2n^2$					
$2n^2$	2	8	18	32	50
Adjustment (Original – new)	-2	-2	-2	-2	-2

The nth term of the original sequence must be  $2n^2 - 2$

Example: **Higher**

Find the nth term rule of the sequence: 0, 6, 16, 30, 48....

Original	3	9	17	27	39
1 <sup>st</sup> difference	+6	+8	+10	+12	
2 <sup>nd</sup> difference		+2	+2	+2	
2 <sup>nd</sup> difference is same so sequence is quadratic ( $n^2$ ) Half of second difference is 1: rule must include $1n^2$					
$1n^2$	1	4	9	16	25
Adjustment (Original – new)	+2	+5	+8	+11	+14

Find the nth term rule for this adjustment as for any linear sequence:  $3n - 1$

The nth term of the original sequence must be  $n^2 + 3n - 1$

## GEOMETRIC SEQUENCES

Key property: geometric sequences increase or decrease by the scale factor each term

So to get from one term to the next you will **multiply (or divide) by the same amount**.

This value is called the **common ratio** and found by dividing one term by the term before

$ar^{(n-1)}$  is the general rule of **all** geometric sequences

Where **a** is value of the first term of the sequence

**r** is the common ratio between each term

and **n** is (as ever) the position of a term

As such geometric sequence growth is **exponential**

To find nth term rule of a geometric sequence:

- 1) Identify the first term
- 2) Find common ratio between terms - **divide the value of a term by term before**.
- 3) Substitute into the general form  $ar^{(n-1)}$  - **simplify as needed**

HegartyMaths clip 264

Understanding the nth term rule:

**Example: Starting at 1 create a sequence where each term is 3 times more than the last:**

Position (n = ...)	1	2	3	4	5
Starting term (a =	1				
Common ratio (r =		x3	x3	x3	x3
Sequence:	1	3	9	27	81

So to calculate the 5<sup>th</sup> term, you would have to start with 1 then multiply by 3 4 times in total i.e.  $1 \times 3^4 \dots$  and whatever term you want to calculate you need to apply the "r" 1 less times than its position i.e.  $1 \times 3^{(n-1)}$

## FIBONACCI-style SEQUENCES

Key property: add the previous 2 terms to get the next term.

The classic Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, 21 ..... i.e. 1, 1, (1+1=2), (2+1=3), (3+2=5), etc

Fibonacci-style sequences are based on this term-to-term rule but may start at different points:

e.g. starting at 4,5  $\Rightarrow$  4, 5, 9, 14, 23, 37 ...

So for any starting point a and b  $\Rightarrow$  a, b, (a+b), (a+2b), (2a+3b), (3a+5b), etc...

HegartyMaths clip 263

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

- Understand how sides and angles are labelled and draw diagrams from a written description.
- Know and apply the rules of angles at a point, angles at a point on a straight line, vertically opposite angles;
- Know and use the rules of alternate and corresponding angles on parallel lines.
- Understand how the sum of angles in a triangle and quadrilateral can be used to deduce the sum of angles in any polygon, and the properties of regular polygons.
- Apply the properties and definitions of special types of quadrilaterals and triangles.
- Use knowledge of angle facts to calculate bearings.

**Key words**

points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons, rotation symmetries, square, rectangle, parallelogram, trapezium, kite and rhombus,

**How are sides and angles labelled?**

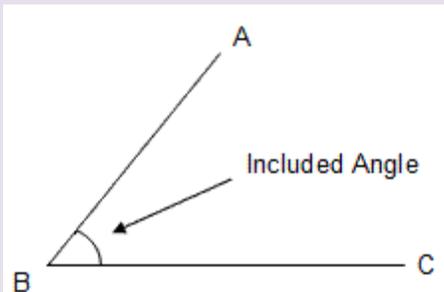
HegartyMaths clip 456

**Vertices** – Points/corners are labelled with capital letters.

A **straight Line** has two points and is named after the starting vertex and the end vertex.

Eg. The line AB or the line BC

**Angle** – An angle is the space between 2 intersecting lines that meet at **vertex** (corner), this space is measured in Degrees or Radians. The included angle can be called  $\angle ABC$  or it can be written as ABC.



A **Polygon** is created when straight lines are joined up to enclose a space. The polygon can be labelled by its vertices. For example, triangle ABC or  $\triangle ABC$ .

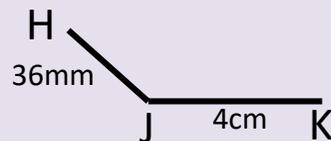
You might be asked to draw a diagram from a written description.

Eg.

**Angle HJK** is **obtuse** JK is **4cm** and HJ is **36mm**. Draw and label  $\angle HJK$

The word **Angle** means you will be drawing two lines that meet at a point. The word obtuse means the included angle is greater than  $90^\circ$  but less than  $180^\circ$ . The order of the letters means J will be the vertex where the two lines meet. Using a ruler, HJ should be drawn exactly 36mm long and JK is 4cm long.

Answer



**Angle Facts**

Acute angles are less than  $90^\circ$

Obtuse angles are between  $90^\circ$  and  $180^\circ$

Perpendicular lines meet at a right-angle which is  $90^\circ$

Reflex angles are between  $180^\circ$  and  $360^\circ$



Acute



Obtuse



Right-angle



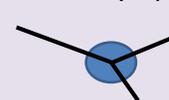
Reflex

Angles at a point sum to  $360^\circ$

Angles on a straight line sum to  $180^\circ$

Angles in a triangle sum to  $180^\circ$

Vertically opposite angles are equal



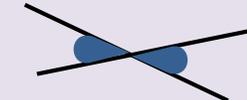
Sum to  $360^\circ$



Sum to  $180^\circ$



Sum to  $180^\circ$

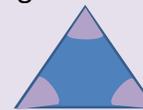


Opposite are equal

An equilateral triangle has 3 equal angles of  $60^\circ$

Base angles on an Isosceles triangle are equal

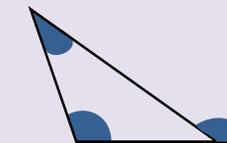
The exterior angle of a triangle is the sum of the two opposite interior angles



All  $60^\circ$



Base angles equal

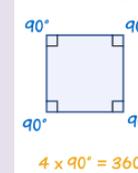


Sum of opposite interior = Exterior angle

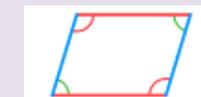
Angles in a quadrilateral sum to  $360^\circ$

Opposite angles in a Parallelogram are equal

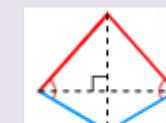
A kite has one pair of equal angles



$4 \times 90^\circ = 360^\circ$



Parallelogram



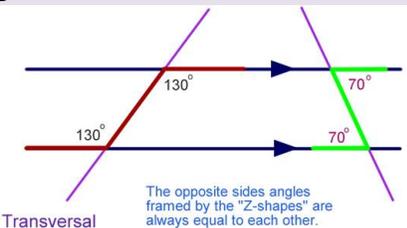
Kite

**Angles in Parallel lines**

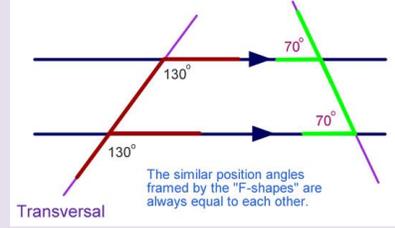
Parallel lines never get closer or further apart and therefore never intersect. A line that intersects a pair of parallel lines is called a **Transversal**



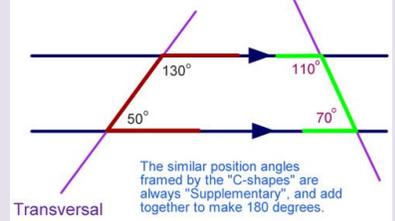
**Alternate angles are equal**, they form a 'Z' shape. When you think of 'alternate' you might think backwards and forwards, similar to how a 'Z' goes backwards and forwards. Alternate angles are on either side of the transversal.



**Corresponding angles are equal**, they form an 'F' shape. Corresponding angles on the same side of the transversal.



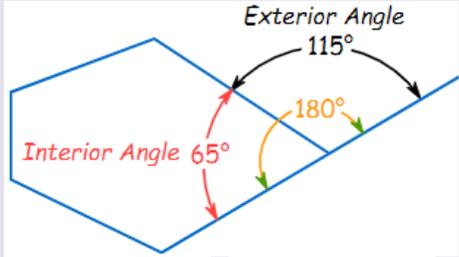
**Co-interior angles sum to 180 degrees**, they form a 'C' shape.



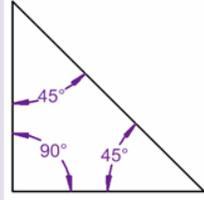
**Sum of Interior angles in Polygons**

**Polygons** are 2D shapes with straight lines. Polygons have **Interior** and **Exterior angles**, think interior like the inside of a house and exterior is the outside.

Two angle facts we already know are 'angles in a triangle sum to 180 degrees' and 'angles in a quadrilateral sum to 360 degrees'.



**Spot the pattern.....**



3

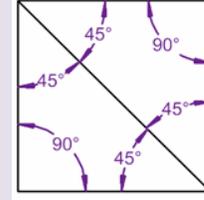
Number of sides:

1

Split into least number of triangles:

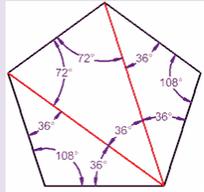
180 degrees

Sum of interior angles:



4

2



If we follow this pattern then we can predict the sum of the interior angles on a pentagon.....hexagon.....heptagon.....etc.

N° of sides: 5  
 N° of triangles: 3  
 Sum of interior angles: 3 x 180 degrees = 540 degrees

**General Rule:** The number of triangles is always 2 less than the number of sides. The number of triangles multiplied by 180 degrees equals the sum of the interior angles. In a regular polygon all angles are equal.

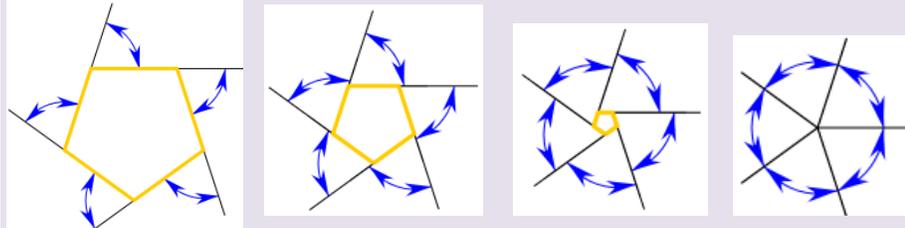
Therefore: (n = N° of sides)

HegartyMaths clips 561 to 565

**Sum of Interior Angles = (n-2) x 180 degrees**  
**Each Angle (of a Regular Polygon) = (n-2) x 180 degrees / n**

**Sum of Exterior angles in Polygons**

The exterior angle is formed by extending the side of a polygon, therefore the interior and exterior angles on a straight line will sum to 180 degrees.

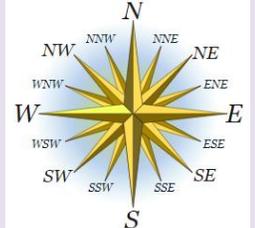


If we bring all the exterior angles on a polygon together we can see they meet at a point. We already know that angles at a point sum to 360 degrees. Therefore the general rule is:

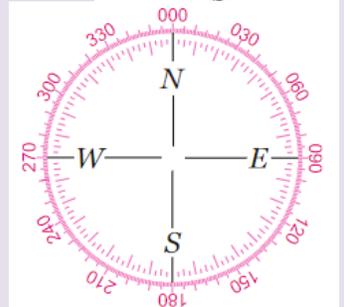
**The Exterior Angles of a Polygon add up to 360 degrees**

**Three Figure Bearings**

**Bearings** tell us direction. You are familiar with compass bearings - North, East, South and West.

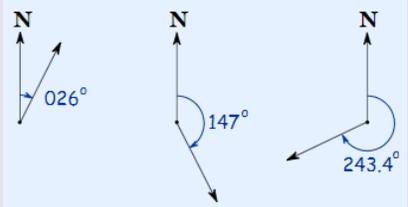


Three figure bearings are an alternative to compass bearings that are much more precise, measured in degrees.



3 things to remember:

- Bearings always use three figures. Eg. North is 000 degrees, East is 090 degrees, South is 180 degrees and West is 270 degrees
- Bearings are always measured from North (000 degrees)
- Bearings are always measured Clockwise



HegartyMaths clips 492 to 496

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

- Understand what is data and what are the different types of data
- What are the different ways of collecting and organising data?
- Understand what averages are and how to calculate the Mean, Median, Mode and Range
- Construct accurate statistical representations including Pictograms, Bar charts, Pie charts and Scatter graphs.
- How to interpret data from a table, graph and chart and make reasonable deductions

## Key words

### Data

Discrete	Mean
Continuous	Median
Primary	Mode
Secondary	Range
Qualitative	Ascending
Quantitative	Correlation
Numerical	
Primary	
Secondary	
Tally	
Frequency	
Class Intervals	
Averages	

## What is Data and what are the different types of data?

**Data** – Information in the form of words, numbers or symbols collected together for reference or analysis.

If the data is **numerical** (in numbers) we call this **quantitative** data, think quantity like amount. Example: How many pets do you have? “4” the answer is quantitative.

If the data is in words we call this **qualitative** data, think quality like the quality of an essay. Example: What’s your favourite food? “Curry” the answer is qualitative.

Quantitative data can be split into 2 types; **Discrete** data is when the answer is counted. Example: How many computer games do you own? You count how many games you have “10 games” and your answer is specific and therefore discrete.

**Continuous** data is measured. Example: What is your foot length? You can never measure anything exactly, your answer might be different depending on the tool you use and the accuracy with which you measure. You might measure your foot with a ruler to be 18cm but in a shoe shop with more accurate tools might measure it as 186mm, therefore the answer is continuous.

HegartyMaths clips 392, 393

## Collecting Data

**Primary** data – data you collect yourself. Questionnaires, surveys, observation, experiments, interviews etc.

**Secondary** data – Using data collected by someone else.

Research, books, internet, newspapers, articles, studies etc.

## Organising Data

HegartyMaths clip 401

Once the data has been collected it needs to be organised so it can be analysed. I ask 67 people what their favourite colour is, their responses can be organised in a **tally** chart like this one. Tallies are recorded in groups of 5. Adding the tally gives the **frequency**. Frequency is the total number of times an answer has been selected.

Colour	Tally	Frequency
Red	HHH HHH III	13
Blue	HHH IIII	9
White	HHH HHH HHH HHH IIII	24
Black	HHH HHH II	12
Other	HHH IIII	9

When there are many options the answers can be grouped into **class intervals**, or groupings. Grouped frequency table:

Number of magazines	Tally	Frequency
0 - 4	HHH III	8
5 - 9	HHH	5
10 - 14	HHH II	7
15 - 19	III	3
20 - 24	HHH IIII	9
25 - 29	III	3
30 - 34		0
35 - 39	HHH	5
40 - 44		0
45 - 49	III	3
more than 49		0

## Analysing Data

**Average** – A number that best represents a set of data. A calculated “central” value of a set of numbers. There are 4 mathematical averages, the best type of average to use depends on the data set.

**Mean** – The most common type of ‘average’ It is easy to calculate: **add up** all the numbers, then **divide by how many** numbers there are.

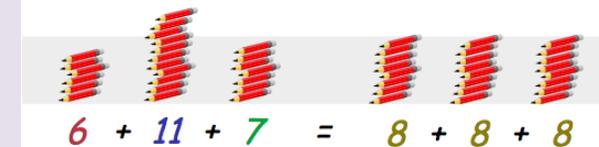
HegartyMaths clips 405 to 408

Example 1: What is the Mean of these numbers?

6, 11, 7

- Add the numbers:  $6 + 11 + 7 = 24$
- Divide by *how many* numbers (there are 3 numbers):  $24 / 3 = 8$

The Mean is 8



It is like you are “flattening out” the numbers

**Mode** – The **“most common”** or the appears most often. There can be more than one Mode.

HegartyMaths clip 404

Example:

3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29

In order these numbers are:

3, 5, 7, 12, 13, 14, 20, **23, 23, 23, 23**, 29, 39, 40, 56

This makes it easy to see which numbers appear **most often**.

In this case the mode is **23**.

**Range** – The **difference** between the largest and smallest values in a data set.

Biggest – smallest = Range

**Analysing Data**

**Median** – The *"middle"* of a sorted list of numbers.

Step 1 – Put the numbers in **ascending** order (smallest to biggest)

Step 2 – Find the **middle** number. **count how many numbers, add 1 then divide by 2.**

$$\frac{n+1}{2} \quad n = \text{how many numbers in the data set}$$

Example 1: Calculate the median of 3, 13, 7, 5, 21, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29

Step 1 – Order the numbers  
3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 39, 40, 56,

Step 2 – There are 15 numbers  
 $n = 15 \quad \frac{n+1}{2} = \frac{15+1}{2} = 8^{\text{th}}$

The middle number is the 8<sup>th</sup> number:

3, 5, 7, 12, 13, 14, 21, **23**, 23, 23, 29, 39, 40, 56,

The Median is 23

If the data set has an even amount of numbers then the median is mid-point between the 2 middle numbers.

Example: Calculate the median of 5, 7, 3, 9,

Step 1: Order numbers 3, 5, 7, 9,

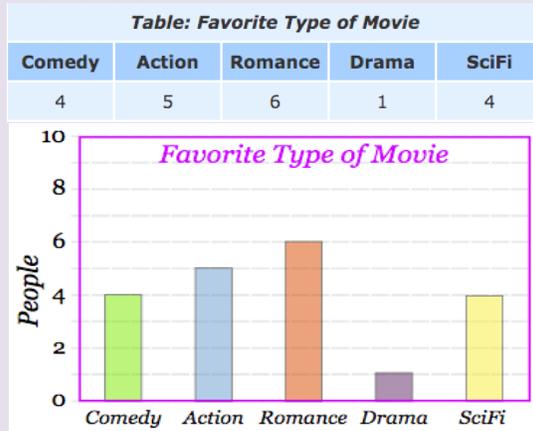
Step 2:  $n = 4 \quad \frac{n+1}{2} = \frac{4+1}{2} = 2.5^{\text{th}}$

The median is half way between the 2<sup>nd</sup> and 3<sup>rd</sup> number. The median is 6.

**Presenting Data**

The data has been collected, it has been sorted and now it can be presented.

**Bar Chart:**

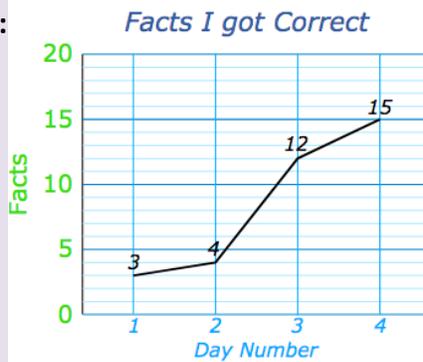


The perfect **Bar chart** must:

- Be drawn with a pencil and ruler
- Have a title
- Have spaces between the bars
- The axes must be labelled
- Have bars of equal width and equal sized spaces between the bars
- Have an even scale – equal sized space between the numbers

**Line graph:**

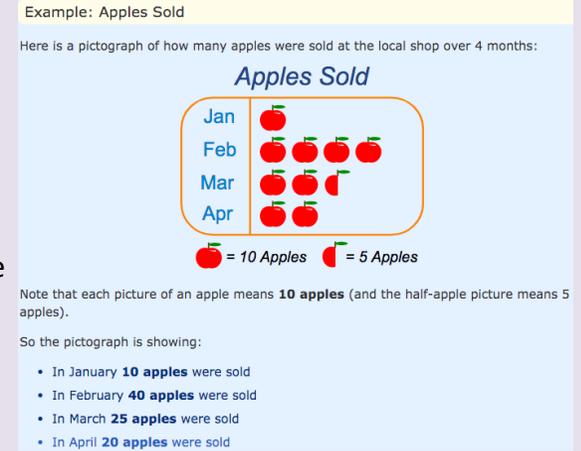
Same as a bar chart but data points connected by straight lines.



**Pictogram/pictograph** – showing data using images. Each image represents a specific value.

The perfect **Pictogram** must:

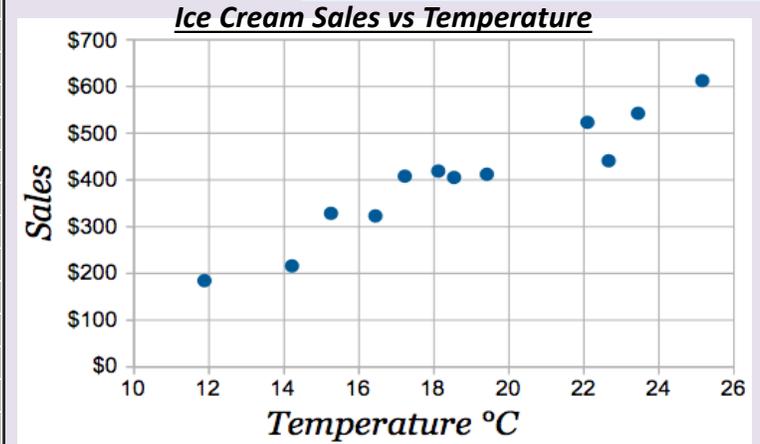
- Have a title
- Have a key showing the value of the image
- Have images of an equal size and shape with equal distance between each image



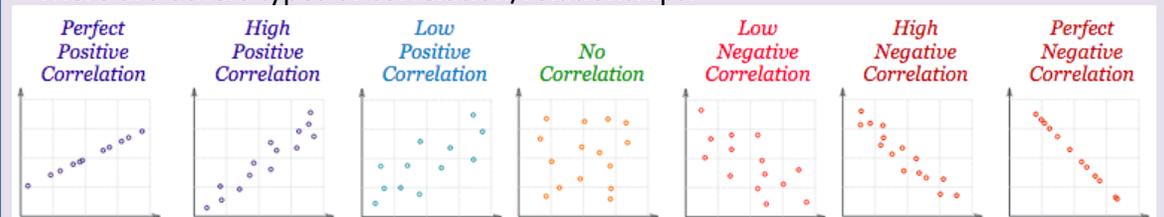
**Scatter Graph** – shows the relationship between two quantitative data sets.

*Ice Cream Sales vs Temperature*

Temperature °C	Ice Cream Sales
14.2°	\$215
16.4°	\$325
11.9°	\$185
15.2°	\$332
18.5°	\$406
22.1°	\$522
19.4°	\$412
25.1°	\$614
23.4°	\$544
18.1°	\$421
22.6°	\$445
17.2°	\$408



This type of graph allows us to draw a conclusion about the relationship between two things, in this example we can say as the temperature increases, so does the number of ice creams sold. We call this a positive correlation as both values are increasing together. There are others types of correlation/relationships:



### Pie chart

Represents data in a way that shows the relative size of the category. A good way of displaying data if there are large differences between the categories but not accurate when interpreting the data.

Example: You survey your friends to find out their favourite genre of movie. The results are

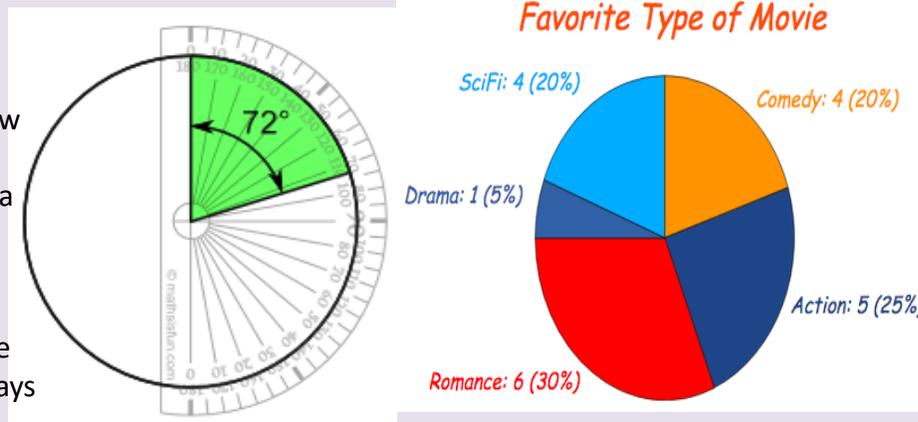
Comedy	Action	Romance	Drama	SciFi
4	5	6	1	4

Comedy	Action	Romance	Drama	SciFi	TOTAL
4	5	6	1	4	20

$$\frac{360}{20} = 18^\circ$$

Comedy	Action	Romance	Drama	SciFi	Total
4	5	6	1	4	20
4 x 18 = 72°	5 x 18 = 90°	6 x 18 = 108°	1 x 18 = 18°	4 x 18 = 72°	20 x 18 = 360°

- Draw a circle using a compass and pencil
- Draw a line from the centre of the circle to the edge, this is the base line
- Line up a protractor with the base line, the centre of the circle positioned with the central cross of the protractor. Follow the base line to the edge of the protractor and counting up from zero, measure the angle of the first sector (slice). Make a mark, remove the protractor and draw a straight line to complete the first slice
- Line up the protractor on the line you have just drawn and repeat the last step, this time measuring the slice to the angle of the next slice, repeat until complete. Remembering to always line up with the last line drawn.
- Don't forget to add a title and Key.



### How to draw a pie chart:

- Calculate the total frequency (add up all of the people in your survey)
- There are 360° in a full circle, Divide 360 by the total frequency (the number of people in your survey) to calculate how many degrees each person is worth  $\frac{360}{20} = 18^\circ$
- Multiply each frequency by the number of degrees per person to calculate the angle size of the sector (slice of the pie)

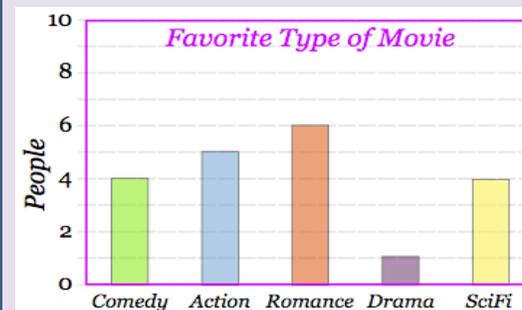
### Interpreting Data

To interpret data is to analyse data and make deductions and infer relationships.

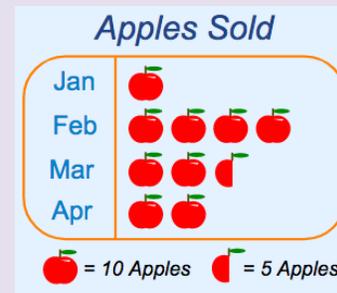
Examples:

Colour	Tally	Frequency
Red		13
Blue		9
White		24
Black		12
Other		9

By analysing this tally chart we can deduce that the most popular colour is white.



By analysing this bar chart we can deduce from the survey that the most popular genre of Movie is Romance and the least popular is Drama.



From this pictogram We can deduce that The most number of Apples were sold in February (40) and the least in January (10). The Range is 30.

The way in which the data is presented can show relationships and differences quickly and efficiently. Making analysis and interpretation easy depending on the type of graph/chart used.

## 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.

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

### 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 e.g. 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.

## 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.

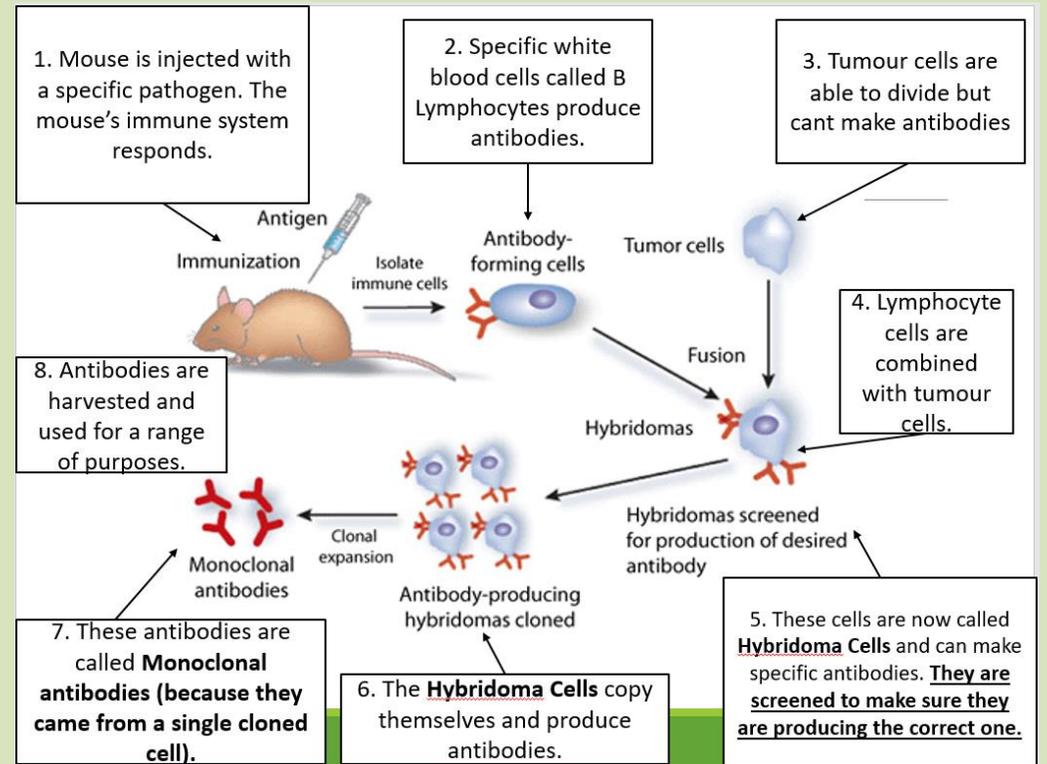
- Very low doses of the drug and given at the start of the clinical trial.
- If the drug is found to be safe, further clinical trials are carried out to find the **optimum dose** for the drug.
- In **double blind trials**, some patients are given a **placebo**.

## Uses of monoclonal antibodies

- For diagnosis e.g. **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.



## [HT 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.

## 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 fetus 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).

**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.

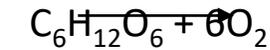
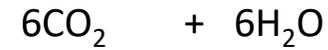
## KS4 Biology: B8 Photosynthesis

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.

Carbon dioxide + water

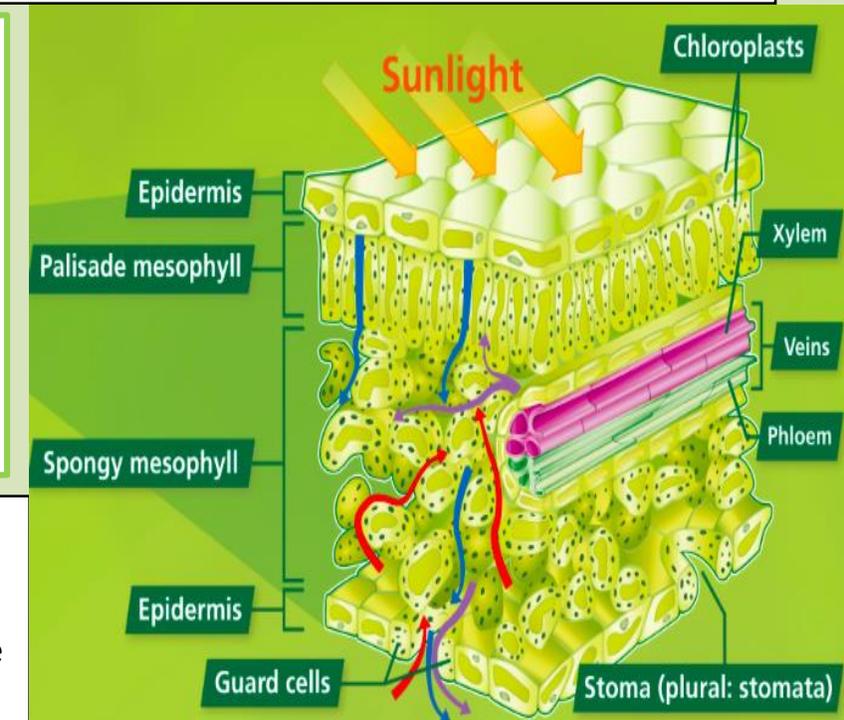
Light  
Chlorophyll

glucose + oxygen



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.

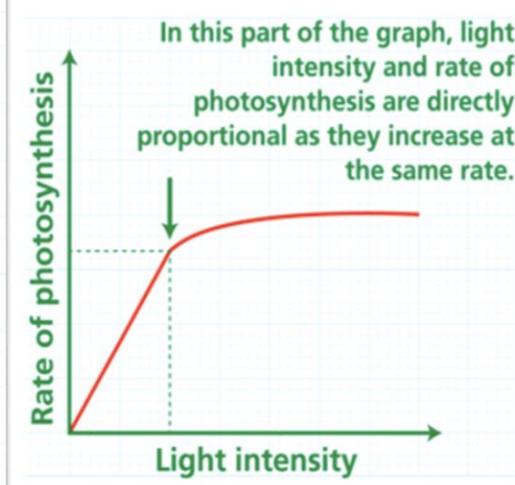
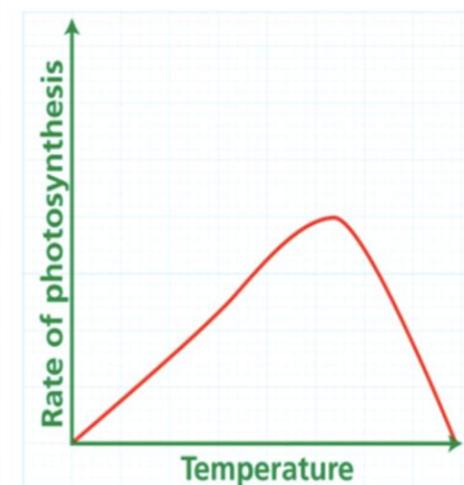
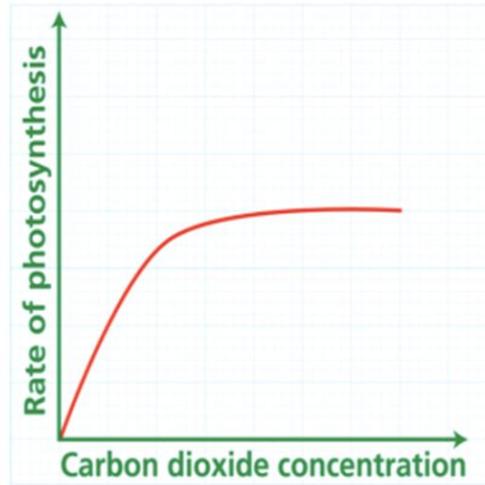
Keyword	Definition
Palisade Mesophyll Cell	Elongated cells, packed closely together with many chloroplasts.
Partially Permeable Membrane	A membrane with tiny holes which lets some molecules through.
Phloem	Type of plant tissue which transports dissolved sugars around the plant.
Photosynthesis	Process 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

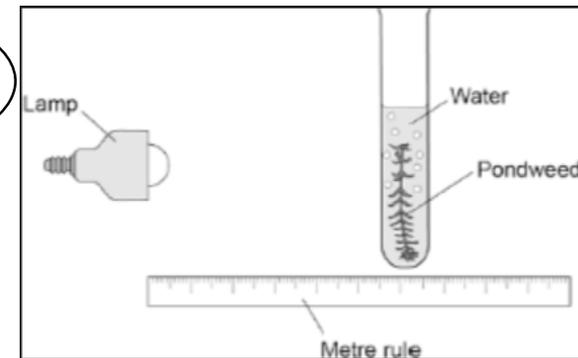
- These three factors can prevent the rate of photosynthesis happening faster:



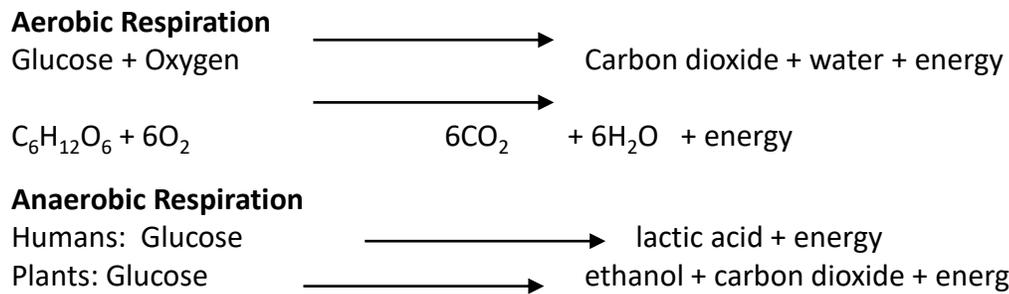
### Required Practical

- 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



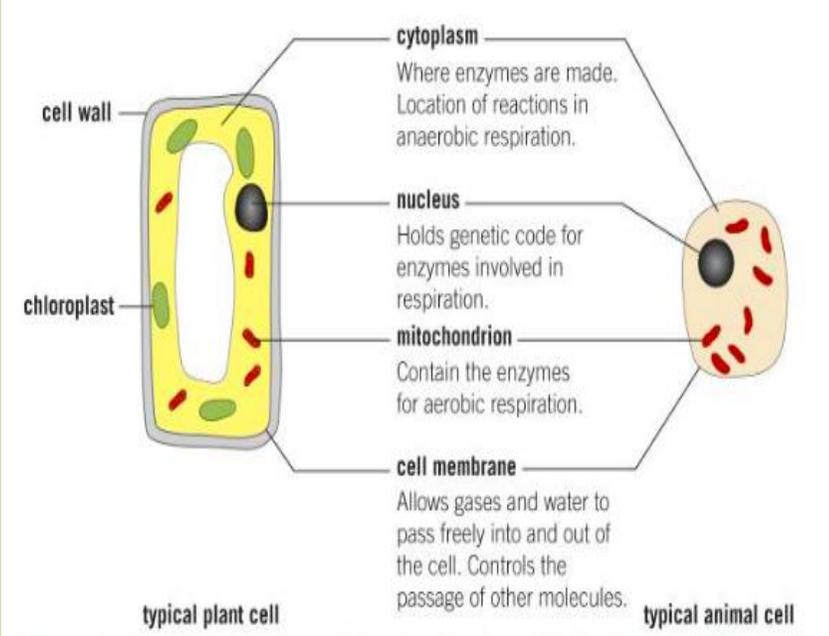
- Aerobic Respiration**
- Chemical reaction that occurs inside cells in all living organisms.
  - Process of transferring energy from the breakdown of glucose.
  - Exothermic reaction.
  - Aerobic respiration is with oxygen.
  - Anaerobic respiration is without oxygen.
  - Occurs in mitochondria.

- 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.

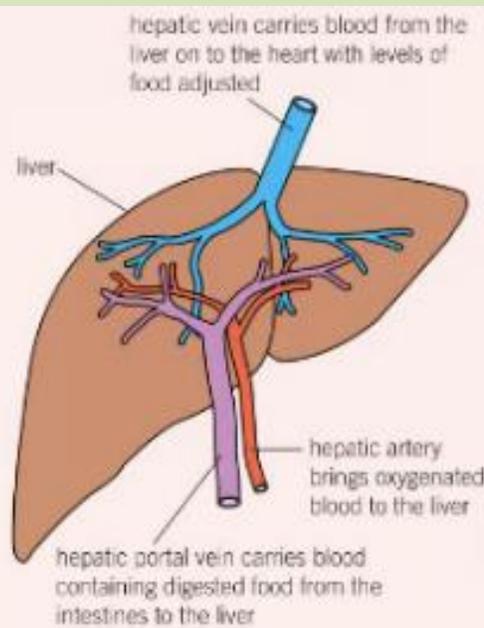
- Oxygen Debt**
- Is the amount of extra oxygen the body needs after exercise to react with the build up of lactic acid and remove it from the cells.
  - The pulse and breathing rate stay high whilst there are high levels of lactic acid and carbon dioxide to deliver more oxygen to the cells.
  - Lactic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

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.  e.g.) 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.



**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

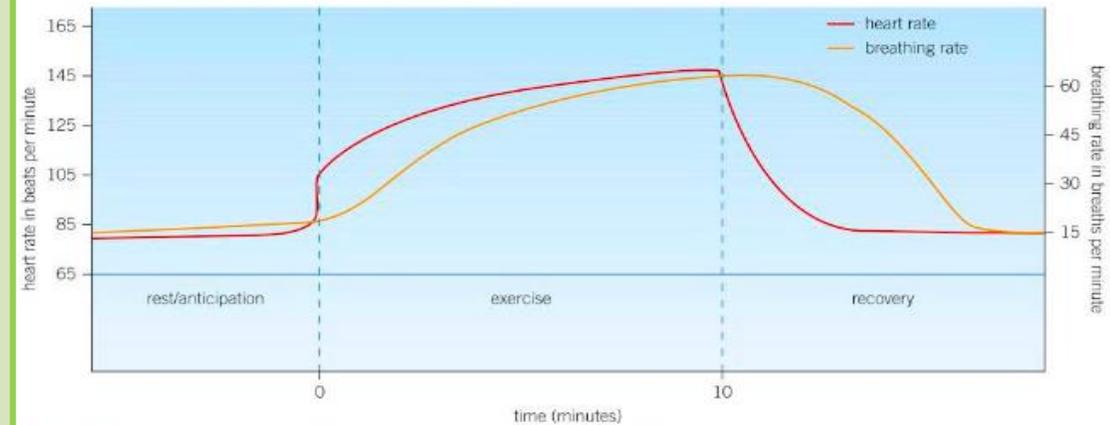


Figure 2 The changes measured in the heart and breathing rate before, during, and after a period of exercise

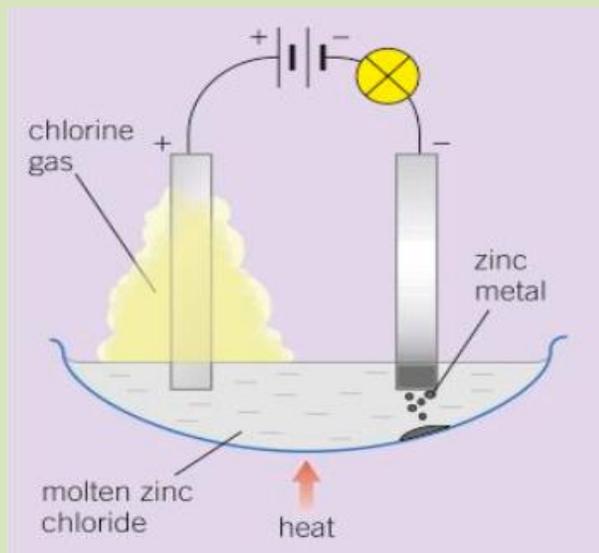
### Metabolism

- 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.

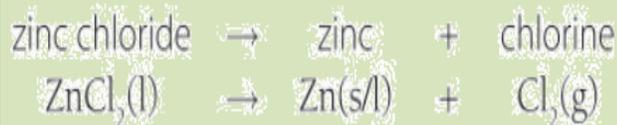
# KS4 Chemistry: C6 Electrolysis

Keyword	Definition
Electrolysis	decomposition of an electrolyte by an electric current
Electrolyte	Molten or dissolved substance which conduct electricity
Electrode	: A conductor used to make electrical contact with a circuit.
Anode	Positive electrode
Cathode	Negative electrode
Ion	An atom that has lost or gained electrons- becoming charged
Ionic compound	A compound made from a metal and a non-metal
Inert	A typically unreactive substance
Brine	A concentrated sodium chloride solution

## Introduction to electrolysis

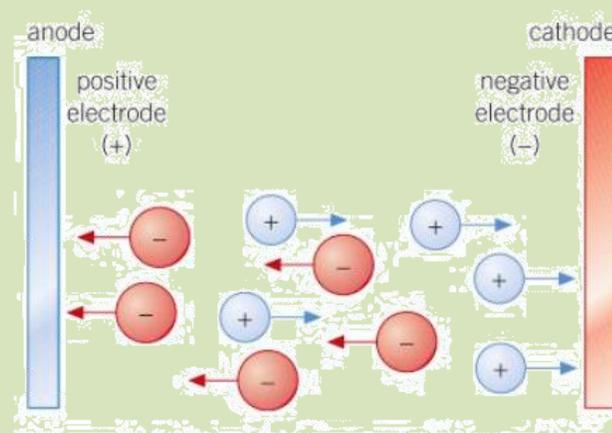


- During electrolysis positive ions move to the cathode and negative ions move to the anode
- This is mainly for ionic compounds
- These compounds must be in solution or be molten as the ions need to be able to move to conduct electricity. When the compound is a solid, these ions are fixed



- Zinc chloride is electrolysed into solid zinc metal and chlorine gas

## Changes at the electrodes



- Negative ions lose an electron at the anode to become an atom
- Positive ions gain an electron at the cathode to become an atom

**Oxidation**  
Is  
**Loss of electrons**

Negative ions

**Reduction**  
Is  
**Gain of electrons**

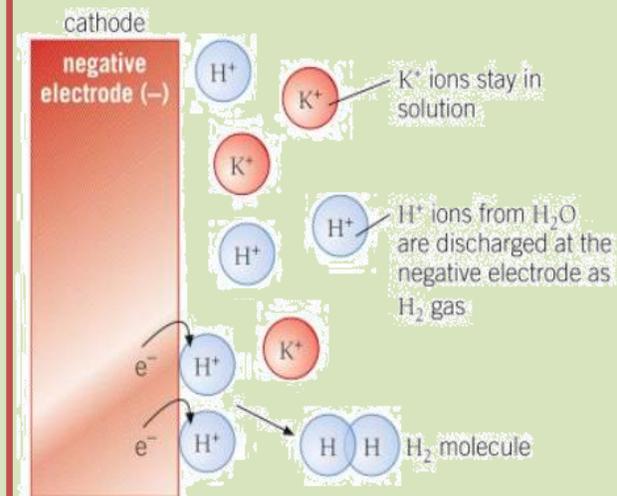
Positive ions



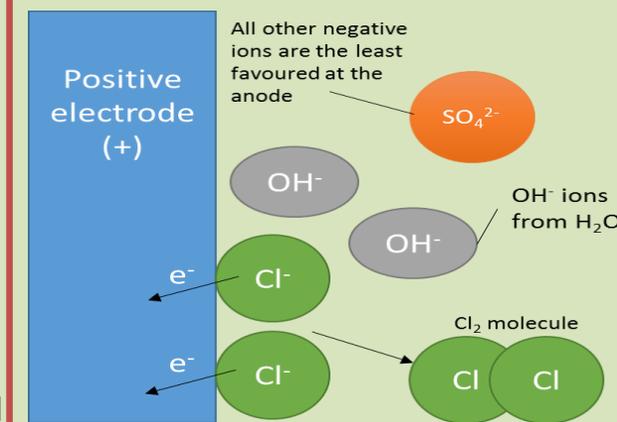
- Water can also ionise into the above ions. This means that there are more ions in solution when ionic compounds are dissolved

## What is formed at the electrodes?

- At the cathode it is always the least reactive element that is formed (use the reactivity series to help you)

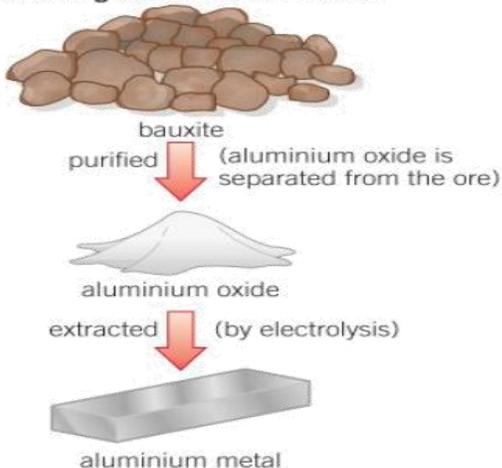


- At the Anode, the order of discharge is: Group 7 halide ions > hydroxide (OH<sup>-</sup>) ions > all other negative ions

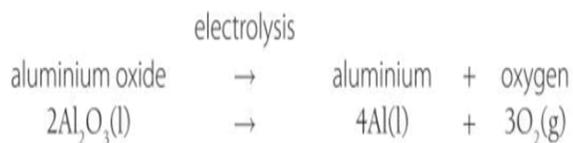


## Extraction of aluminium

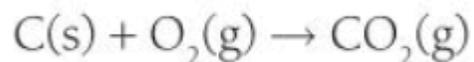
### extracting aluminium from its ore



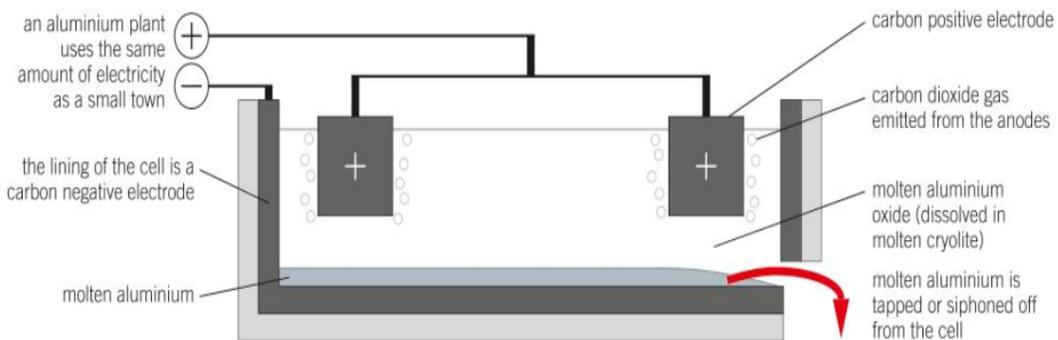
Equation for the electrolysis of aluminium oxide



Reaction between the oxygen produced and the hot carbon electrodes (causing the destruction of the electrodes)

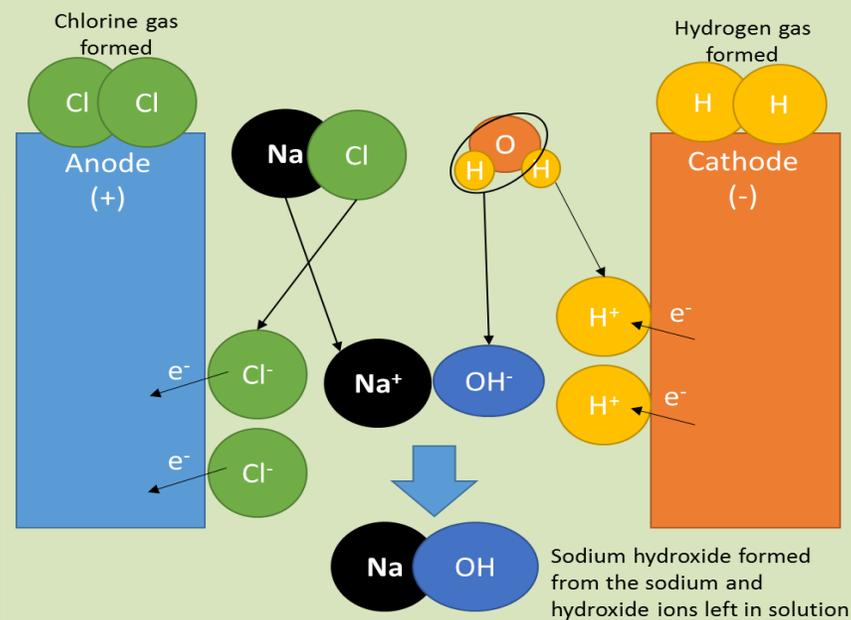


- Aluminium is an important and useful metal used for pans, planes, bikes and drinks cans
- Aluminium is found in ore called Bauxite as aluminium oxide
- It is too reactive to be displaced and extracted using carbon



- Aluminium oxide must be melted to undergo electrolysis, this usually requires a lot of energy to heat to its melting point of 2050°C. However a substance called cryolite is added to it which lowers the melting point to 850°C, saving energy.
- Aluminium is formed at the cathode and Oxygen is formed at the anode
- The aluminium is collected and the Oxygen reacts with the hot carbon electrodes to form carbon dioxide gas, requiring the electrodes to be replaced regularly

## Electrolysis of aqueous solutions



- Electrolysis of brine is an important reaction as it gives 3 useful products
- Hydrogen gas which can be used as a fuel
- Chlorine gas which can be used to kill bacteria in drinking water
- Sodium hydroxide solution which is used to make bleach
- Chlorine is formed as it is a halide ion, making it the preferred to be formed at the anode
- Hydrogen is formed as it is less reactive than sodium at the cathode
- The remaining solution is a mixture of sodium and hydroxide ions which combine to form sodium hydroxide. You can test this by adding universal indicator to the solution as sodium hydroxide is an alkali

### Further reading

- <https://www.bbc.co.uk/bitesize/guides/zcsyw6f/revision/1>
- [https://www.youtube.com/watch?v=7ullq\\_Ofzgw&safe=active](https://www.youtube.com/watch?v=7ullq_Ofzgw&safe=active)

## HT only- Half equations

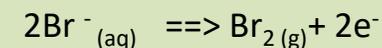
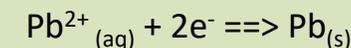
Remember that half equations show the movement of electrons so we can see if a element has been oxidised or reduced

A helpful hint is that there are only ever 3 parts to a half equation

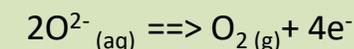
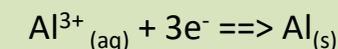
- The neutral atom of the element
- The positive or negative ion it forms
- The electrons that have been lost or gained ( $e^-$ )

if it is a positive ion then the electron(s) will be on the same side as the ion. If it is a negative ion then the electron(s) will be on the opposite side to the ion.

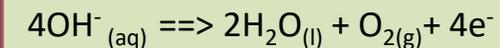
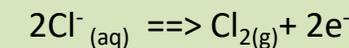
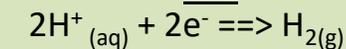
### Half equations for Lead bromide



### Half equations for Aluminium



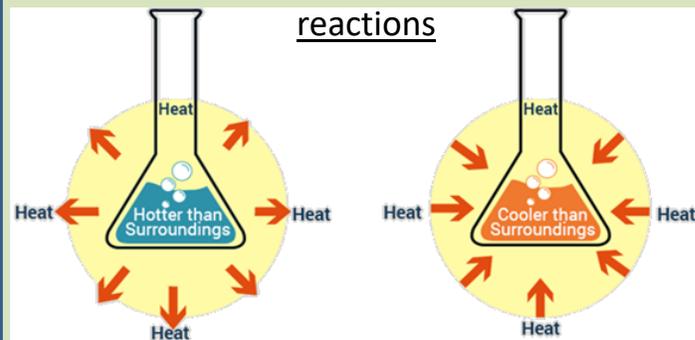
### Half equations for Brine (including $\text{OH}^-$ )



# 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	A store of chemical energy that can be transferred as an electric current in a circuit
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
HT only	Always <u>endothermic</u> as energy is
<b>Bond breaking</b>	needed to break bonds in reactants
<b>Bond making</b>	Always exothermic as energy is released when bonds are formed in products

## Exothermic vs Endothermic reactions



Energy can not be created or destroyed- only transferred from one form to another. heat is an example of energy (thermal energy).

Exothermic reactions heat is transferred to the surroundings from the reaction and in

Endothermic reactions heat is transferred from the surroundings to the reactions

## Cooling down!

Instant ice packs contain separate compartments of ammonium nitrate and water. When needed the compartments can be punctured causing the substances to mix and undergo an endothermic reaction. These are great for first aid kits as they do not need to be kept in the fridge/freezer

## Warming up!

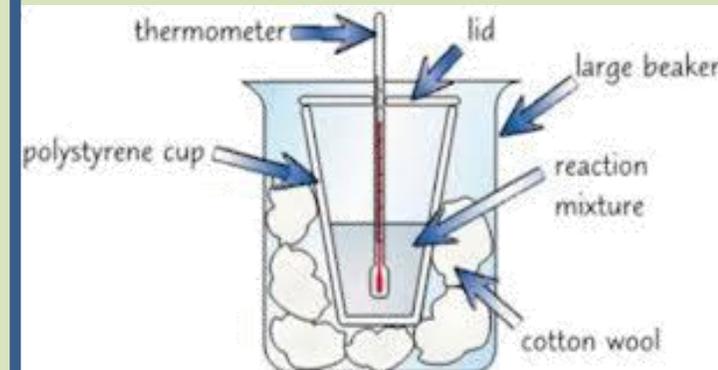
Hand warmers are a great example of exothermic reactions. A small metal disc is used to start the crystallisation reaction in a super saturated solution of sodium ethanoate. They can be reused, reducing the waste to landfill.

Self heating cans use calcium oxide and water in a separate compartment to heat up the contents such as food or coffee.

## Examples of endo/exo reactions

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

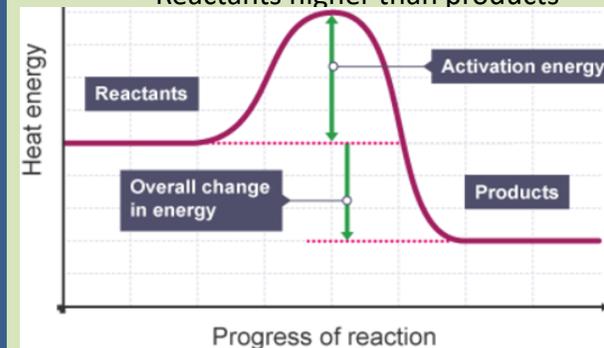
## Required practical- investigating temp changes



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)

## Exothermic

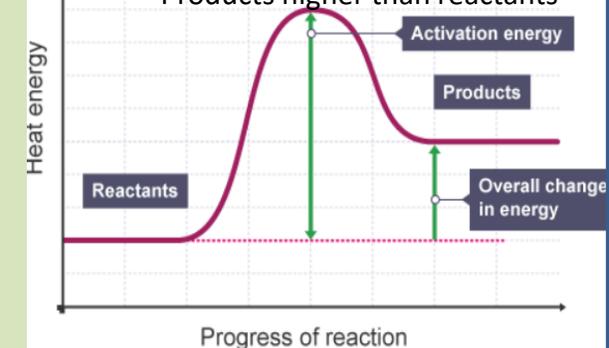
Reactants higher than products



## Reaction profiles

## Endothermic

Products higher than reactants



## Bond energy calculations (HT only)

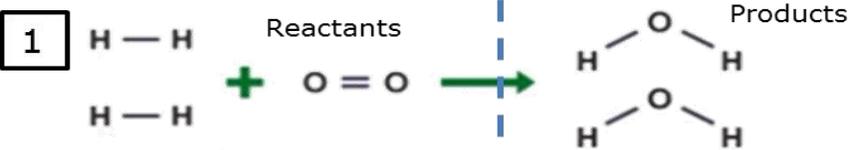
Bond energy calculations tell us the energy changes in a reaction. This ultimately determines if it is endothermic or exothermic.

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.

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



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

4

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

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

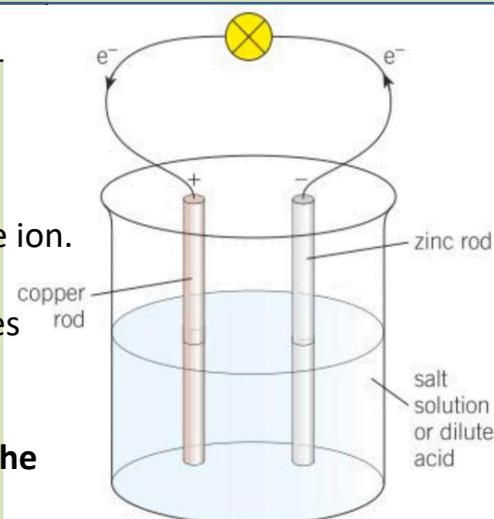
## Chemical cells and batteries (Chem only)

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**



You can also make a cell by reacting hydrogen and oxygen to make water- reducing the amount of fossil fuels used

## Fuel cells (Chem only)

$\text{H}_2$  gas supplied to cathode

$\text{O}_2$  supplied to anode

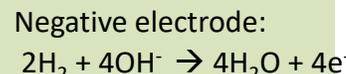
### Pros

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

### Cons

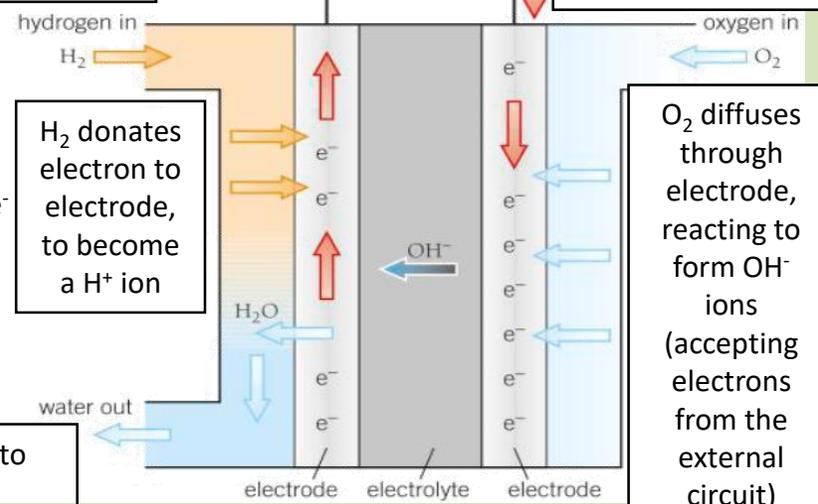
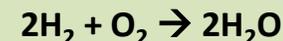
- Hydrogen is difficult to store
- Is highly flammable
- Is sometimes produced using finite resources

### Half equations- HT only



$\text{OH}^-$  and  $\text{H}^+$  ions react to form water

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>

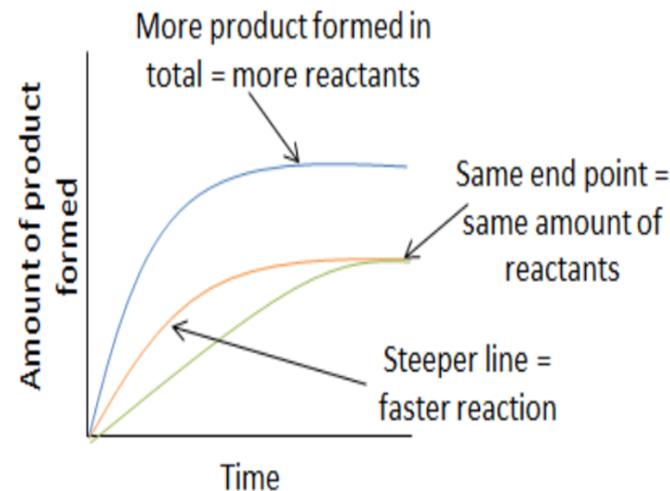
## KS4 Chemistry: C8 Rates of reaction

Key word	Definition
Reactant	What is used in a chemical reaction
Product	What is formed during a reaction
Catalyst	A chemical/substance that increases the rate of reaction without being used up in the reaction
Tangent	A straight line that touches a curve on a graph at one point
Activation energy	The minimum energy required for a reaction to take place
Collision theory	The theory that states that for a chemical reaction to take place- it needs particles to collide with sufficient energy
Le Chatelier's principle	A principle that 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 occurring at the same rate
Rates of reaction	The speed at which products are formed
Closed system	A reaction where no reactants or products can escape and only heat can be exchanged freely

### Rate of reaction

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



### 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



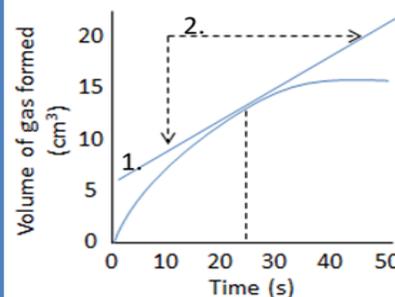
Reactants have or exceed activation energy on collision



### Calculating rates of reaction

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:



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

Mean rate of reaction

amount of product formed  
or  
amount of reactant used

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

OR

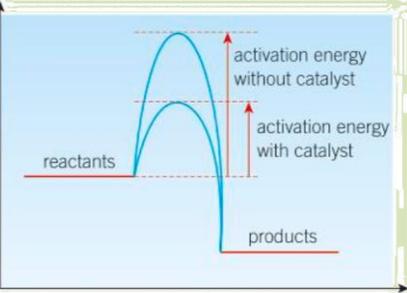
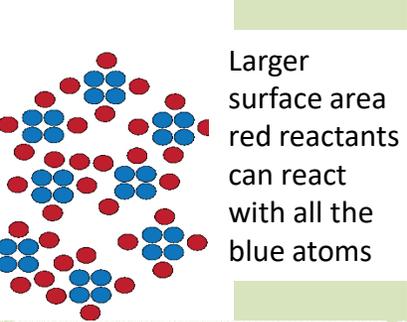
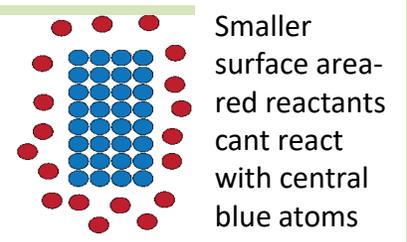
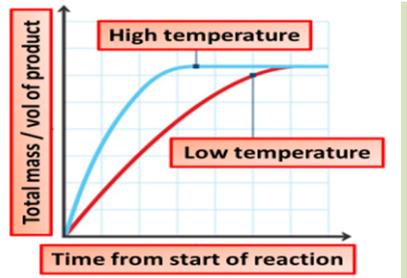
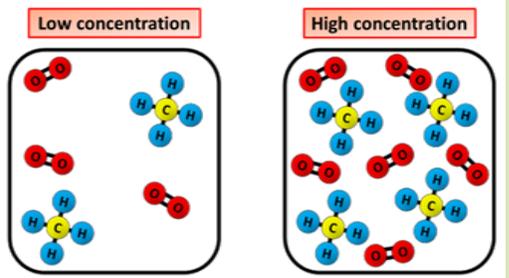
- Draw a tangent at the point you want to calculate the rate
- Pick any two points along the tangent
- Calculate the change in X and the change in Y

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	faster RoR- more kinetic energy= more chance of successful collisions	Slower RoR- less kinetic energy= smaller chance of successful collisions
Pressure/concentration	Increase	Decrease
Effect on rate of reaction	faster RoR- smaller space and more particles overall= more successful collisions	Slower RoR- larger space and fewer particles overall= smaller chance of successful collisions
Surface area of reactants	Increase	Decrease
Effect on rate of reaction	faster RoR-as more particles are available to react	Slower RoR- Fewer particles are accessible/available to react
Catalyst	Present	Not present
Effect on rate of reaction	faster RoR-as it provides an alternative route with a lower activation energy required	Slower



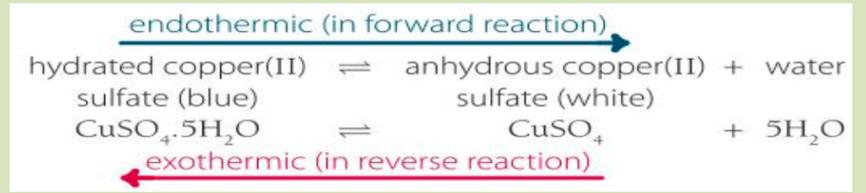
Reversible reactions

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



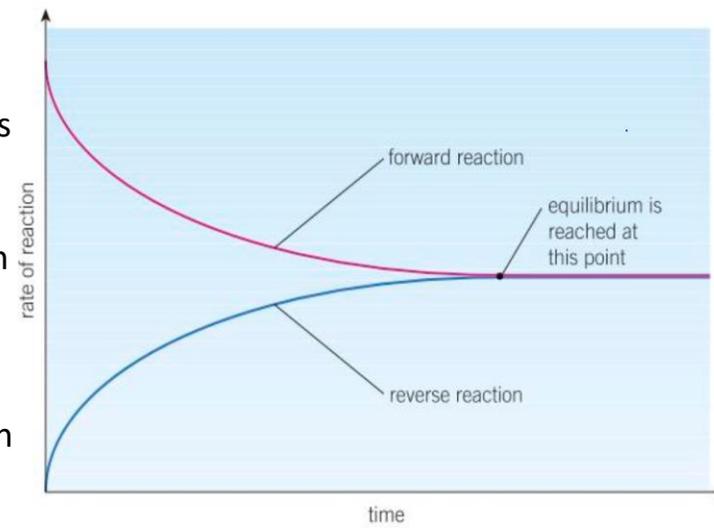
We use this symbol to show the reaction is reversible

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



## Le Chatelier's principle (higher)

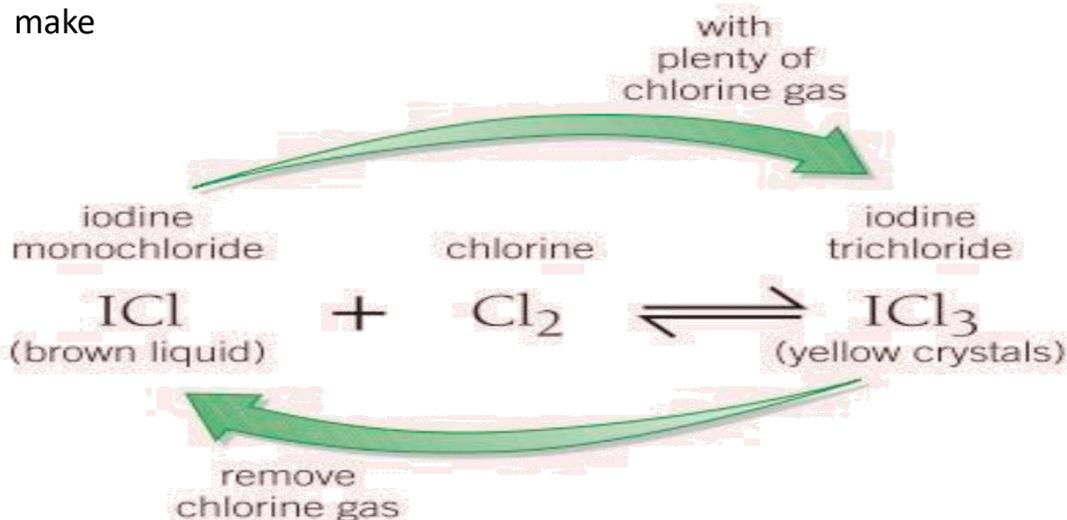
Le Chatelier's principle is a principle that a reversible reaction will "work against" any changes made to the reaction so that it is cancelled out. The changes made can be either

- 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

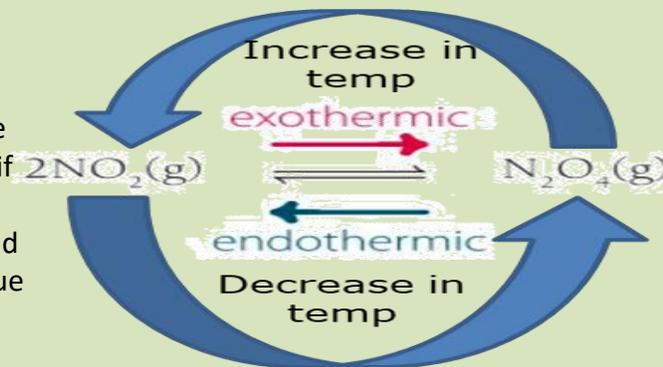
Le Chatelier's principle is important as we can use it in industry to change the conditions of a reaction to favour a product we wish to make



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

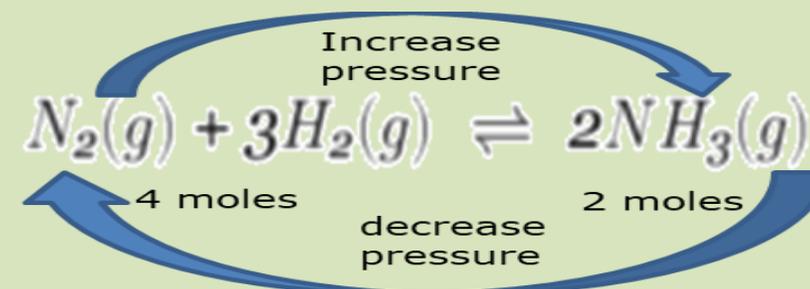
### Temperature

In a closed system- the effect of temperature on a reversible reaction depends on which reaction is exo or endo thermic. 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 exothermic



### 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 <u>more</u> molecules of gas	If the forward reaction produces <u>fewer</u> molecules of gas	If the forward reaction is <u>exothermic</u>	If the forward reaction is <u>endothermic</u>
An increase in pressure decreases the amount of products formed	An increase in pressure increases the amount of products formed	An increase in temperature decreases the amount of products formed	An increase in temperature increases the amount of products formed
A decrease in pressure increases the amount of products formed	A decrease in pressure decreases the amount of products formed	A decrease 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>

# KS4 Physics: P7 Radioactivity

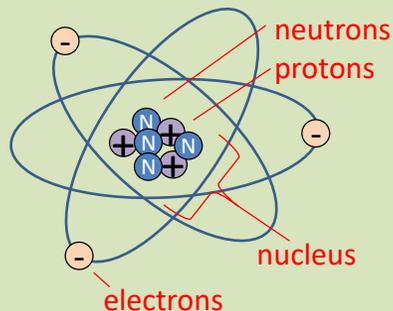
## Atomic structure

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



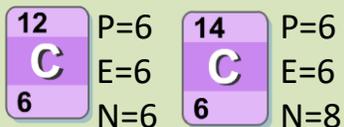
**Atomic number** = number of protons (number of electrons also)



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.

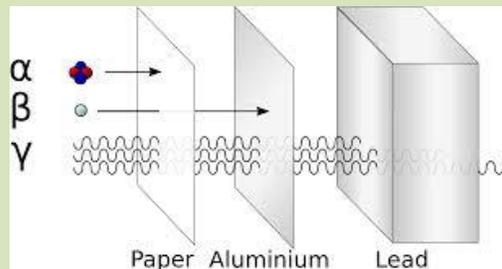
## The history of the atom

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.

## KS4 Physics: P7 Nuclear physics and radioactivity

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**.



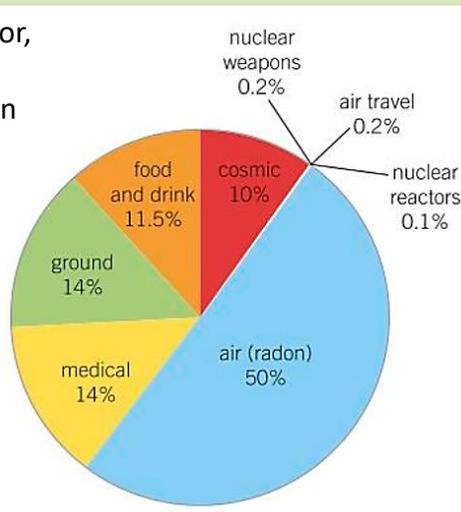
Radiation	Symbol	What is it?	Ionisation strength	Penetrating power	Range in air
Alpha $\alpha$	${}^4_2\text{He}$ ${}^4_2\alpha$	A Helium nucleus	Strongly ionising	Stopped by paper	A few cm (~10cm)
Beta $\beta$	${}^{-1}_0\text{e}$ ${}^{-1}_0\beta$	An electron	Moderately ionising	Stopped by aluminium	Several metres
Gamma $\gamma$	${}^0_0\gamma$	An electro magnetic wave	Very weakly ionising	Stopped by thick lead	Many, many metres

### Measuring radiation:

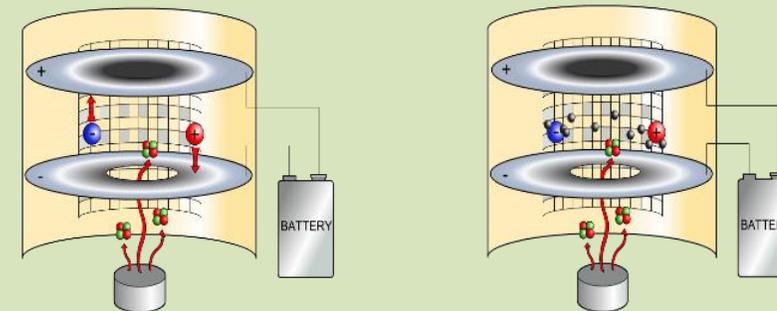
- **Count-rate** is the number of decays recorded each second by a detector, such as the Geiger-Muller tube.
- **Activity:** the number of decays per second from a sample (measured in Becquerel's Bq).
- Sieverts: this is a unit for dose (Sv) usually given in milli Sieverts, mSv

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.

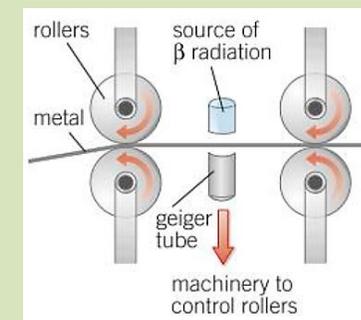


### Uses of radioactive decay

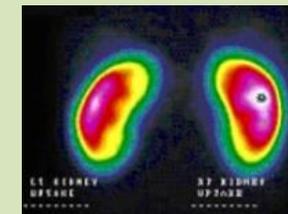


**Alpha** particles are used in smoke detectors. The alpha particles ionise air between two plates in a circuit. This allows a current to flow. If smoke is present, this interacts with the alpha particles resulting in a drop in the current and the alarm sounds.

**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.



**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.

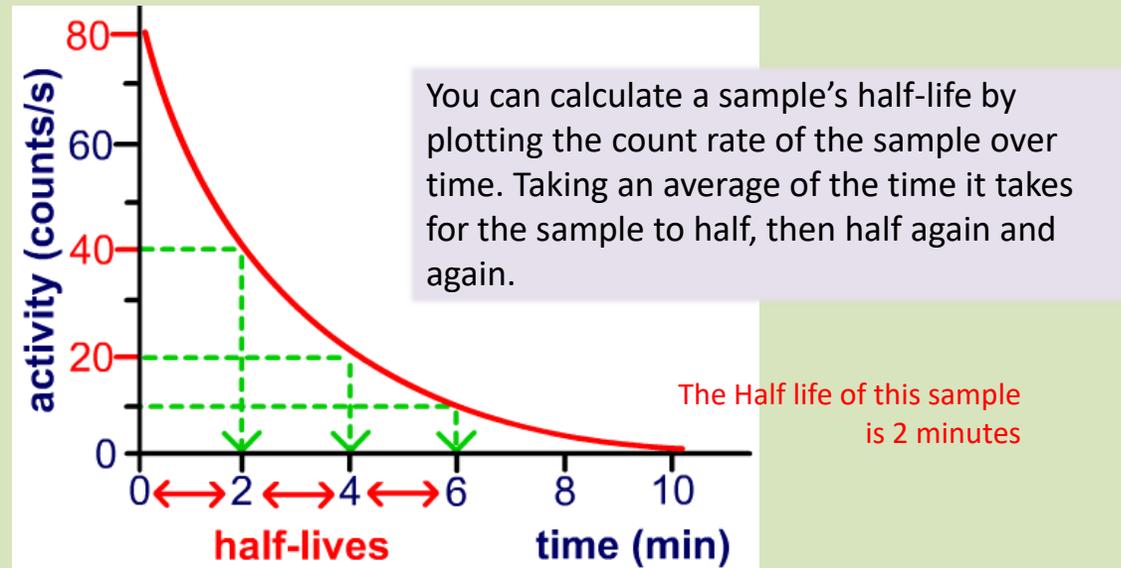
**Half-life** The half-life of a radioactive isotope is the average time that it takes for **half** the nuclei in a sample to decay.

There are three ways to consider half-life:

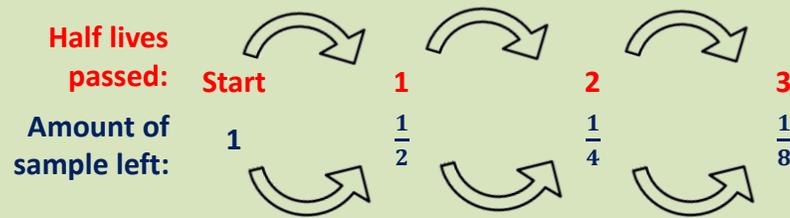
**Half-life is the time it takes for half of nuclei in a sample to decay**

**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*

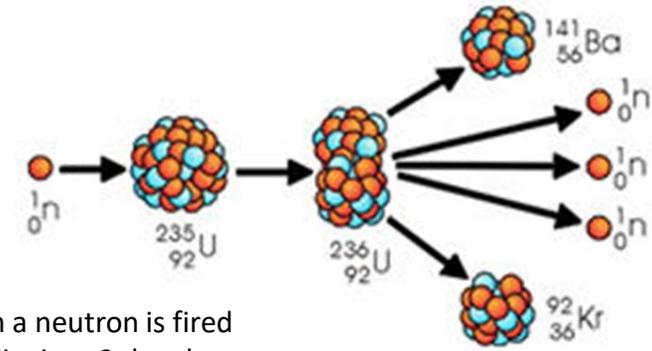
## Physics Separates only

### 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.



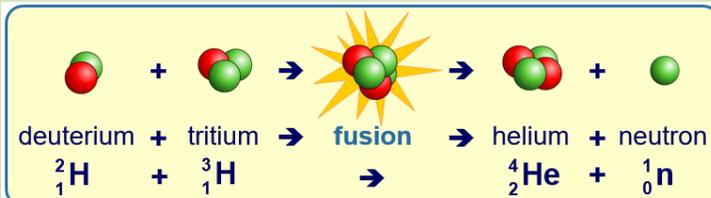
In a fission chain reaction a neutron is fired at a  $^{235}\text{U}$  nucleus. This splits into 2 daughter nuclei and releases 3 more neutrons. These in turn collide with other  $^{235}\text{U}$  nuclei and the process repeats. Lots of energy is released in the form of kinetic energy and gamma rays.

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.

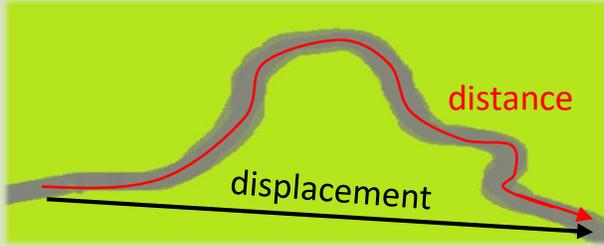


The Torus fusion reactor can achieve this on earth but at the moment we put in more energy in than we get out so can not use it to generate electricity

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

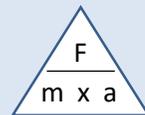
### Newton's first law of motion

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 ( $m/s^2$ ))



### Newton's third law of motion

When two objects interact with each other, they exert equal and opposite forces on each other

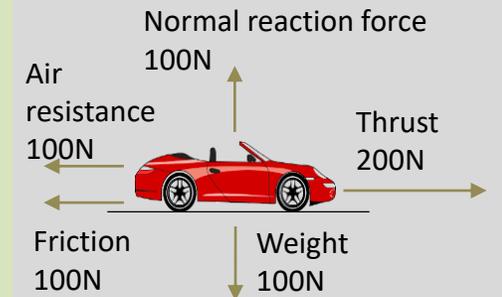
The resultant force on the red ball is **400N downwards** ( $500N - 100N$ )

The resultant force on the red car below is  $50N \leftarrow$   
 $(\leftarrow 100N + 150N = 250N \leftarrow) \quad 250N - 200N = 50N \leftarrow$



## 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.  $100N = 1cm$

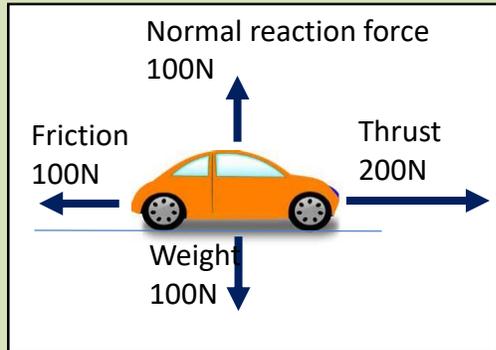


Scale:  $100N = 1cm$

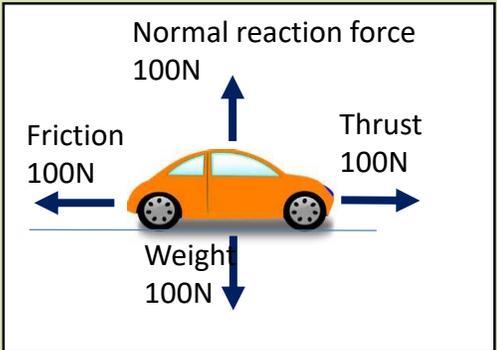
**KS4 Physics: P8 Forces in balance**

**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)

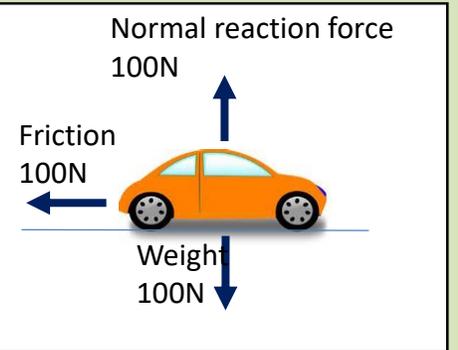
<b>Drag</b>	Drag forces oppose the motion of an object. They include air resistance and friction
<b>Normal reaction force</b>	Normal reaction force is the force exerted by a surface on an object, it acts at right angles to the surface



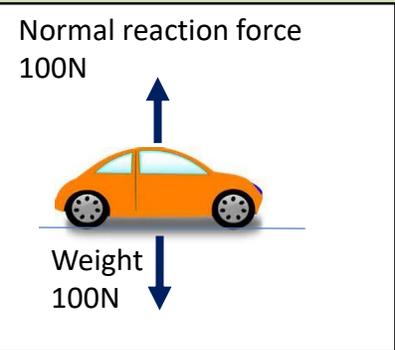
This car is accelerating as it has a larger thrust force than friction force (The resultant force is 100N →)



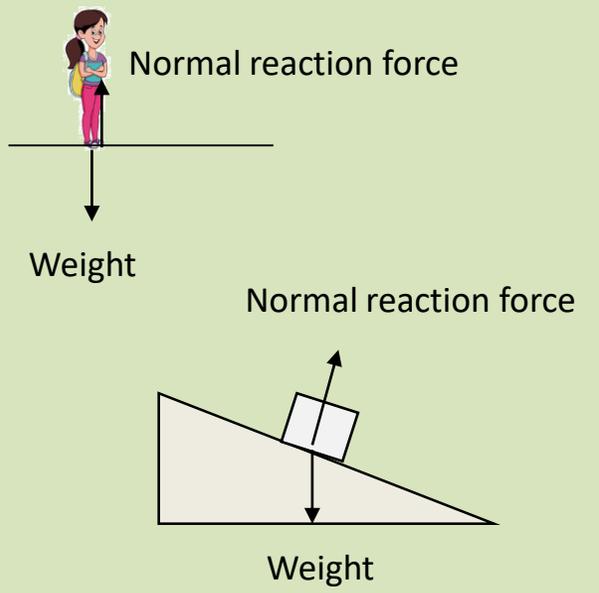
This car is travelling at a constant speed as it has an equal thrust force and friction force (The resultant force is zero)



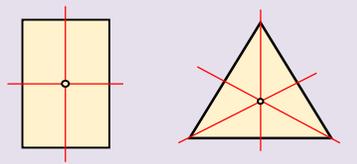
This car is decelerating as it has a larger friction force than thrust force (The resultant force is 100N ←)



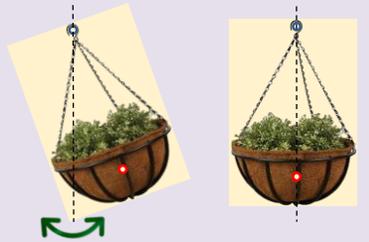
This car is stationary as there is no friction or thrust forces (the resultant force is zero)



**Centre of mass**  
 For a symmetrical flat shape, the centre of mass will always be along its line of symmetry.

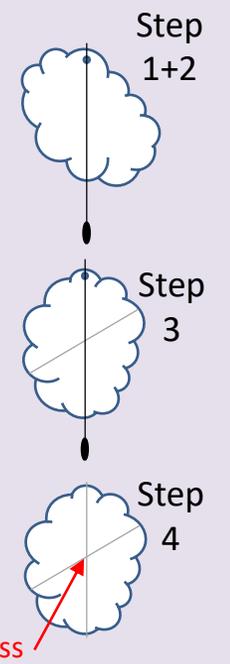


A swinging object will always come to rest with its centre of mass below the pivot.



This idea can be used to find the centre of mass of an irregular flat shape.

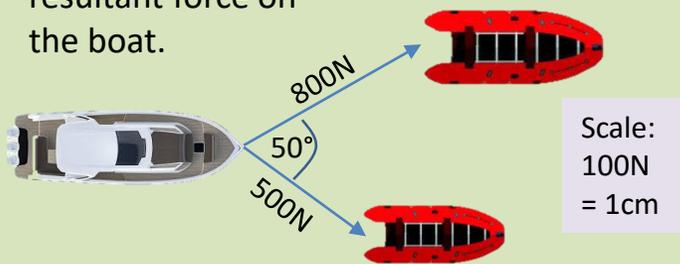
1. Suspend your irregular flat shape from a pin.
2. Use a plumb line (string with a mass on the end) to draw a vertical line on the shape.
3. Repeat putting the pin in a different location.
4. The point at which the two lines meet is the centre of mass.



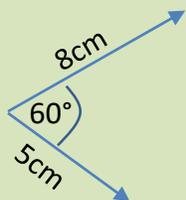
**KS4 Physics: P8 Forces in balance**

**HT: Parallelogram of forces:** working out the resultant force from two forces at an angle

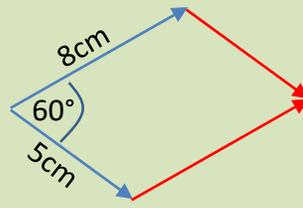
1. Look at the problem. Calculate the resultant force on the boat.



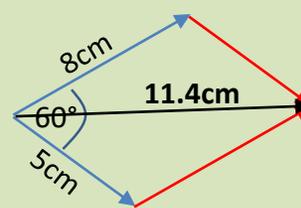
2. Draw a vector for each force at the correct angles



3. Turn into a parallelogram



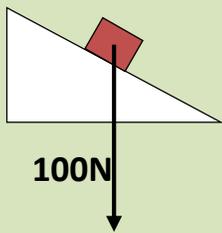
4. Draw a line across the parallelogram and measure its length



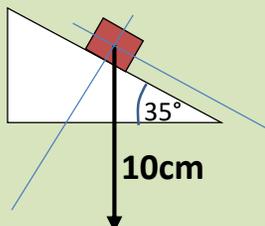
5. Use the scale to turn the length back into a force. You may need to give the angle of the resultant force relative to one of the other force vectors.

**Resultant force = 1140N** at an angle of **23°** to the **800N** force.

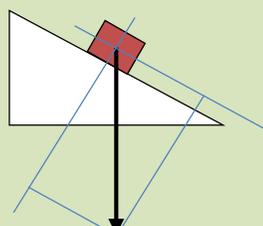
**HT: Resolving forces:** working out the 2 components of a force



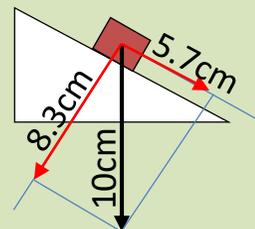
1. A 100N weight is stationary on a 35° slope. What is the friction force?



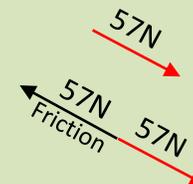
2. Draw the problem as a vector diagram. E.g. 1cm = 10N. Add faint lines perpendicular and parallel to the slope.



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.



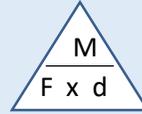
5. The force down the slope is 57N, because the block is stationary the forces are balanced so the force down the slope = the friction force acting up the slope. So the friction force is 57N

**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)**

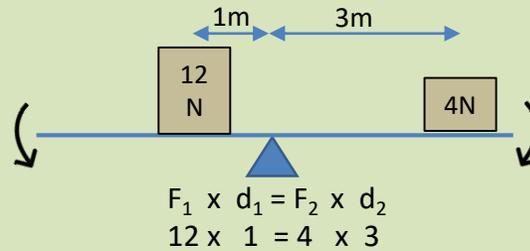
**M = F x d**



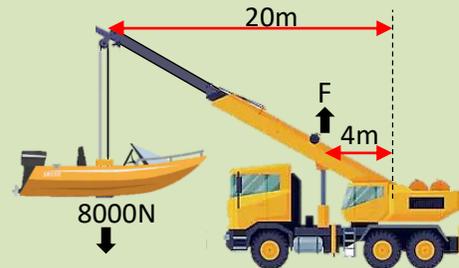
Levers are force multipliers because they can multiply the effect of the force. When looking at levers there is always a pivot, effort and load. Levers reduce the force required to lift or move objects

**Balancing moments – equilibrium**

If a lever is in balance the clockwise moment must equal the anticlockwise moment.



**Example:** what force is required to hold the boat above the ground?



( Anticlockwise moment = Clockwise moment )

$$F_1 \times d_1 = F_2 \times d_2$$

$$8000 \times 20 = F \times 4$$

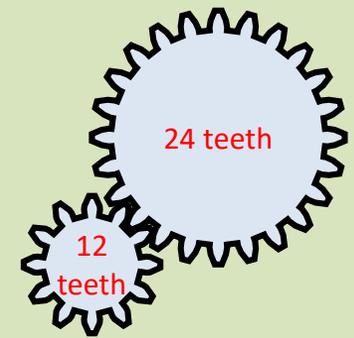
$$\frac{(8000 \times 20)}{4} = F = 40000N$$

**Gears**

Gears are force multipliers

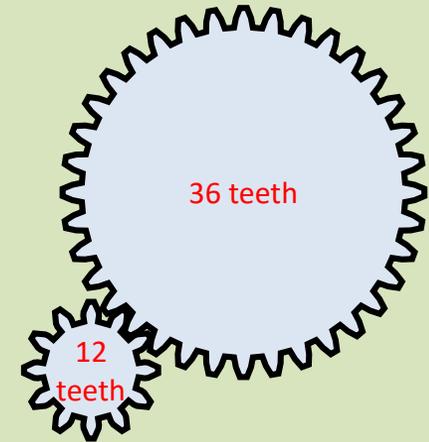
A wheel with more teeth turns slower. Here, the bigger wheel turns at *half* the speed

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?

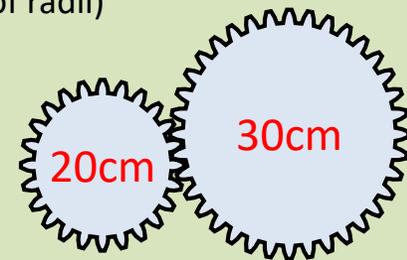
- (Remember ratio of moments = ratio of radii)

•  $20 : 30 = M : 120$

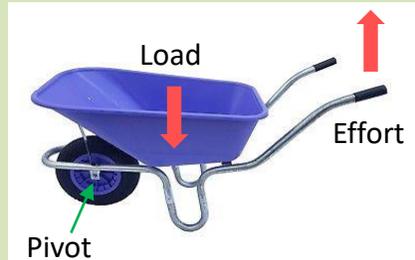
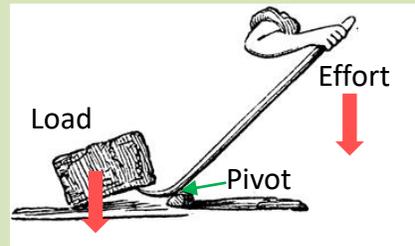
• or,  $\frac{20}{30} = \frac{M}{120}$

•  $\therefore \frac{20 \times 120}{30} = M$

•  $\therefore M = 80Nm$

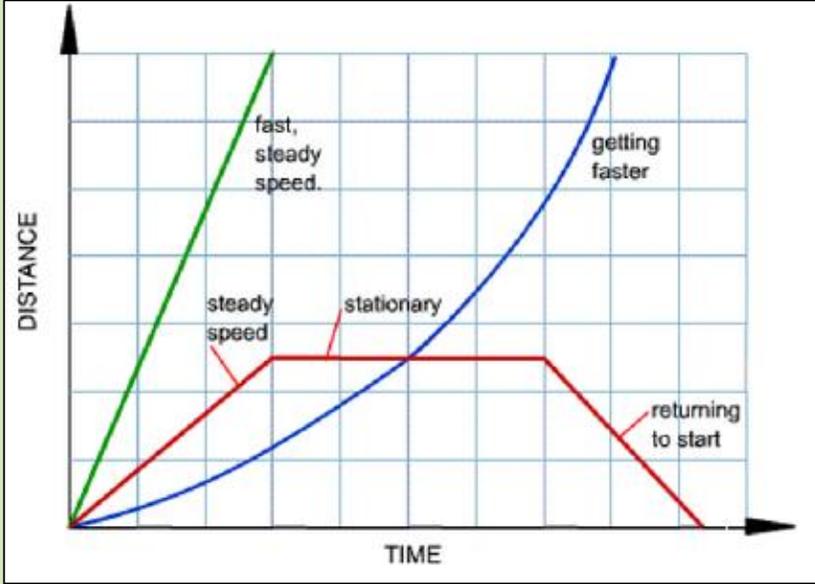


The same calculation can be performed if you were given the number of teeth instead of the gear radii



**KS4 Physics: P9 speed and motion**

**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)

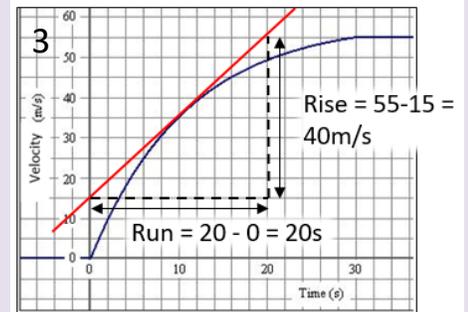
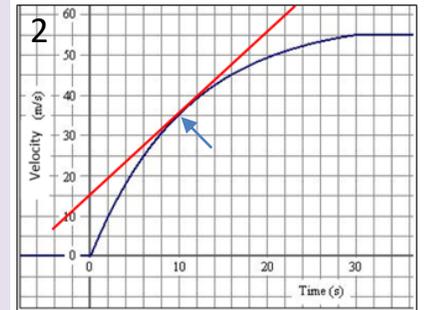
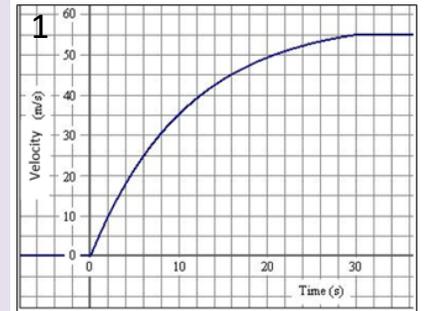
$$\text{gradient} = \frac{\text{change in } y}{\text{change in } x}$$

or

$$\text{gradient} = \frac{\text{rise}}{\text{run}}$$

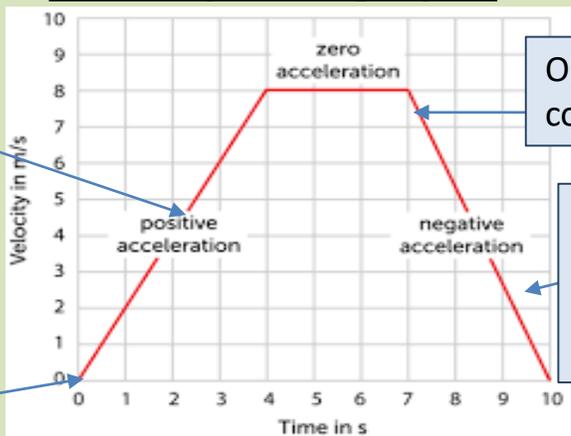
Calculate the gradient of the tangent, draw vertical and horizontal lines to the tangent. Measure rise and run.

$$\text{gradient} = \frac{\text{rise}}{\text{run}} = \frac{40}{20} = 2\text{m/s}^2$$



# KS4 Physics: P9 speed and motion

## Velocity time graphs



constant acceleration / speeding up

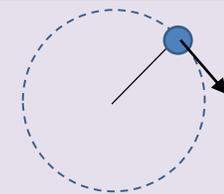
Object stationary

Object at a constant velocity

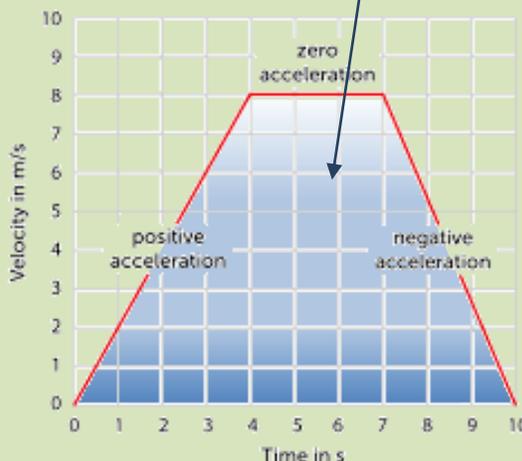
Constant deceleration / slowing down

Shape	description
	Constant speed
	acceleration
	deceleration
	Increasing deceleration
	Decreasing acceleration
gradient	Acceleration or deceleration

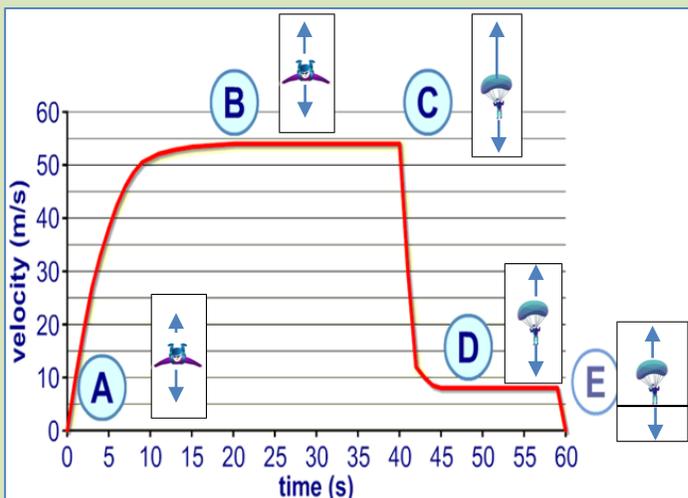
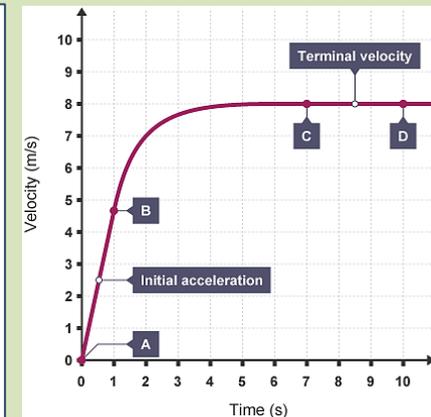
**HT: Circular motion** – an object moving in a circular motion can have a constant speed but its velocity is constantly changing as it changes direction (remember velocity is a vector quantity with a magnitude and direction)



**HT:** The area under a velocity time graph = displacement



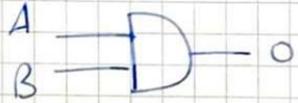
Falling objects start with an initial acceleration (A-B). Acceleration decreases due to increasing air resistance (B-C). They reach a terminal velocity as weight and air resistance become balanced (C-D).



- 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.

LOGIC

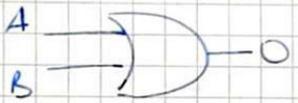
**AND** OUTPUTS 1 IF A AND B IS 1



A	B	0
0	0	0
0	1	0
1	0	0
1	1	1

$A \cdot B = 0$   
 $A \text{ AND } B = 0$   
 $A \wedge B = 0$

**OR** OUTPUTS 1 IF A OR B IS 1



A	B	0
0	0	0
0	1	1
1	0	1
1	1	1

$A + B = 0$   
 $A \text{ OR } B = 0$   
 $A \vee B = 0$

**NOT** REVERSES THE INPUT



A	0
0	1
1	0

$\text{NOT } A = 0$   
 $\overline{A} = 0$   
 $\neg A = 0$

BINARY ADDITION

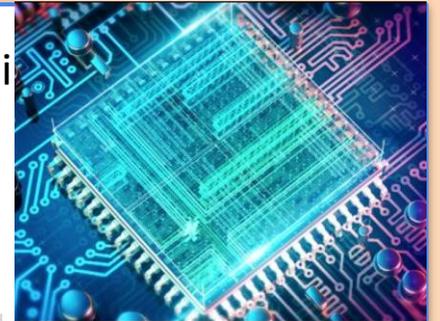
$$\begin{array}{r} 01110011 \\ 01100111 \\ \hline 11011010 \end{array}$$

ANSWER  
CARRY BIT

$$\begin{array}{r} 11101011 \\ 10011010 \\ 10011101 \\ \hline 00100010 \end{array}$$

OVERFLOW!

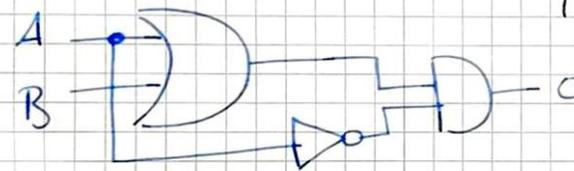
You must be able to express logic in 3 ways:



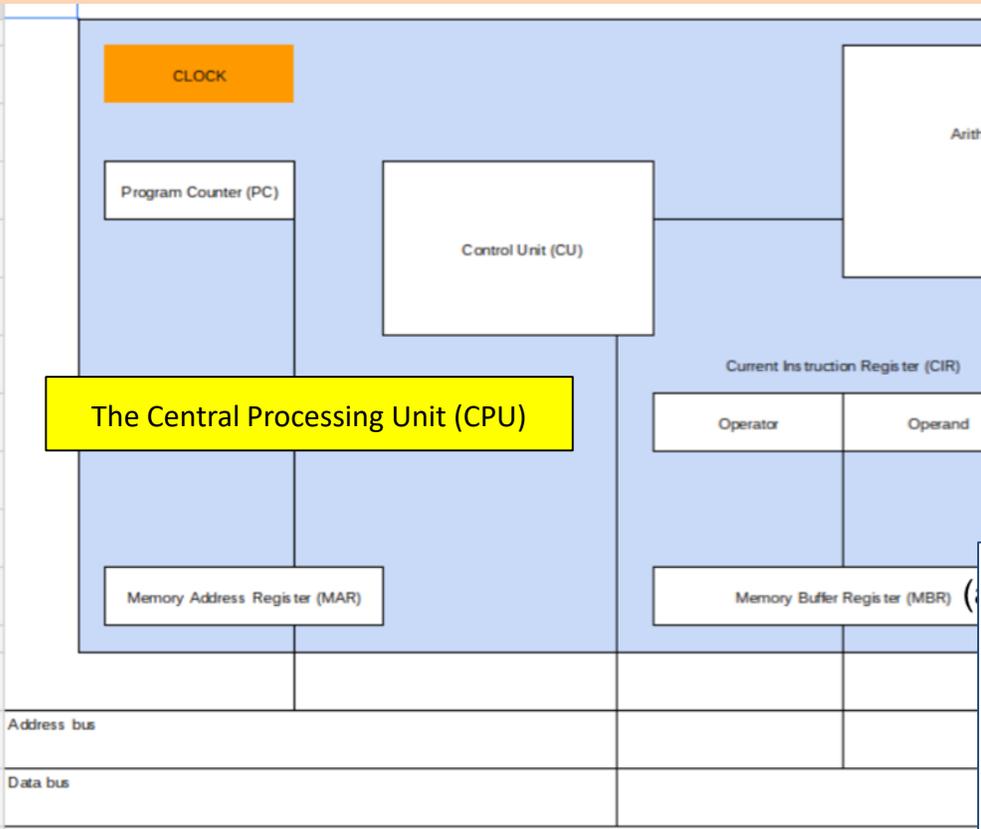
1. Logic diagram
2. Logical expression

$$(A + B) \cdot \neg A = 0$$

A	B	(c)	(a)	(o)
A	B	A+B	$\neg A$	C.D
0	0	0	1	0
0	1	1	1	1
1	0	1	0	0
1	1	1	0	0



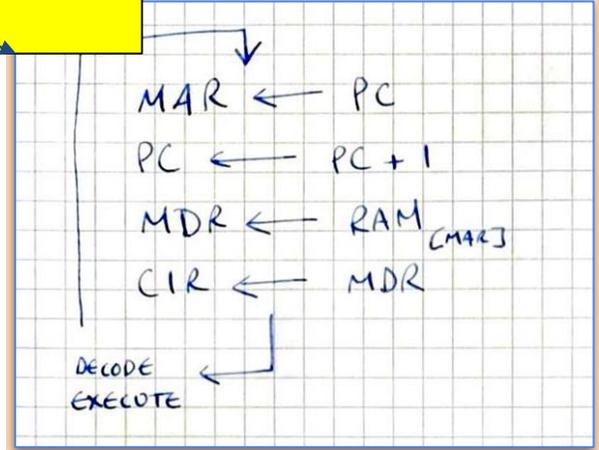
The role of the CPU = The Fetch/Decode/Execute cycle



The Central Processing Unit (CPU)

RAM (main memory)

Addr.	Data
0	INP
1	LDA 6
2	INP
3	ADD 6
4	OUT
5	HALT
6	
etc	

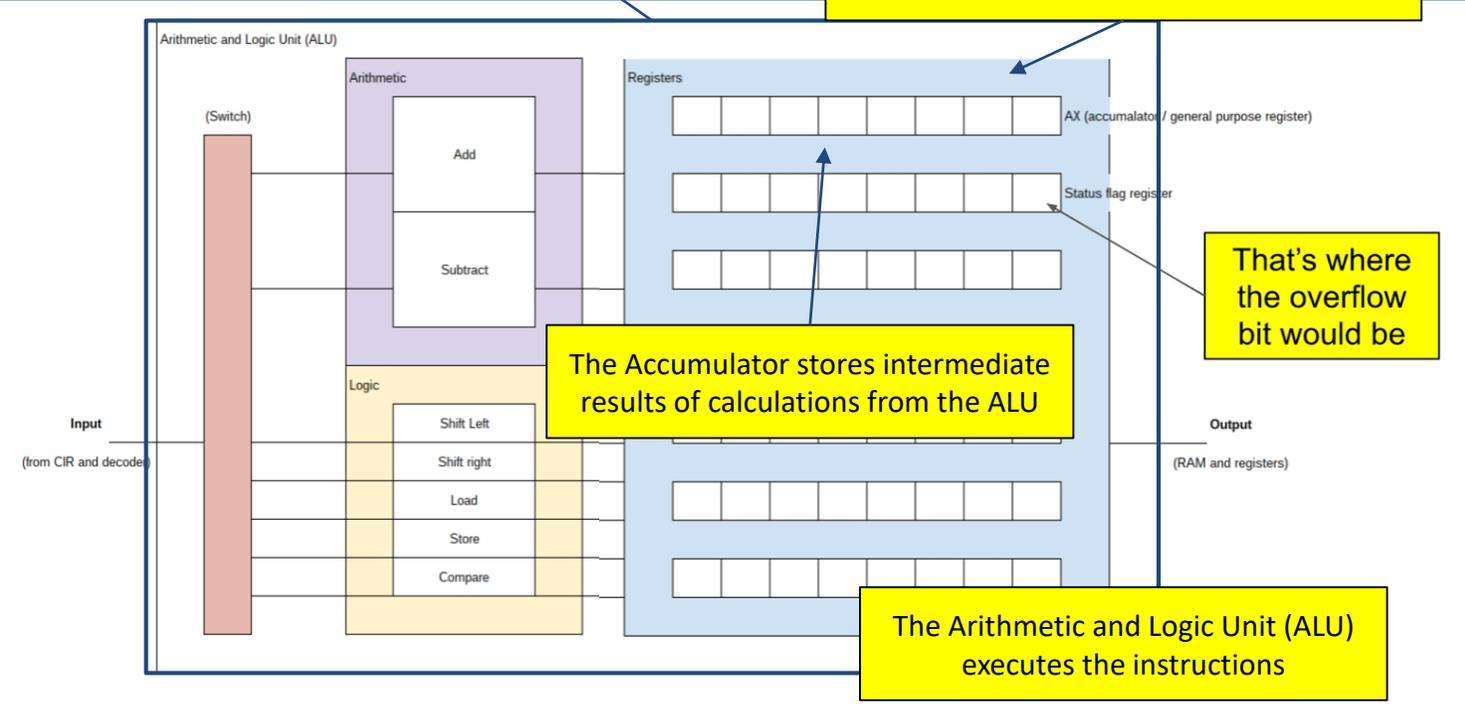


Registers = a super fast temporary place to store data in the CPU

- A CPU performance can be improved by:
- Increasing the size of RAM
  - Increasing the size of CACHE
  - Increasing the number of cores
  - Increasing the clock speed

**Von Neumann architecture** describes a system where the CPU fetches instructions and data from the same memory block

Harvard architecture describes a system where instructions and data are stored in separate memory blocks



The Accumulator stores intermediate results of calculations from the ALU

That's where the overflow bit would be

The Arithmetic and Logic Unit (ALU) executes the instructions

## CT Term 3 – Ethics and cultural issues

The impact of technology on a society can be examined in these ways:

Ethical issues	What would be considered right and wrong by society. These values may be shared across many countries.	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?  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?
Legal issues	What is actually right and wrong in the eyes of the law. These values are specific to individual countries.	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.  For example, it is now a criminal offence to upload messages onto the internet that are considered 'hate speech'.
Cultural issues	How groups of people with particular values, beliefs, languages or practices are affected by technology.	For example, should remote communities become connected to the Internet and therefore be exposed to alien beliefs and potentially be exploited by other cultures?  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?
Environmental issues	How technology impacts the natural world.	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.  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.

## CT Term 4 – Network threats/Cyber security

How a system is secured depends upon who it is being secured against.

### What is Cyber security?

A set of tools that ensure:

- Secrecy of data
  - only authorised people can view/edit
- Integrity of data
  - only authorised people can use computer systems
- Availability of data
  - ensuring data is available to authorised users

### Questions when considering how to protect

- Threat model
  - What/who is the threat?
    - Who are they?
    - What are their skills/resources?
    - What is their goal?
- Attack vector
  - How to secure against the threat?

### Threats

- Social engineering
  - Tricking employees into providing details to gain access
- Brute force attacks
  - Millions of password combinations are autonomously attempted in search of a real password(s)
- DDoS / botnets
  - A network is flooded with useless data that then prevents authorised access
- Virus/malware
  - Malicious software that can be accidentally downloaded onto computer systems
- Disgruntled employees
  - Who want revenge and have access to your systems
- Phishing
  - Sending fake or spoof emails to trick someone into providing sensitive info.
- Packet sniffing / passive attack
  - Hackers monitor network traffic to intercept sensitive information
- Dumpster diving
  - Raiding paper/equipment being discarded in order to find sensitive info.

### SQL Injection

Malicious SQL statements are inserted into a data entry field of a system that is not appropriately secured.

### Network policy

- Regular software updates
- Enforce strong passwords that are regularly changed
- Network firewall
- Anti-virus software
- Staff training on spotting fraud
- Regular network pentesting
- Control physical access to hardware

### System security questions

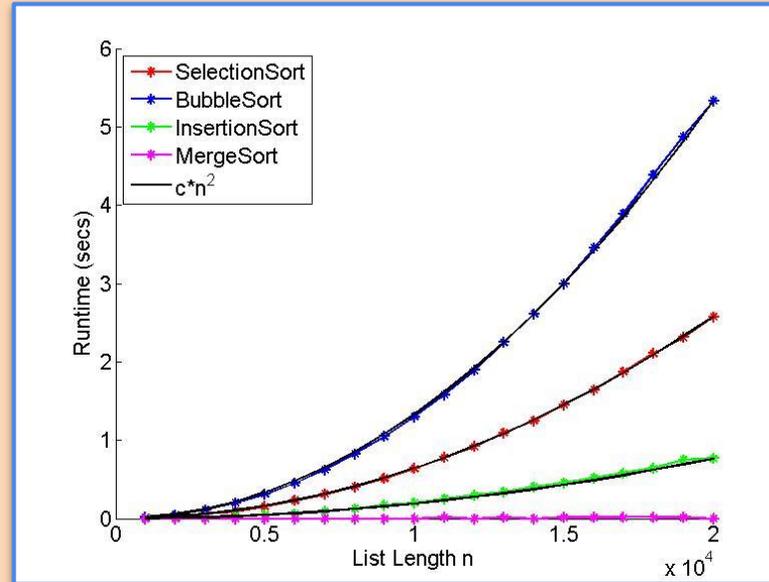
- Authentication (who are you?)
  - What do you know?
    - Passwords (det.)
    - Pin (det.)
  - What do you have?
    - Key fob (det.)
    - Physical key (det.)
  - What are you?
    - Biometrics (prob.)
    - Gait analysis (prob.)
- Access control (What should you have access to?)
  - Access levels: read, write, execute

## CT Term 4 – 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



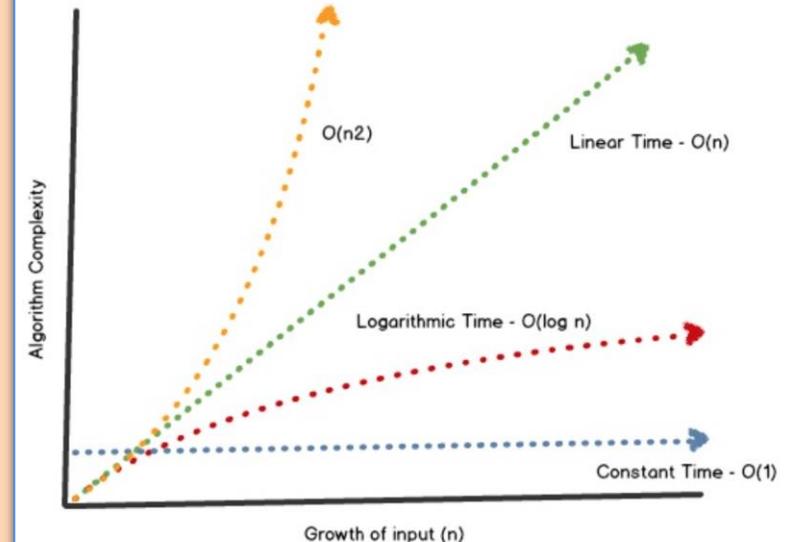
### The common algorithms you need for GCSE

- **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>

## iMedia - Digital Graphics – Key Terms

Key Term	Explanation
Assets	These are the component parts that are used in the creation of the digital graphic. Examples would be photographs, images, graphics, text, logos.
Design and layout of graphics	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> .
File formats	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> .
Image editing software	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.
Legislation	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
Properties	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
Resources	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
Technical compatibility of assets	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
Visualisation diagram	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 3

## What is a Client Brief

A client brief is what a company will be asked to do when designing a media product. These might come from as written brief, a discussion, a script or from a specification.

## Target Audience

The Target audience of a product is who the product is aimed at. Note: This is not always the same as who it is being produced for!

You will need to consider the following when creating a product for your target audience:

- Age group
- Gender
- Location
- Ethnicity / culture
- Income

## 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.



## Film Editing

Film editing software is used to create and edit video footage. It allows Video Editors to cut and manipulate video footage to create films, documentaries, tutorials and vlogs among many other things.



## Digitising

Digitising is where a pre-production document is created by hand and then convert into a digital format, usually by a scanner. These are then saved as an appropriate file format and size.

## Key Words

Hardware Software Web Browser  
Digitising Peripheral Computer system  
Plan Mind Map Storyboard  
Pre-Production Visualisation

## Hardware and Software

In order to create or digitise pre-production documents, different types of computer hardware are needed which are split into different categories. These are the computer systems, peripherals, imaging devices and other equipment

- Computer Peripherals – attachments to increase functionality of the system. e.g. keyboard, mouse, trackpad, graphics tablet, monitor, speakers, microphone etc.
- Imaging device – devices used to capture or create images e.g. digital cameras, camcorders, scanners
- Other equipment – these are pieces of equipment not connected to a computer system.

They are often materials that are used, such as pens, pencils, paper. They are still classed as Hardware because they are needed especially when pre-production documents can also be created by hand.

## Primary Research

When planning a product for a client is it important that some research is undertaken in order to ensure your product is appropriate for both the client and it's intended target audience.

Primary research is where fresh or new data is collected for the first time. Examples of primary research methods are: questionnaires, surveys, interviews, focus groups or monitoring of particular behaviours or interactions. Others include photos, videos or recordings.

## Secondary Research

Secondary research involves the gathering of pre-existing data that has already been produced.

Secondary research is where information or data is collected from reports or previous studies by agencies such as the government or business within a particular area of business or industry that has previously collected primary research, Others include biographies, articles or news broadcasts

## Hardware and Software

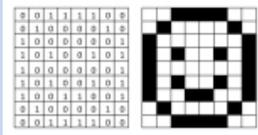
All components of a computer system can be categorised into Hardware and Software.

- Hardware – the parts of the computer system you can physically touch: e.g. Monitor, Printer, Camera, Microphone, Scanner
- Software – Programs that are installed and run on a computer to perform a specific task: e.g. Web browser, Desktop Publishing, Film Editing, Image Editing, Word Processing & Web Authoring.

# iMedia - Digital Graphics Term 4

## Bitmap

Bitmap graphics are made up of tiny little squares called pixels. Each pixel is stored as a data value which represents each colour. These data values are made up of 1's and 0's – a number system that computers use called binary.



## Vector

A vector image uses geometrical formulas to represent image as a shape or object. They can be resized without losing quality and so are often used for company or product logos.



## Images

Images are pictures that have been created or copied and stored in electronic form. There are two types: bitmap and vector graphics.

## Key Words

Formats Bitmap Vector  
Compression  
Lossy Lossless Version Control

## 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 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.

## Examples of File Formats

Image	.jpg .psd .pdf	.png .bmp	.tiff
Video	.wmv .mov	.mp4 .fiv	.avi
Audio	.mp3 .ogg .m4a	.wav .aac	
Document	.doc .pub	.pdf .html	.ppt
Animation	.gif	.swf	

## 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 Image Formats

Format	Properties and Uses	Limitations
.jpg	Lossy compression to reduce file size.	Quality is reduced.
.png	Lossy compression and supports transparency.	Not widely supported.
.tiff	Lossless files used for high quality printing	Very large file size
.psd	Photoshop document that allows editing	Only supported by Adobe products.
.bmp	Bitmap file, usually uncompressed	Large file size
.pdf	Export format that turns documents into images	Cannot be directly edited.

# iMedia - Digital Graphics Term 4

## 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.



## 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

## 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.

## 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.

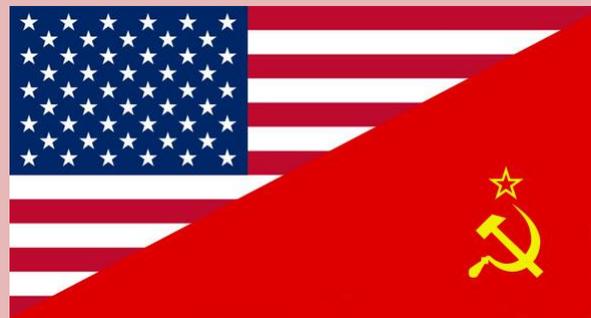
# History Terms 3 & 4: The Cold War

## Background Context

At the end of World War II, the world was split into two factions; The **Western Bloc** a group of countries under capitalist rule, comprised of the United States and its allies, some of whom would later become **NATO**, and the **Eastern Bloc** - led by the USSR (known as the Soviet Union) and communist countries, some of whom would later sign the **Warsaw Pact**. An imaginary **Iron Curtain** divided east and west.

These two factions would spend the next 40+ years engaged in a stand-off - both the United States and the USSR had developed nuclear weapons - and knew that attacking the other would lead to **M.A.D. (mutually assured destruction)**. There were incidents of **brinkmanship** and **proxy wars** fought in Korea and Vietnam, as the USA became increasingly concerned about a **domino** effect as neighbouring countries would fall to **communist** rule.

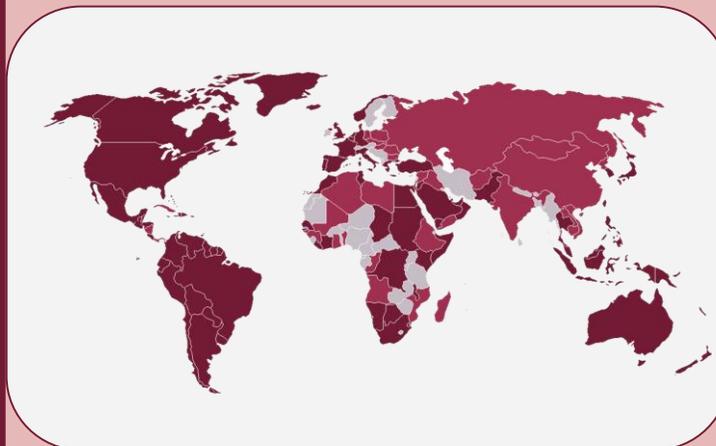
With the fall of the **Berlin Wall** in 1989, and the collapse of the USSR in 1991, the Cold War came to an end, as the world sought a more harmonious approach to co-existence.



**USA, NATO & Its Allies**

**USSR & Its Allies**

Neutral/Non-aligned



Cold War Video Library

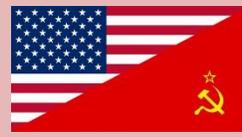
<https://tinyurl.com/ColdWarVids>

## Key Vocabulary

<b>Capitalism</b>	An economic system based on private ownership
<b>Communism</b>	An economic system based on community ownership
<b>Democracy</b>	A political system where people vote for their representatives
<b>Totalitarianism</b>	A political system where one person holds complete power
<b>Government</b>	A group of people responsible for running a country
<b>Rebellion</b>	Fighting against someone who is in power
<b>Guerilla Warfare</b>	A method of fighting using ambushes, raids and surprise.
<b>Nuclear Weapon</b>	A weapon of mass destruction powered by a nuclear reaction.
<b>Soviet Union</b>	A communist country comprised of Eastern European republics.
<b>Missile</b>	A weapon that is projected (fired) at a target.
<b>Blockade</b>	Sealing off a place to prevent movement of goods or people.
<b>Brinkmanship</b>	Pushing a situation to the brink of disaster to achieve an advantage.
<b>Domino Theory</b>	A theory that if one country fell to communism, others would follow.
<b>Iron Curtain</b>	The imaginary line dividing free and communist countries in Europe.
<b>Satellite Nations</b>	Nations under the control of the Soviet Union.
<b>Détente</b>	Lessening of military and diplomatic tensions between countries.
<b>M.A.D</b>	Mutually Assured Destruction.
<b>NATO</b>	North Atlantic Treaty Organisation.
<b>Warsaw Pact</b>	A defence pact between the USSR and neighbouring countries
<b>Allies</b>	Countries that are committed to military cooperation and defence.

<b>Potsdam Conference</b> 1945	<b>Iron Curtain divides East and West</b> 1945	<b>Truman Doctrine</b> 1947	<b>Berlin Blockade</b> 1948	<b>USSR tests nuclear bomb</b> 1949	<b>Korean War</b> 1950-53	<b>Vietnam War begins</b> 1955	<b>Space Race</b> 1955-75	<b>U-2 Plane Incident</b> 1960	<b>Berlin Wall erected</b> 1961	<b>Bay of Pigs botched invasion</b> 1961	<b>Cuban Missile Crisis - brink of WW3</b> 1961	<b>Strategic Arms Limitation Talks</b> 1969	<b>Soviets invade Afghanistan</b> 1979	<b>Fall of the Berlin Wall</b> 1989	<b>Fall of the USSR End of Cold War</b> 1991
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# Key Topic 1: Origins of the Cold War



## Capitalism

**Politics:** Favours democracy – people choose their leaders from several different parties.

**Economy:** Businesses are privately owned, and there are opportunities to become very wealthy for some people. If you work hard and are good at your job, you will be promoted and earn more money – this gives people an incentive to work.

**Beliefs:** Freedom is good and is necessary for a successful society. Some people will be wealthier than others but mostly this should reflect their ability, ingenuity and hard work. It would be unfair for everyone to be equal if some work harder than others. Capitalism should be the system used by the rest of the world because it encourages prosperity and development.

**Problems:** Capitalism leads to inequality – some people become very rich, but others become very poor. Power is concentrated in the hands of a minority of rich and powerful individuals, whilst the poor are vulnerable to being exploited.

## Communism



**Politics:** Only one party allowed, the Communist Party, which represents the people. There are no elections and you cannot change your government.

**Businesses** are all owned publicly – by the government. All profits and products are shared amongst the people. Nobody becomes hugely wealthy, but nobody is much poorer than anyone else.

**Beliefs:** Freedoms such as a free media and freedom to hold different political views is harmful to the unity and success of the country. Everyone should be equal, and it is the government's job to ensure that this happens, as capitalism will exploit the poor and the workers to benefit the elite. Communism should be the system used by the rest of the world, and the USSR should encourage revolutions in other countries to ensure this happens.

**Problems:** Communism leads to a lack of productivity – why work hard with no opportunity for financial reward? It also stifles creativity – people are less likely to have the freedom and incentive to develop ideas if they won't personally benefit from them. Lack of democracy leads to the suppression of other basic rights.

## The Conferences

**Grand Alliance** | Wartime alliance between USA, Britain and USSR

**Sphere of Influence** | The region over which a country has influence/control

**Demilitarisation** | The removal of army and other military from a region

## Soviet Expansion

**Satellite states** | Countries controlled by a larger, more powerful nation

**Containment** | The US plan to prevent the spread of Communism

**Iron Curtain** | The name given to the 'border' of Western/Eastern Europe

## US Actions – The Truman Doctrine and Marshall Plan

**Doctrine** | A key message that you are committed to enforcing

## Soviet Actions – The Berlin Blockade

**Comecon** | Organisation to increase Soviet economic control in Europe

**Cominform** | Organisation encouraging cooperation between communist countries

**Blockade** | Preventing access to a location or region

**Bizonia** | The merging of the German regions controlled by the US and Britain

**Airlift** | Bringing needed goods into a region by air

**NATO** | Military alliance of America and its allies

**Warsaw Pact** | Military alliance of the USSR and its allies

## The Arms Race

**Arms race** | Competitive military spending between countries

**ICBM** | Missiles than can be fired huge distances – across continents

**H-Bomb** | Hydrogen bomb – a very powerful and destructive weapon

**B-52** | The type of bomber aircraft used by the USA

**Sputnik** | A Soviet satellite, the first man made satellite in space

## Hungarian Uprising

**De-stalinisation** | Khrushchev's policy of moving away from Stalin's methods

**Secret Police** | Organisations that enforce the law but are not accountable or public

**Guerrilla** | A type of fighting that relies on ambushes or unconventional warfare

# Key Topic 1: Origins of the Cold War



## The Three Conferences 1943-45

### The Tehran Conference, November 1943

**Representatives:**

Franklin D. Roosevelt (USA)  
Joseph Stalin (USSR)  
Winston Churchill (UK)

**Focus:** Develop relationship between three powers in the Grand Alliance; strategy to win the war.

**Level of cooperation:** High, Roosevelt and Stalin agreed on most major issues.

**Agreements:**

Britain and US would open up a second front in WWII by invading France in 1944.  
The Soviet Union would join the US in declaring war on Japan after Germany's defeat.  
The United Nations would be set up after the war to resolve disputes and guarantee international security.  
An area of Poland would become part of the USSR.

### The Yalta Conference, February 1945

**Representatives:**

Franklin D. Roosevelt (USA)  
Joseph Stalin (USSR)  
Winston Churchill (UK)

**Focus:** What to do with Europe after Allied victory in WWII.

**Level of cooperation:** Medium, Stalin had started to push his luck on some issues and the other leaders put their foot down.

**Agreements:**

Both Germany and its capital Berlin would be divided into four zones administered by the US, USSR, Britain and France.  
To give liberated countries formerly occupied by the Nazis full freedom to choose their own governments without pressure or interference.  
That each of the three powers would join the new United Nations  
That Eastern Europe was in the Soviet 'sphere of influence' and this would be respected by the US and Britain.

**Disagreements:**

How much in reparations Germany should pay (Stalin wanted more)  
Where Germany's eastern border should be (Stalin wanted Germany to be as small as possible)  
What kind of government Poland should have (Stalin wanted a 'friendly' Polish government to act as a buffer against Germany).

### The Potsdam Conference, July 1945

**Representatives:**

Harry S. Truman (USA)  
Joseph Stalin (USSR)  
Winston Churchill then Clement Attlee (UK)

**Focus:** Resolving issues left incomplete at Yalta; dealing with changing situation after Germany's surrender.

**Level of cooperation:** Low, Stalin had ignored some previous agreements, and now that the war was over the US saw the USSR as more of a threat than an ally. Truman didn't get on with Stalin the way Roosevelt had.

**Agreements:**

Established borders of the zones of Germany and Berlin  
Germany demilitarised  
Democracy, freedom of speech and a free press would be established in Germany  
Most of Germany's reparations would go to the USSR as they had suffered most.  
The Nazi party was banned.

**Disagreements:**

Stalin wanted to disable Germany with huge reparations but Truman saw a strong Germany as a useful ally against the threat of the USSR  
Truman wanted free elections across Eastern Europe but Stalin argued that as this was the Soviet sphere of influence this shouldn't happen.



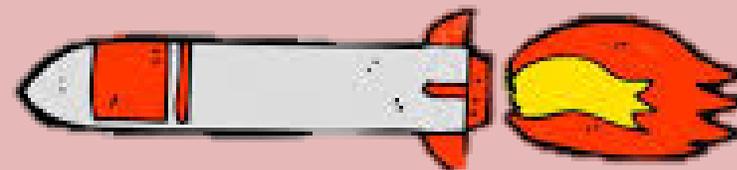
# THE COLD WAR



## Key Topic 1: Origins of the Cold War

### Timeline of the arms race 1945-1962

1945	The USA tests its first atomic bomb. It is used twice, against Japan. Joseph Stalin demands the USSR develop its own nuclear capability, and triples the pay of scientists working on the project.
1949	The USSR carries out its first successful nuclear test. In the US, Truman massively increases defence spending and work commences on a new, more powerful 'hydrogen bomb' (H-bomb)
1953	The US and USSR both conduct their first successful H-Bomb tests. Both sides are now in possession of powerful nuclear weapons.
1954	The US explodes its largest ever H-Bomb – the equivalent of 15 million tons of TNT, and capable of wiping out Moscow, the Soviet capital. The USSR had similar capability to wipe out American cities.
1957	The Soviet Union launches the first satellite into space. The US fears that this could eventually lead to a military threat, and diverts resources to its own space program.
1962	The Cuban Missile Crisis – the US discovers Soviet nuclear missiles in Cuba, 90 miles off the coast of Florida. The USA has 63 inter-continental missiles, 21 nuclear submarines, 24 aircraft carriers and 96 missiles capable of being launched from submarines. The USSR had more than 50 inter-continental missiles, and no aircraft carriers, no sub-launched missiles and only 2 nuclear submarines. The USA had started to pull ahead in the arms race, but both sides possessed enough nuclear weapons to wipe the other side out many times over.



Roosevelt  
1933-1945

1943 Tehran Conference  
1944  
1945 Yalta Conference / Potsdam Conference / A-Bomb



Truman  
1945-1953

1946 1945-47 Soviet Expansion  
1947 Truman Doctrine / Marshall Plan / Cominform  
1948 Berlin Crisis / Airlift  
1949 Comecon / NATO / USSR tests A-Bomb



Eisenhower  
1953-1961

1950  
1951  
1952  
1953 Successful H-Bomb tests / Khrushchev new leader  
1954  
1955 Warsaw Pact  
1956 Hungarian Uprising  
1957 Launch of Sputnik – first key moment of space race



Kennedy  
1961-1963

1958  
1959  
1960 U-2 spy plane crisis  
1961 Second Berlin Crisis  
1962 Cuban Missile Crisis

# Key Topic 2: Cold War Crises



## Key Terms

### Two crises in Berlin – not the same thing!

#### Berlin Crisis of 1948

The Berlin crisis of 1948 was caused by Stalin, who was resentful of the US and Britain having free access through East Germany to get to their sectors of Berlin. He thought they were spying on the Communist country and were spreading pro-capitalist messages. He closed off all the roads and railways, and attempted to force the US and Britain to give up their claim to West Berlin. Instead, the US organised airlifts of food and fuel to defeat the blockade and save the people of West Berlin. Stalin eventually had to back down. This crisis was significant in the wider Cold War because it showed that the USA was prepared to back up its words in the Truman Doctrine with actions. It was also significant because it led to the creation of NATO.

#### Berlin Crisis of 1961

The Berlin Crisis of 1961 was caused by Khrushchev, who was resentful of highly qualified professionals leaving East Berlin and East Germany. There was no border between the East and West zones, meaning that people frequently travelled to the West and then on to capitalist countries that they otherwise were not allowed to go to. Highly qualified people knew they could earn lots more money in the capitalist West, so the 'brain drain' was a big concern for Khrushchev. He attempted to force the US to prevent this migration, but the US refused, so Khrushchev authorised the East Germans to build a wall around the entirety of West Berlin. This meant no East Germans could enter or they would be shot. Migration stopped, but the city was cut in two. The wall stood for 28 years.

#### The Berlin Crisis, 1961

**Defection** Leaving one country to go to its enemy

**Refugee** A person fleeing crisis in their home country

**Ultimatum** A final choice with two serious options

#### The Construction of the Berlin Wall

**Checkpoint** A guarded border post on the Berlin Wall

#### The Cuban Revolution

**Dictator** A leader with total power over the country

**Diplomat** A representative from one country in another

**Exile** A person forced to leave a country to live in another

**CIA** The Central Intelligence Agency – US spy network

**Bay of Pigs** A bay in Cuba that was the focus of a failed invasion

#### The Cuban Missile Crisis

**U-2** US spy plane which captured images of the missiles

**Hawks and Doves**

People who favoured aggressive or diplomatic US response

**Brinkmanship**

Going right to the edge to get what you want

#### Consequences of the Cuban Missile Crisis

**Hotline**

A telephone connection to allow instant communication

**Treaty**

An agreement between countries

**Detente**

The thaw in relations that led to progress between US/USSR

#### The Prague Spring

**Reforms**

Changes to the way the country is run

**Censorship**

Limiting the information that people have access to

#### The Soviet Invasion of Czechoslovakia

**Resistance**

Refusal to cooperate

**Propaganda**

Materials which are designed to push a particular message

**Brezhnev Doctrine**

USSR plan to invade countries which threatened E. Europe

**Vietnam War**

A disastrous conflict the US was involved in in the 1960s/70s

# Key Topic 2: Cold War Crises



## Three Cold War Crises

### The Berlin Crisis 1961

**Key individuals:**

- Eisenhower and Kennedy (USA)
- Khrushchev (USSR)

**Causes:**

- ‘Brain drain’ refugee crisis - hundreds of thousands of highly qualified workers leaving East Germany for the West

**Key events:**

- Berlin ultimatum 1958
- Vienna Summit 1961
- Construction of the Berlin Wall 1961

**Outcomes:**

- West Berlin isolated and migration ended
- Heightened tensions between USA and USSR

### Cuban Missile Crisis 1962

**Key individuals:**

- Kennedy (USA)
- Khrushchev (USSR)
- Castro (Cuba)



**Causes:**

- USSR placed missiles on Cuba in response to US Jupiter missiles in Turkey.

**Key events:**

- Communist revolution led by Castro 1959
- Bay of Pigs invasion 1961
- Missiles discovered by USA
- Kennedy ordered removal + blockaded Cuba

**Outcomes:**

- Increased rivalry between USA and USSR
- Hotline installed for instant communication
- Various treaties between 1963 and 1968

### Czechoslovakia 1968

**Key individuals:**

- Brezhnev (USSR)
- Dubcek (Czechoslovakia)
- Johnson (USA)

**Causes:**

- Czechs demanded greater freedoms and economic reform. Dubcek appointed leader

**Key events:**

- Dubcek announced Prague Spring reforms
- Opposition to Communism increase
- USSR invades and arrests Dubcek, reversing reforms

**Outcomes:**

- Brezhnev Doctrine
- Other communist countries condemned USSR
- US condemnation but no intervention



Eisenhower  
1953-1961

1958 Berlin Ultimatum

1959 Khrushchev visits USA / Cuban revolution

1960 Planned Paris Summit / U-2 spy plane crisis

1961 Vienna Summit / Berlin Wall built / Bay of Pigs



Kennedy  
1961-1963

1962 Cuban Missile Crisis

1963 Kennedy visits Berlin



Johnson  
1963-1969

1964 Brezhnev replaces Khrushchev as Soviet leader

1968 Prague Spring / Soviet invasion / Brezhnev

Doctrine



Nixon  
1969-1974

1969 Czech Anti-Soviet demonstrations continue

## Key Topic 3: End of the Cold War



### Ronald Reagan



### Mikhail Gorbachev



Ronald Reagan was a former Hollywood actor who was elected US President in 1980. He took a tougher line with the USSR, and his SDI 'Star Wars' initiative led to massive military spending. His description of the USSR as the 'Evil Empire' in 1982 deteriorated relations, but his policies forced the USSR to accept that they couldn't keep up with US progress and that reform was necessary.

Mikhail Gorbachev came to power in 1985 with the USSR in crisis. He was their fourth leader in the last three years and their political and economic situation looked bleak. Gorbachev announced a series of reforms called 'New Thinking' including 'glasnost' and 'perestroika'. His willingness to reform the USSR and improve relations with the West made him incredibly popular in the USA. His reforms brought about the end of the Soviet Union.

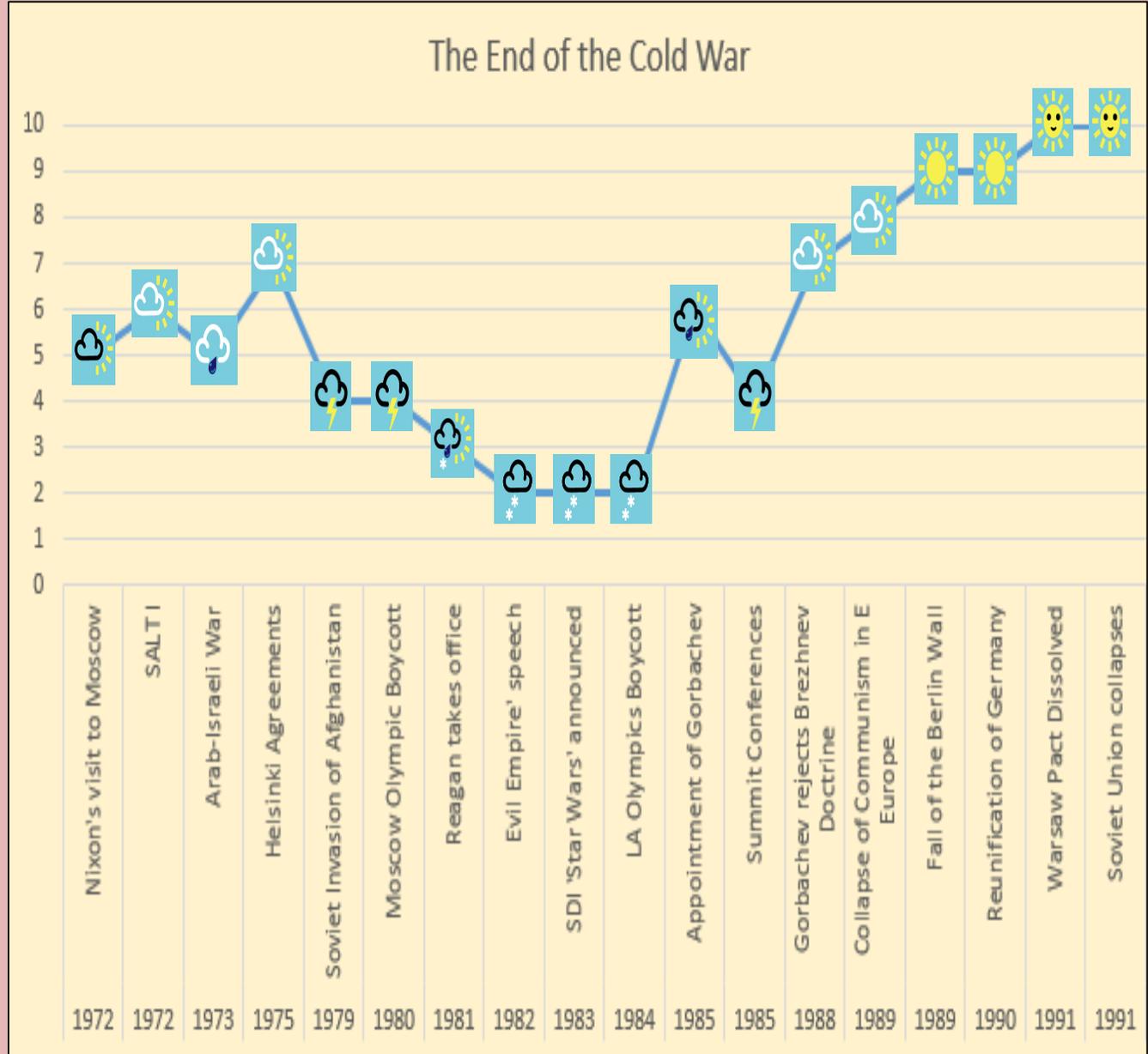
## Key Terms

<b>Reasons for Detente</b>		<b>Carter Doctrine</b>	A US vow to go to war if their interests in Middle East threatened
<b>Detente</b>	An period of improved relations between US and USSR	<b>Boycott</b>	A refusal to use certain services or to attend an event
<b>Linkage</b>	Nixon's plan to 'link' benefits to positive Soviet actions	<b>Reagan and the Second Cold War</b>	
<b>Bilateral</b>	Agreements that involve cooperation between two parties	<b>Second Cold War</b>	Reagan's escalation of the Cold War after the failure of detente
<b>Detente</b>		<b>NUTS</b>	Targeting nuclear weapons at USSR warheads, not cities
<b>SALT I</b>	A plan to limit production of new nuclear weapons	<b>START</b>	Talks focused on reducing total nuclear weapons on both sides
<b>ABM</b>	Anti-Ballistic Missiles – reduced by the SALT Treaty	<b>SDI</b>	'Star Wars' – high tech laser guided missile protection system
<b>MIRV</b>	Weapons that contained several targetable warheads	<b>Gorbachev's 'New Thinking'</b>	
<b>Disarmament</b>	Reducing or completely destroying supplies of weapons	<b>New Thinking</b>	A series of reforms proposed by Gorbachev to modernise USSR
<b>Apollo-Soyuz</b>	A US-Soviet meeting in space to show their cooperation	<b>Perestroika</b>	'Restructuring' – economic changes to the USSR and communism
<b>Helsinki Agreements</b>	Agreements over issues like security and human rights	<b>Glasnost</b>	'Openness' – greater freedoms within the USSR and E Europe
<b>Human Rights</b>	Basic freedoms that are not respected in some countries	<b>Dissidents</b>	Political opponents to a regime that often experience persecution
<b>Afghanistan and End of Detente</b>		<b>Uskoreniye</b>	Acceleration – a Soviet plan to boost and modernise the economy
<b>Mujahideen</b>	An Afghan resistance force that was armed by the US	<b>INF Treaty</b>	First successful agreement to reduce nuclear weapons
<b>Jihad</b>	A Muslim 'holy war' that was declared against the USSR	<b>Sinatra Doctrine</b>	Nickname of plan for E European countries to do things 'their way'
<b>Fundamentalism</b>	An extreme and dangerous version of a religion	<b>The Fall of the Berlin Wall and the End of the Cold War</b>	
<b>Embassy</b>	A building that represents one country's people in another.	<b>Reunification</b>	Germany being reunited into a single country after being divided

# Key Topic 3: End of the Cold War



## The End of the Cold War



Nixon  
1969-1974

1970

1971

1972 SALT I signed / Nixon visits Moscow

1973 USSR brokers peace deal to end Vietnam War

1974 Nixon visits Moscow for second time



Ford  
1974-77

1975 Apollo-Soyuz link up / Helsinki agreements

1976

1977



Carter  
1977-1981

1978 Communist revolution in Afghanistan

1979 SALT II discussions end / Soviets invade Afghanistan

1980 US boycott of Moscow Olympics

1981

1982 Death of Brezhnev / Andropov new leader

1983 SDI announced 'Star Wars'

Reagan  
1981-1989

1984 Soviets boycott LA Olympics / Chernenko new

leader

1985 Gorbachev new leader / Reagan + Gorbachev meet

1986 Reykjavik Summit collapses

1987 INF Treaty

1988

1989 Iron Curtain ends / Berlin Wall pulled down

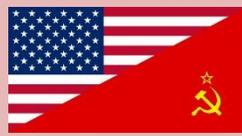
Bush Sr.  
1989-1993

1990 Collapse of Soviet Union / Germany reunited

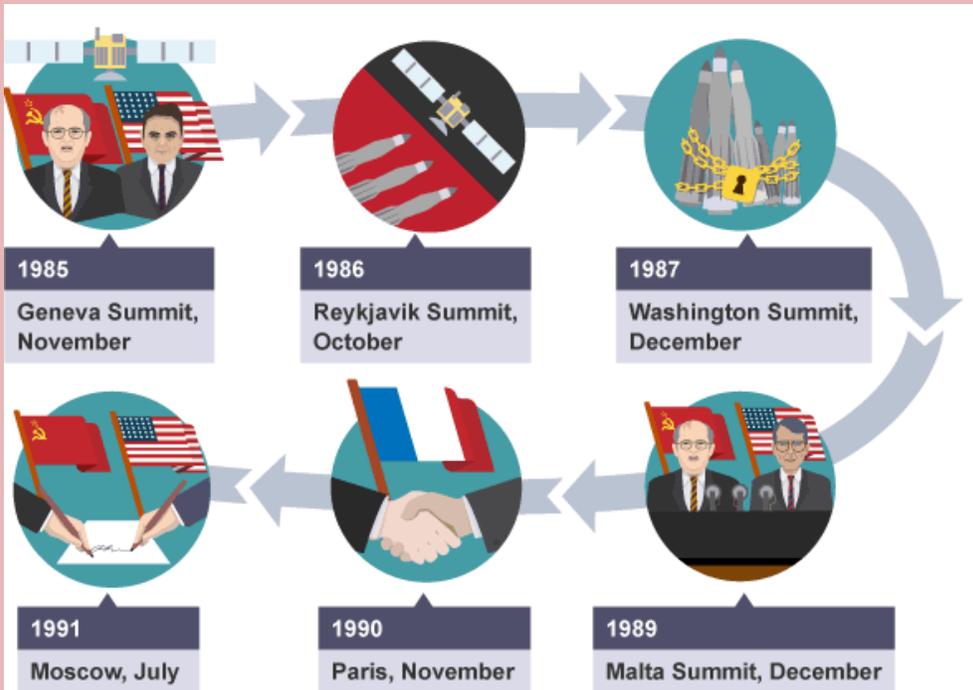
1991 START I / Gorbachev resigns / Warsaw Pact ends



# Key Topic 3: End of the Cold War



Date	Summit, Meeting or Treaty	Key points
1972	<b>Nixon visits Moscow</b>	Nixon agreed to participate in European Security Conference which led to Helsinki Agreements.
1972	<b>SALT 1</b>	Restrictions on new nuclear weapons
1974	<b>Nixon visits Moscow</b>	Commitment to reduce tensions further
1975	<b>Helsinki Agreements</b>	Agreements on security, cooperation and human rights
1985	<b>Geneva Summit</b>	Commitment to abolish chemical weapons, Reagan refused to cancel SDI
1986	<b>Reykjavik Summit</b>	Talks collapse over continued refusal to cancel SDI
1987	<b>INF Treaty</b>	Large scale reduction of nuclear weapons



Cold War Video Library  
<https://tinyurl.com/ColdWarVids>

## East Germany

Oct-Nov 1989: Millions protest on the streets of major cities  
 Nov 1989: Berlin Wall is opened  
 Oct 1990: German reunification

## Czechoslovakia

Nov 1989: Mass protests against Communism lead to resignation of government  
 Dec 1989: Non-communist president appointed  
 1990: Elections won by non-Communist alliance

## Poland

1988: Mass strikes across country  
 1989: *Solidarity* party wins elections and first non-Communist leader in E Europe is elected.

## Romania

25 Dec 1989: Communist dictator Ceausescu executed  
 1990: Democratic elections held, won by party dominated by ex-communists

## Hungary

1988: Becomes multi-party state  
 1989: Border opens with democratic Austria  
 1990: anti-Communist alliance wins elections

## Bulgaria

1990: Democratic elections held, won by renamed Communist Party



YALTA CONFERENCE 1945

BERLIN BLOCKADE 1948

WARSAW PACT 1955

BERLIN WALL 1961

TEHRAN CONFERENCE 1943

TELEGRAM LONG 1946  
Novikov

NATO 1949

HUNGARIAN UPRISING 1956

GENEVA SUMMIT 1959

BAY OF PIGS 1961

CUBAN MISSILE CRISIS 1962

POTSDAM CONFERENCE 1945

TRUMAN DOCTRINE 1947

COMECON 1949

CAMP DAVID SUMMIT 1959

CUBA 1959 REVOLUTION

VIENNA SUMMIT 1961

GRAND ALLIANCE 1941

MARSHALL PLAN 1947

COMINFORM 1947

FRG 1949  
GDR 1949

KENNEDY'S BERLIN SPEECH 1963

1940s > > > > > 1950s > > > > > 1960s

WASHINGTON-MOSCOW HOTLINE 1963

# Superpower Relations & Cold War

LIMITED TEST BAN TREATY 1963

1990s < < < < < 1980s < < < < < 1970s

OUTER SPACE TREATY 1967

INF TREATY 1987

SDI "STAR WARS" 1983

REAGAN'S "EVIL EMPIRE" SPEECH 1983

CARTER DOCTRINE 1980

HELSEINKI AGREEMENTS 1975

1972 SALT 1 AGREEMENT

PRAGUE SPRING 1968  
INVASION OF CZECHOSLOVAKIA

FALL OF THE BERLIN WALL 1989

REYKJAVIK SUMMIT 1986

LOS ANGELES OLYMPICS 1984

MOSCOW OLYMPICS 1980

1979 SOVIET INVASION OF AFGHANISTAN

NUCLEAR NON-PROLIFERATION TREATY 1968

BREZHNEV DOCTRINE 1968

WARSAW PACT DISSOLVED 1991

CHERNOBYL 1986

GENEVA SUMMIT 1985

SALT 2 ABANDONED 1979

RESIGNATION OF GORBACHEV & END OF USSR 1991

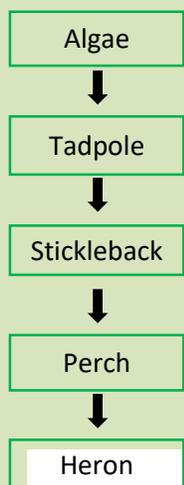
GORBACHEV BECOMES SOVIET LEADER 1985

**What is an Ecosystem?** An ecosystem is a natural system made up of plants, animals and their surrounding physical environment which includes various components such as soil, rainwater & sunlight. All of the components are closely inter-linked and if one changes there will be knock- on effects to the whole ecosystem.

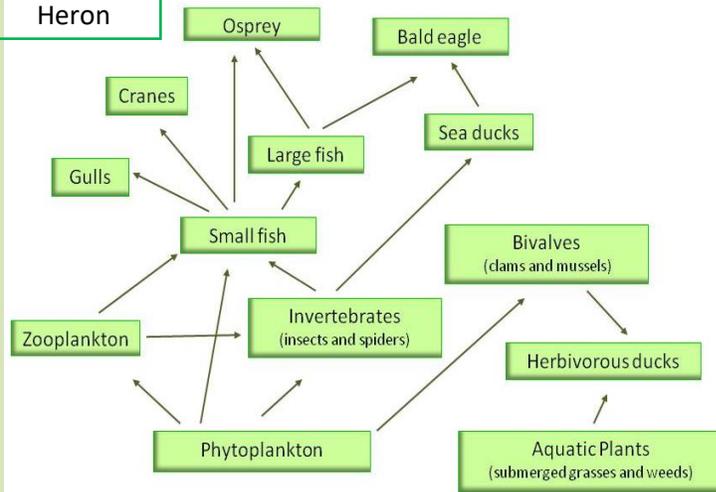
**Food chains & Food webs**

The links between **biotic** components in an ecosystem can be shown through two flow diagrams: a **food chain** and a **food web**.

**Food chain:**



**Food web:**



**What is Nutrient cycling?**

Nutrients are food that are used by plants and animals as they grow. Nutrients are derived from two main sources:

- **Rainwater**, washing chemicals out of the atmosphere
- **Weathering of rocks**, releasing chemicals onto the soil.

A typical **nutrients cycle** has 3 main nutrients stores & several flows responsible for transferring nutrients between the stores.

**Decomposers** help return nutrients to the soil as they break down dead **biotic** components of an ecosystem.

**The impact of change on an Ecosystem.**

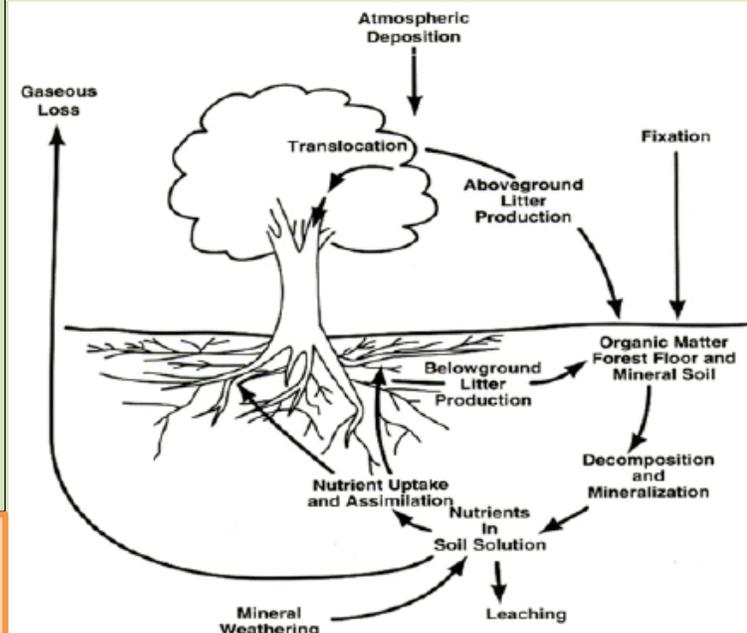
A **sustainable** and healthy ecosystem can take hundreds of years to develop. A sudden change can make everything become unbalanced which can have disastrous impacts. There are two main types of changes: natural changes & human – induced changes.

**Natural Changes:**

- Extreme weather events, such a flood or a drought
- Fire caused by a lightning strike
- Climate change and global warming
- Spread of invasive species or introduction of new species.

**Human – induced Changes:**

- Land use change, such as deforestation
- Alteration to water & soils
- Hunting or trapping animals or wildlife
- Introduction of new species



**Key terms and definitions for this topic**

**Ecosystem-** biological community of interacting organisms and their physical environment.

**Food chain** -a series of organisms each dependent on the next as a source of food.

**Food web**-a system of interlocking and interdependent food chain

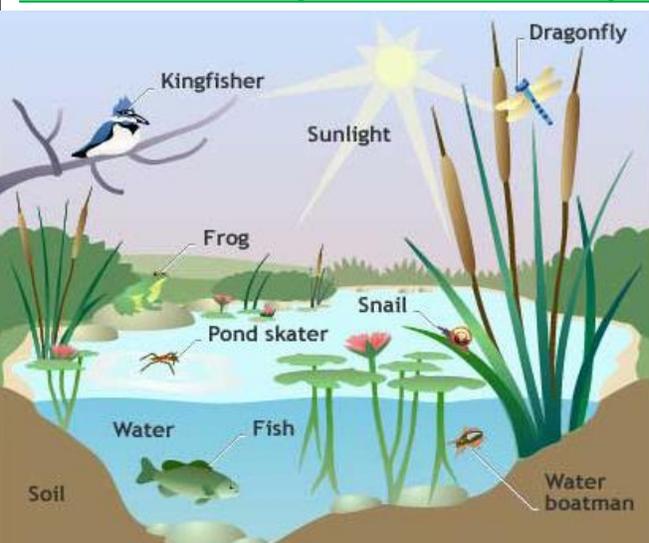
**Nutrient cycling-** repeated pathway of a particular nutrient or element from the environment through one or more organisms and back to the environment

**Species-** group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

**Decomposers-** an organism that decomposes organic material

**Weathering-** describes the breaking down or dissolving of rocks and minerals on the surface of the Earth.

## A small scale ecosystem: a freshwater pond

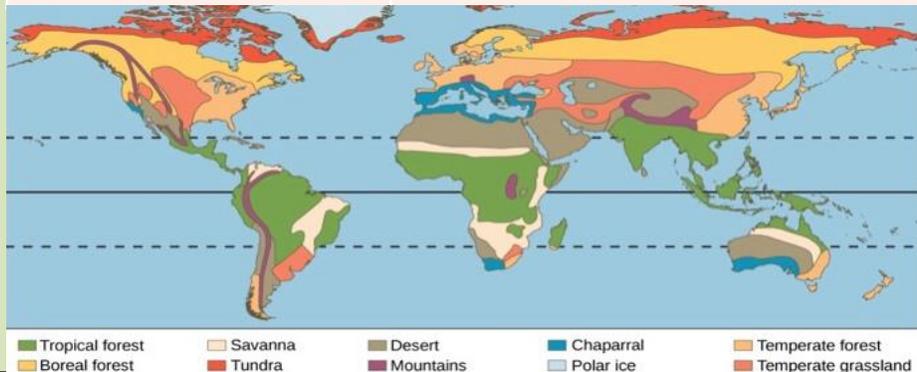


In this picture, there are examples of **producers**, **consumers** & **decomposers**. If one of these species is removed or there is an increase in another species this will have an effect on the whole food chain and might cause an increase or decrease in another species.

### Key terms and definitions for this topic

- Biotic** – living things such as plants & animals.
- Abiotic** – non-living things such as climate & soils.
- Food chain** – shows the direct links between different organisms that rely on each other as a food source.
- Food web** - shows the complex system of plants & animals that rely on each other as a source of food within an ecosystem.
- Producer** – convert energy from the environment into sugars. (Makes food)
- Consumers** – get energy from the sugars produced by the producers. (Eats a plant or another animal)
- Decomposers** – break down plant&animal matter, returning nutrients to the soil
- Biomes** – a global ecosystem often found at specific latitudes.
- Nutrients** – A nutrient is a substance used by an organism to survive, grow, and reproduce. The requirement for dietary nutrient intake applies to animals, plants, or fungi.

Global Ecosystems	Definition
Coniferous/Boreal forest	cold & dark winters with quite warm summers. Made up of coniferous trees and many more evergreen plants.
Deciduous/Temperate forest	mild & moist conditions with few extreme temperatures. Made up of deciduous trees meaning they lose leaves.
Desert	Hot during daytime & cooler at night. Plants & animals well adapted. Little rain leading to arid conditions.
Mediterranean(Chaparral)	hot & dry summer, wet & mild winters,vegetation includes citrus fruit, oak & olive trees.
Tundra	extremely cold all year round with brief summers where much of the land can become very boggy at surface level, but remain frozen deep down in the soil.
Temperate grassland	hot summers & cold winters with low rainfall perfect for grasses
Tropical rainforest	moist air rises to produce heavy rainfall & high temperatures. Ideal conditions for plant growth.
Tropical grassland	Tropical climate with wet & dry seasons. Fires are very common due to lightning strikes.
Polar Ice	Very cold all year around, with some ice melt but temperatures often below -40°C.
Mountain/Alpine	Comprise some of the most intriguing habitats of the world for the stark beauty of their landscapes and for the extremes of the physical environment. It's a hard place for plants and animals to live, with seasonal extremes of snow, rain and temperatures, as well as poor soils and rocky, often very steep slopes .These habitats lie above the upper limit of tree growth but in the summer often have a spectacular display of colourfully flowered plants. Globally, alpine ecosystems cover only about 3% of the world's land area.



The distribution of the different types of global ecosystems can be seen on this choropleth map.

**What is it like in a tropical rainforest?**

A tropical rainforest has some key characteristics that make it very different to other ecosystems or biomes and support a wide variety of different species. This means that they have a high **biodiversity**.

**Climate**

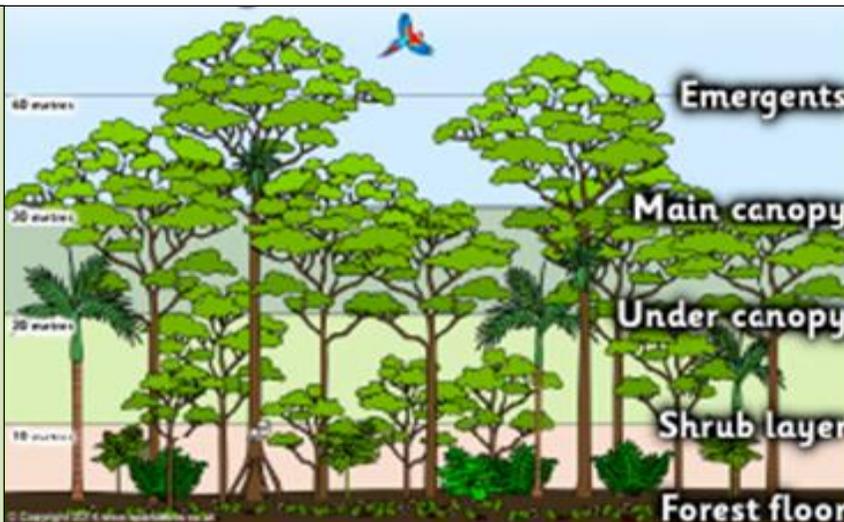
Tropical rainforests are very wet with over 2,000 mm of rainfall per year, and very warm with an average daily temperature of 28°C. The temperature never drops below 20°C and rarely exceeds 35°C. The atmosphere is hot and humid. The **climate** is consistent all year round. There are no seasons.

**Soil**

Most of the soil is not very fertile. A thin layer of fertile soil is found at the surface where the dead leaves decompose, but due to heavy rainfall the nutrients are quickly washed out of the soil. This is why trees have shallow roots. The soil is red in colour because it is rich in iron.

**Structure of a tropical rainforest**

A tropical rainforest has several distinct layers, as shown on the diagram. It is important to remember that the closer to the ground a tree or plant is, the less sunlight it will receive as the trees above will be shading it. For example, the shrub layer will be relatively dark and damp compared to the main canopy.



**Plants**

**Lianas** – Have adapted to the rainforest by being vines which are rooted in the ground but attach themselves to trees, so that as the tree grows, they too climb high into the tree canopy to receive light.

**Buttress roots** – Trees have adapted by growing very large roots which start above ground level and make the base of the tree wider and therefore more stable given the trees height.

**Shallow roots** – Plants have roots that generally grow outwards rather than downwards deep into the soil, to absorb nutrients from the thin fertile layer in the soil close to the surface.

**Plants** - in the shrub layer have large leaves that rotate with the sun in order to obtain enough energy in the low light conditions. These would be very easily snapped off if too much water collects on them, so they have drip tips to channel water away rapidly. These are three interlinked **adaptations!**

**Layers of the Tropical Rainforest**

**Emergent**- The top layer of trees which gets the most amount of sun.

**Main canopy** - 80% of sunlight is caught in here which leaves very little for below.

**Under canopy** - This is just below the main canopy and is home to squirrels, monkeys, bats etc. There is loads of food so life is plentiful.

**Shrub layer**- The shrub layer. It is dark and gloomy with very little vegetation between the trees. During heavy rainfalls this area can flood.

**Forest floor** – Made up of tree roots, soil and decaying matter.

**Animals**

**Flying frog** - has fully webbed hands and feet, and a flap of loose skin that stretches between its limbs, which allows it to glide from plant to plant.

**Spider monkey** - has long, strong limbs to help it to climb through the canopy.

**Sloth** - uses **camouflage** and moves very slowly to make it difficult for predators to spot.

**Parrot** – has a large, strong beak to help it crack nuts.

**Facts**

- 80% of sunlight gets caught in the main canopy.
- 80% of the flowers in the Australian rainforests are not found anywhere else in the world.
- Bats are essential for the pollination of many tropical foodstuffs such as bananas and mangoes.
- 1 out of 4 ingredients in our medicines are from rainforest plants.
- Tropical rainforests are located between the tropics.

## Value of rainforests

- They are home to more species of plants and animals than any other ecosystem on the planet (over 50% of all species in the world!)

Tropical rainforests act as life support systems for the planet as they:

- **Regulate the composition of the atmosphere** - all tropical rainforests, such as the Amazon, regulate the composition of the atmosphere and help to offset the effect of climate change by taking in carbon dioxide through photosynthesis and releasing oxygen.
- **Maintain soil health** - in areas such as the Amazon, tropical rainforests have a thin yet rich, fertile top soil due to the rapid leaf fall and decomposition which rapidly recycles nutrients. These soils can be used to grow cassava and maize which is the staple diet of the local people.
- **Influence the hydrological cycle** - rainforests help to provide water for people. Trees act as a water store by intercepting rainfall. They release water into the atmosphere by evapotranspiration (evaporation and transpiration). This then falls again as precipitation and so gives the people living in areas such as the Amazon a constant supply of water. Tree roots also increase infiltration.

### Goods and services

**Food** - rainforests can produce food such as nuts, which forms part of the diet of local people in the **Amazon**.

**Cash crops** - rainforests also produce cash crops, such as the development of wild coffee that resists disease and has a higher yield than the Arabica beans traditionally used by growers in the rest of Brazil.

**Medicines** - **rainforests** have also been used to search for medicines. For example, the rosy periwinkle from the rainforests of Madagascar can help treat childhood leukaemia. In total, more than 1 in 4 of all known medicinal ingredients are sourced from the rainforest!

**Raw materials** - rainforests can be logged to produce timber such as hardwoods for garden furniture exports. In Indonesia, oil palm plantations cover 7.8 million hectares and employ over 2 million people, making up 7% of Indonesia's **exports**, valued at \$12 billion. Palm oil is used in cosmetics, confectionary, detergents and many other **products**.

## Causes of deforestation

- Clearing land for cattle ranching accounts for over 80% of **deforestation** globally.
- Clearing land for mining valuable minerals found beneath.
- Creation of **Hydroelectric power (HEP)** stations in the **Amazon Basin** has resulted in large areas of forest being flooded to create the reservoirs and dams. The flooding of the Balbina dam in Brazil resulted in the loss of 920 miles<sup>2</sup> of rainforest.
- The timber trade- global demand for tropical hardwoods which are hardwearing and durable, e.g. mahogany.
- Clearing land for transport links – mainly roads – to be developed between cities and countries, to increase trade between them.

## Impacts of deforestation

- When **deforestation** occurs in the rainforest, millions of animals and plants lose their habitats.
- Indigenous people (300 tribes in Amazon alone) will lose homes. They are poorly equipped to adapt to modern city life.
- Loss of medicinal plants, some yet undiscovered.
- The soil soon loses **nutrients** due to surface run off, rendering the land useless for anything.

## Strategies to manage deforestation include

- Setting up an **ecotourism** resort (Yachana Lodge) which supports local people with jobs, local children with training and education, and brings money in, in a sustainable manner.
- **Selective logging** can be utilised, rather than mass clearance techniques, so that only the trees required are removed, rather than large quantities of forest being flattened simply to make access to the desirable timber.
- At a National level, Governments could set up areas as **legally protected reserves**, while internationally, **HIC** governments could write off debts of **LICs** in return for the protection of areas of forest. Banning the international trade of tropical hardwoods reduces the incentive for cutting them down.

## Key terms and definitions for this topic

**Biodiversity** - The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.

**Vegetation** – collective name for the plants and trees in an ecosystem.

**Adaption** –Plants and animals changing to fit the needs of the environment.

**Climate** – long term weather patterns.

**Deforestation** – the act of cutting down large areas of trees.

**HIC** – High Income Country

**LIC** – Low Income Country

### Characteristics

Deserts have extreme **diurnal temperatures**. During the day the temperature may reach 50°C, while at night it may fall to below 0°C. Deserts have less than 250 mm of rainfall per year. The rain can be unreliable. Most deserts are found between 20° and 35° north and south of the equator. They are generally **sparsely populated** areas with little vegetation or **biodiversity** because the soil is dry and sandy with little water or nutrients and it is often windy. The Thar Desert is, however, the most densely populated desert anywhere in the world.

### Adaptations

Due to the challenges of living in a hot desert, many animals and plants have adaptations to help them survive. Common themes include animals keeping cool by being active at night (being nocturnal), or digging underground burrows to shelter from the heat. Other animals have big ears, light-coloured coats, and adaptations that help conserve water. These are often **endemic** species – they only live in this one place.

- **Camel** – large feet help to spread their weight safely across the sand and their humps store fats so that they can go for long periods of time without food. Also has two sets of eyelashes to help keep sand out of its eyes!
- **Cactus** – spikes offer protection from animals who want a tasty snack; a waxy surface helps to minimise water loss; and long roots enable it to collect water from up to 10m away.
- **Joshua tree**- deep, thick roots up to 12m long to collect water and it retains its dead leaves, which hang against the trunk like an umbrella to shade it from the hot sun, reducing water loss.



### Desertification

#### Causes

- **Soil erosion**- means that there is less plant growth as the topsoil is lost, often through windblown movement. This occurs more frequently where vegetation has been removed.
- **Salinization**- a process which occurs when the water in soils evaporates in high temperatures, drawing salts from the soil to the surface. These salts are toxic to many plants and make the land unusable. This has consequences such as low yields, poor profits and even starvation. **Irrigation of land** - when water is brought to land that is naturally dry - can cause salinization on desert margins.
- **Climate change** – means a change in seasonal rainfall, less rainfall, long droughts, higher rates of evaporation .
- **Population growth**- increased water consumption, over grazing and over cultivation, as well as **Urbanisation** – the growth of settlements.
- **Removal of wood** – logging to provide fuel wood means top soil is at risk of erosion.
- **Over-cultivation**- growing too much in one place reduces nutrients, fertility and weakens soil, overusing pesticides and planting crops in the same place each year damages the soil.
- **Over-grazing** – livestock eat plants quicker than they can grow, cattle stop water from penetrating and infiltrating the soil, often as a result of reduced nomadic lifestyles (local people moving around less on the land than they used to).

#### Reduction

- **Water and soil management**- use drought resistant plants, roots of plants bind the soil together, building walls stops erosion.
- **Tree planting** – Great Green Wall (project in Saharan Africa, 800km wide) leaves provide shade for soil, acts as a wind break, there are jobs available planting trees meaning more money for locals.
- **Appropriate technology**- no machinery (not enough resources or money) ‘magic stones’ protect plants and provide shade, meaning less erosion of the soil.
- **Winds barriers** – provides shade and wind protection, stops soil eroding.

## The Thar desert

- Crosses the border between India and Pakistan
- Average temperature is 27.3° C
- Temperatures often exceed 50° C
- In 1992, 3000km<sup>2</sup> was made into a national park
- The desert has a population density of over 80 people per km<sup>2</sup>. (Other deserts have population densities below 10 per km<sup>2</sup>).
- There are many mobile sand dunes, and sandy hills.

### Challenges

- **Water supply**- population growth and development in farming means demand is increased, low rainfall and high temperatures mean high rates of evaporation, water sources include: ponds, underground wells and intermittent rivers (only after rainfall).
- **Extreme temperatures**- high temperatures and low rainfall mean high rates of evaporation, means little water and nutrients in soil.
- **Inaccessibility**- limited road networks, high temperatures melted tarmac roads, winds blow sand over roads, transport usually consists of camels or overloaded buses.

### Opportunities

- **Tourism**- camel tours/ safari, unique cultural hotels, selling local goods, dune buggies and dune surfing, cultural activities.
- **Energy**- solar panels, wind turbines, coal and oil extracted from under the soil.
- **Farming- Subsistence** - The desert area is not very fertile. Soils are quickly drained, and contain few nutrients. The farming is limited, typically a few animals on more grassy areas and fruit. Most is subsistence farming.
- **Farming- Commercial** - Commercial farming has been possible since the building of the Indira Gandhi Canal. This irrigates an area near Jodhpur. Wheat and cotton can be grown. The canal also supplies drinking water.
- **Mining**- Minerals such as **gypsum** and **feldspar** can be sold for use in building products. Limestone from Jaisalmar quarry is used in buildings. Minerals in the area (**rock phosphate**) are used to make fertiliser for crops.



### Key terms and definitions for this topic

**Diurnal temperature** - the temperature throughout the day/night.

**Feldspar** – mineral used in glass and ceramics.

**Gypsum** – mineral used in plaster/ plasterboard.

**Rock phosphate** – used in fertiliser.

**Irrigation** - application of water to plants and crops.

**Biodiversity** – the variety of plants and species in a certain environment.

**Endemic** – a species native to a certain place.

**Desertification** – the destruction of land until nothing grows, due to loss of water and vegetation.

**Salinization** - the process of increasing salt levels in soil.

**Commercial farming** – growing crops to sell.

**Subsistence farming** – growing crops for your own needs.

**Sparsely populated** – low population density

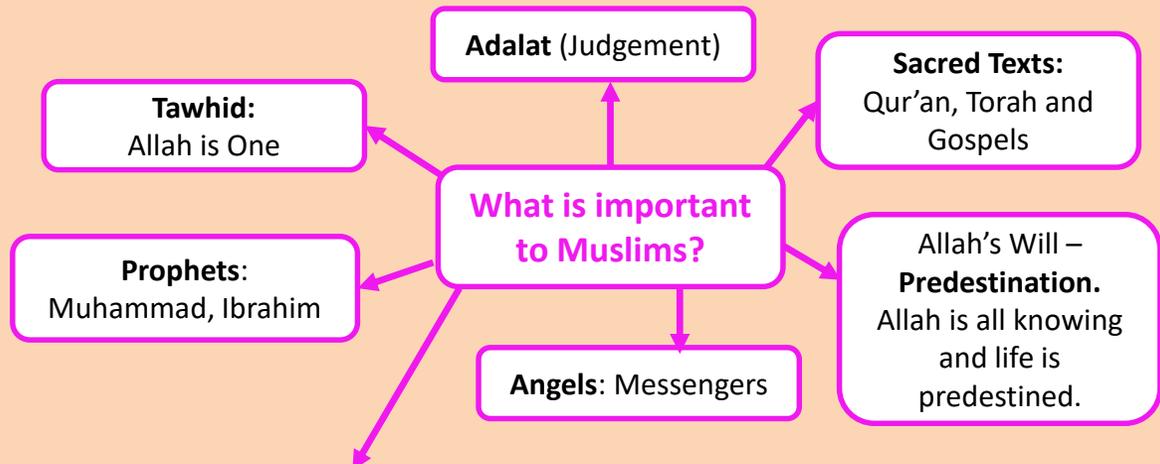
# BVT: Islamic beliefs

Omnipotent	Muslims use the word Al-Qadeer to mean omnipotent for Allah.
Tawhid	Allah is One – he is ultimate, absolute and nobody comes close. Allah is everywhere. <i>“He is Allah, One”</i> Qur’an.
Merciful (all – loving)	Shows mercy is to show forgiveness. This shows Allah’s compassion. An example is that he sent Muhammad to guide Muslims to the right path. It shows Muslims are never alone without Allah.
Fair and Just	Muslims call justice - Adalat. The Day of Judgement shows justice. Fairness - the belief that Muslims should never live to the extreme
Immanent	Allah is active in the world – he can always be with you e.g. through the Qur’an and through teachings of Muhammad. <i>“He is with you wherever you may be”</i> Qur’an
Transcendent	He is beyond our world and understanding. He has no beginning or end and is beyond time. <i>“No vision can grasp him...He is above all comprehension”</i> Qur’an

**Sunni and Shi’a Muslims.**

- Like in other faiths, there are different groups of Muslims.
- This came about after the **death of Muhammad**. Some Muslims believed that Muhammad’s cousin Ali should have been the next leader of Islam; they formed a group called Shi’a Muslims.
- However, other Muslims believed that the next ruler should be elected, which fitted with Arab tradition where they lived. These Muslims formed a group called the Sunni Muslims. 90% of Muslims in the world are Sunni Muslims.
- Both Muslims have very similar beliefs and follow the teaching of Muhammad and are dedicated to Allah; however there are small differences to their beliefs and practices, just like within Christianity.

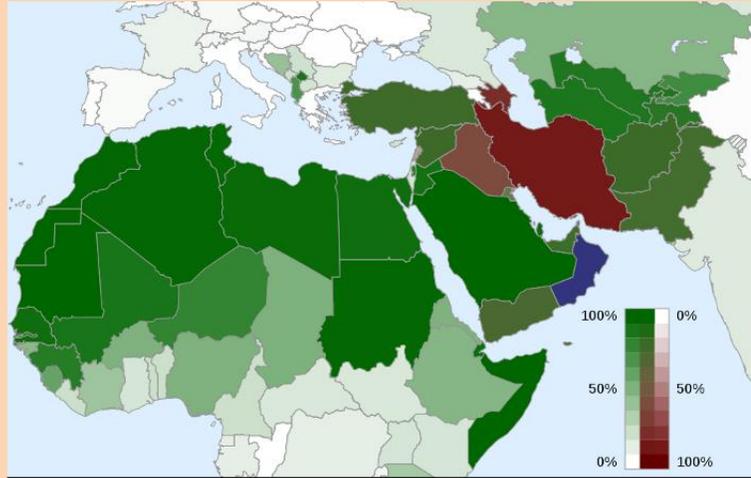
## Muslim Beliefs of the 6 Articles of Faith (Sunni) and the 5 Roots of Usul-ad-Din (Shi’a)



**Shi’a 5 roots ONLY: Imamate (leadership)**  
 There is said to be 12 Imam Leaders after Muhammad. The 11 led their communities. The 12th was said to have disappeared. It is said that the 12th will reappear when Allah decides at the end of time.

## Impacts of Allah and his messengers

- Faith, love, comfort, equality, guidance, teacher, forgiving, protection, awe, connection, immanent



Green is the % of Sunni Muslims  
 Red is the % Of Shi’a Muslims

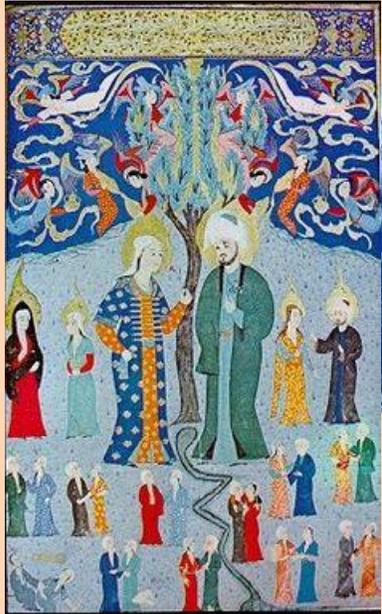
# Prophets

## Adam: The first prophet

Allah created the world for Adam and his decedents. He gave him a thirst for learning and to make choices himself. Allah created Hawwa (Eve) for Adam. They were tempted by Iblis (a creature to represent the Shaytan) to eat the fruit and were banished to earth by Allah.

### Why is Adam important?

- Adam spread the word of Allah, he named his decedents to do the same
  - Adam took care of the planet (Stewardship)
- Adam teaches that sin will be judged and punished, but Allah will show mercy for those that repent.
- Adam built the Ka'aba (the first place of worship, visited at Hajj)



## Ibrahim

Ibrahim challenged people worshipping idols, preaching that there was only one true God. **“I have set my face towards the One” (Ibrahim).** But people did not listen they threw him in a fire but Allah saved him from the fire.

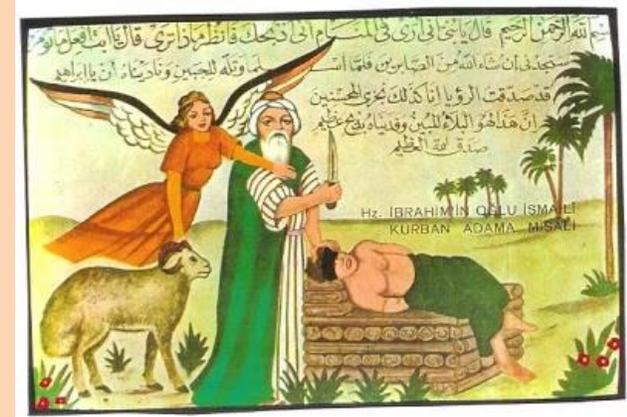
With his family and some followers he set off to God’s Promised Land. This was his first test by Allah. Ibrahim faced 10 more tests. The last one he dreamt Allah wanted him to sacrifice his son, Ismail. **“I have seen in a dream that I should sacrifice you” (Qur’an).** They both agreed this was what Allah wanted and were prepared to go through with this. Allah stopped the sacrifice at the last minute and sacrificed a ram instead.

Allah also helped Ibrahim’s wife and son Ismail who were searching for water in the desert by proving them with a well. This is called the Zam Zam well and visited on Pilgrimage.

### Why is Ibrahim important?

- Shows devotion and faith to Allah by showing if you are willing to submit to Allah you will be rewarded and cared for
  - Zamzam well is used as sacred sites on Muslims pilgrimage in Makkah.

Zam Zam Well



## Muhammad

### The Night of Power:

In cave Hira Muhammad was visited by the Angle Jibril who told him to read a sacred text. Muhammad told him he could not, however after he was shaken by the angel he could then read – all was revealed to him. Muhammad had further revelations from Allah and over 23 years Muhammad wrote the Qur'an dictated to him by Allah (through Jibril).

Muhammad preached about One God; Allah. However, not everyone wanted to hear this so Muhammad was forced to flee or go on a journey (Hijrah) to Madinah where he settled and converted to Islam. Muhammad later converted Mekkah to Islam.

### Why is Muhammad important?

- He wrote the Qur'an and established the 5 pillars
- The Hadith is a book written with Muhammad’s sayings / teachings to live by for Muslims today
- He is a teacher and role model of Islam and Allah
- He lived humbly and shows equality to all Muslims

# Angels

- Made from light
- Messengers of Allah – between Allah and man
- Record Muslims actions for Judgment day
- Take care of paradise



## Mika'il:

- He is giver of rain and substance. (Spiritual and physical help for Muslims)
- He helped Muhammad in his battle to convert Mekkah
- Mika'il purified Muhammad with water before he went to paradise with Allah.

## Jibril:

- Visited Muhammad in Cave Hira – Night of Power
- Saved Ibrahim from the fire

## Azar'il:

- Known as the Angel of Death
- Azar'il asks 3 questions on death, if these are answered correctly, you can sleep until Judgment day, if not you are tormented.



# Judgement, Heaven and Hell

Key Terms	Details
Akhirah	Means after life
Barzakh	Translates as barrier: This signifies Judgement day
Jannah	Heaven or paradise. Paradise has 8 gates (different aspects) and 7 levels (how good you lived). Each soul will go into a different gate at a different level
As-Sirat bridge	The bridge that must be crossed to get to paradise. Once over, angel's welcome you to paradise saying <b>"Enter here and live within"</b>
Jahannam	Hell. This is a fire, pain, misery and torture. There are 7 levels to how bad it could be
Final Judgement	Angels will blow trumpets, the Qur'an will rise to paradise, 40 days after the trumpets – smoke will cover the land, fire will burn over the seas. A final trumpet will sound and the dead and the living will be judged and rise to Paradise



## Important quotes:

**"Enter among my servants! Enter my Paradise" Qur'an**  
**"...your sins are against your soul.... We will show you the truth of what you did"**  
**Qur'an**

# Religious Texts

## Holy Books associated with Muhammad: The Qur'an, the Hadith, the Sunnah

- The Qur'an was dictated by Angel Jibril (from Allah) to Muhammad over 21 years.
- The Qur'an was written over 23 years (2 years after his death too).
- It was dictated by Muhammad and scribed by followers and the next leader of Islam called the Caliph after Muhammad's death.
- It has authority to Muslims as it is the words of Allah and has never been translated or changed throughout history. *"Falsehood shall never come to it"* (Qur'an)
- The Hadith is a book of Muhammad's teachings and life. It was written after Muhammad's death by later Caliphs (some 3 generations after).

### Memorising the Qur'an

At the time of the revelation of the Qur'an, books were not readily available and so it was common for people to learn it by heart.

Learning the Qur'an off by heart is called ***hafiz***.



The Holy Quran acts as the basis of Islamic belief. Some of the major themes are:

- Nature of God e.g. merciful (loving) and forgiving
  - Prophets
- Man – creation / free will
- Sin, judgement and afterlife



# Shari'ah Law

- Shari'ah Law is Islamic Law, which some Islamic countries follow.
- Shari'ah Law are laws that originate from **teachings in the Qur'an** and the Sunnah (practises of Muhammad)
- These laws follow 5 areas: Behaviour, worship, beliefs, punishments, transactions (dealings with people)
- Many Muslims believe that **Shari'ah is superior to human law** as it comes directly from Allah (Allah has absolute authority)
- Muslims are taught to follow the laws of their country e.g. British Muslims follow British law. However some more **radical Muslims feel that Shari'ah Law has authority too**



Other Holy Books	Why they are important? Why are they not as accurate as the Qur'an?
Torah	Scrolls of the Torah are the oldest scripture. They contain teaching about God (Allah). They also contain the 5 books of the old testament which include teachings about Prophets Ibrahim (Abraham) and Moses as well as creation. They teach Muslims that Allah had messengers before Muhammad. These were written <b>by Moses followers after his death</b> . This is the <b>oldest full surviving revelations from God</b> . They have been <b>translated</b> .
Scrolls of Ibrahim	These were written revelations that Ibrahim received from Allah. It taught Muslims what Allah revealed to Ibrahim. They also contained parable like stories. The teachings of the scrolls have been passed down, but the <b>scrolls themselves are now lost</b> .
Gospels (New testament)	These tell Muslims the teachings and life of Prophet Isa (Jesus). Muslims believe that Jesus is a prophet of Allah to spread the word of God. These were written <b>by his disciples after Jesus' death</b> . They have also been <b>translated</b> .

# 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**





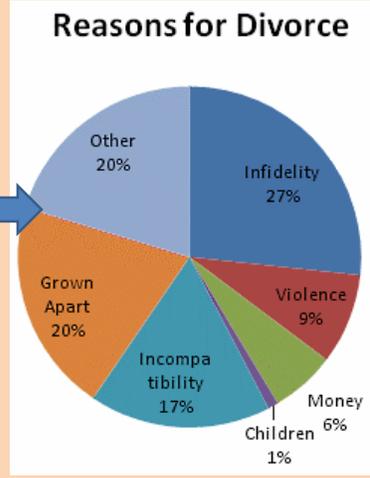
# Adultery, Divorce and re-marriage

## 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 e 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

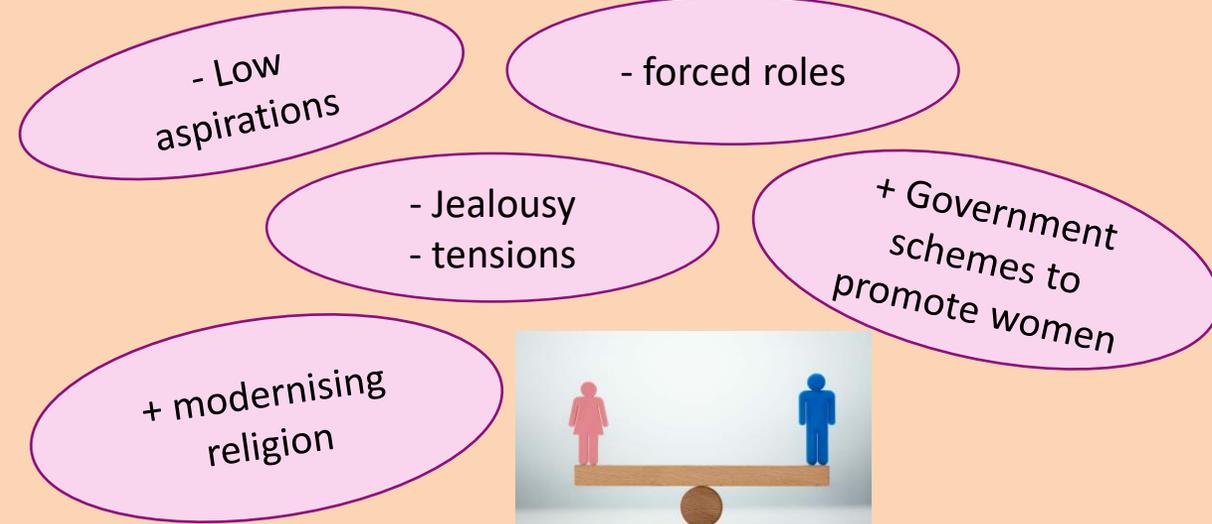
For relaxed divorce laws:

- 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

## Inequality impacts....



## Gender has been in the news recently, expressing problems and inequality for women

9.7% is the average full time pay gap between men and women. For every £1 earned by a man a woman earns **81p**

Only **35%** of senior management roles were female in UK 2012



1 in 10 women have faced sexual harassment at work



## GCSE FRENCH YEAR 10: FREE TIME

### Quels sont tes hobbies / Que fais-tu pendant tes heures libres?

Quand il fait beau / froid / chaud (*when it's nice / cold / hot*)

Pendant mes heures libres (*during my free time*)

Samedi / dimanche / pendant la semaine (*on Saturday / Sunday / during the week*)

Quelquefois / normalement / parfois (*sometimes / normally / occasionally*)

je joue / je fais / je lis / ... (*I play / do / read...*)

j'aime / je préfère... Je n'aime pas tellement (*I like / I prefer / I don't really like*)

mon sport préféré (*my favourite sport*)

faire de l'équitation (*to do horseriding*)

faire du vélo (*to do cycling*)

faire de la natation (*to do swimming*)

jouer au foot (*to play football*)

jouer au badminton (*to play badminton*)

aller en ville (*to go to town*)

lire (*to read*)

écouter de la musique (*to listen to music*)

**R** – range

**O** – opinions

**T** – tenses

**A** – adjectives

**T** – tie together

**E** – extend



### Qu'est-ce que tu as fait le weekend dernier?

samedi (matin / après-midi / soir) (*Saturday morning / afternoon / evening*)

J'ai fait / j'ai joué (*I did / I played*)

J'ai lu (*I read*)

J'ai écouté (*I listened*)

J'ai visité (*I visited*)

J'ai aidé à la maison (*I helped at home*)

J'ai promené le chien (*I walked the dog*)

J'ai rendu visite chez... (*I visited [people]*)

J'ai regardé (*I watched*)

Je suis allé(e) (*I went*)

Je suis resté(e) (*I stayed*)

### Qu'est-ce que tu vas faire ce weekend?

je vais / on va (*I'm going / we are going*)

j'ai l'intention de / je veux / (*I intend / I want*)

aller (*to go*)

jouer (*to play*)

je ferai (*I will do*)

j'irai (*I will go*)

j'aurai (*I will have*)

e jouerai (*I will play*)



## Qu'est-ce que tu aimes manger et boire?

je mange / bois (*I eat / drink*)

j'aime / je préfère manger / boire (*I like to eat / drink*)

mon repas préféré (*my favourite meal*)

au petit déj / à midi (*for breakfast*)

le soir etc (*in the evening*)

du pain (*bread*)

du fromage (*cheese*)

de la confiture (*jam*)

de la viande (*meat*)

des choux de Bruxelles (*sprouts*)

de l'eau (*water*)

de l'aubergine (*aubergine*)

je ne mange jamais de... (*I never eat*)

nous mangeons dans le jardin / la salle à manger / la cuisine (*we eat in the garden / the dining room / the kitchen*)

avoir faim / soif (*to be [have] hungry / thirsty*)



délicieux (*delicious*)

dégueulasse (*revolting*)

dégoûtant (*disgusting*)

savoureux (*tasty*)

très / trop / un peu (*very / too / a little*)

salé / sucré / amer / acide / croustillant  
(*salty / sweet / bitter / acidic / crusty*)

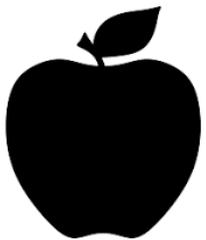
la semaine dernière / le weekend dernier / samedi (*last week / last weekend / on Saturday*)

je suis allé(e) à / nous avons visité (*I went to / we visited*)

un restaurant / McDo

c'était l'anniversaire de X / mon anniversaire (*it was X's birthday / my birthday*)

la cuisine française / anglaise / chinoise / indienne  
(*French food / English / Chinese / Indian*)





## Les opinions

je pense que / à mon avis / en ce qui concerne /  
quant à moi / je suis d'avis que / de mon façon de  
voir / selon moi, mon ami

*(I think that / in my opinion / with regards to /  
when it comes to me / I'm of the opinion that /  
from my point of view / according to me / my  
friend)*



quand j'étais plus jeune... *(when I was  
younger)*  
quand j'avais ... ans *(when I was ... years old)*  
je mangeais *(I used to eat)*  
je buvais *(I used to drink)*  
je faisais *(I used to do)*  
j'aimais *(I used to like)*

**R** – range  
**O** – opinions  
**T** – tenses  
**A** – adjectives  
**T** – tie together  
**E** – extend

## Qu'est-ce qu'on devrait faire pour rester en forme / bonne santé

on doit *(you / one must)*  
on devrait *(you / one should)*  
je vais *(I'm going to)*  
il faut *(you must / one must)*  
c'est important de *(it's important to)*  
toujours *(always)*  
ne...pas *(not)*  
ne...jamais *(never)*  
éviter *(to avoid)*  
fumer *(to smoke)*  
boire *(to drink)*

se droguer *(to take drugs)*  
se lever *(to get up)*  
se coucher *(to go to bed)*  
se relaxer *(to relax)*  
se détendre *(to relax / unwind)*



## KEY GRAMMAR

### Present tense conjugation

THE **INFINITIVE** WILL END IN –ER (most common), –RE OR –IR

The infinitive starts with ‘to’ in English.  
jouer = to play; attendre = to wait; finir = to finish

#### -er verbs

je joue = I play  
tu joues  
il joue  
nous jouons  
vous jouez  
ils jouent

#### -re verbs

je attends = I wait  
tu attends  
il attend  
nous attendons  
vous attendez  
ils attendent

#### -ir verbs

je finis = I finish  
tu finis  
il finit  
nous finissons  
vous finissez  
ils finissent

### Perfect tense

Most verbs take ‘**avoir**’ as *auxiliary 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 *auxiliary 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>

**naître**

**devenir**

+ **ALL REFLEXIVE VERBS**

### Near future

*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

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 mangerai)  
tu – as (tu mangeras)  
il –a (il mangera)

nous –ons (nous mangerons)  
vous –ez (vous mangerez)  
ils –ont (ils mangeront)

**Note:** j’irai = I will go / je serai = I will be  
je ferai = I will do / j’aurai = I will have

### Some / any

du / de la / des / de l’

Je mange **des** pommes = I eat (some) apples)

Je ne mange pas **de** frites = I don’t eat (any) chips

## GCSE SPANISH YEAR 10: FREE TIME

### ¿Cuáles son tus pasatiempos? / ¿Qué haces en tus ratos libres?

Cuando hace buen tiempo / frío/calor (*when it's nice / cold / hot*)

*Durante mis ratos libres (during my free time)*

Sábado / domingo / durante la semana (*on Saturday / Sunday / during the week*)

A veces / normalmente / algunas veces (*sometimes / normally / occasionally*)

juego/ hago/ leo / ... (*I play / do / read...*)

Me gusta / prefiero... no me gusta mucho (*I like / I prefer / I don't really like*)

Mi deporte favorito (*my favourite sport*)

Montar a caballo (*to do horseriding*)

Hacer ciclismo (*to do cycling*)

Nadar (*to swim*)

Jugar al fútbol (*to play football*)

Jugar al badminton (*to play badminton*)

Ir al centro (*to go to town*)

leer (*to read*)

Escuchar música (*to listen to music*)



### ¿Qué hiciste el fin de semana pasada?

Sábado (mañana / tarde / noche) *Saturday (morning / afternoon / evening)*

hice / jugué (*I did / I played*)

Leí (*I read*)

Escuché (*I listened*)

visité (*I visited*)

ayudé en casa (*I helped at home*)

Paseé al perro (*I walked the dog*)

visité... (*I visited [people]*)

ví (*I watched*)

Fui (*I went*)

Me quedé (*I stayed*)

### ¿Qué vas a hacer este fin de semana?

Voy a / vamos a (*I'm going / we are going*)

intento/ quiero/ (*I intend / I want*)

ir (to go)

jugar (to play)

haré (*I will do*)

iré (*I will go*)

tendré (*I will have*)

Jugaré (*I will play*)

**R** – range

**O** – opinions

**T** – tenses

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**E** – extend

## ¿Qué te gusta comer y beber?

como/ bebo (*I eat / drink*)

me gusta / prefiero comer / beber (*I like to eat / drink*)

mi plato favorito (*my favourite meal*)

desayuno/ almuerzo (*for breakfast/lunch i eat*)

por la tarde etc (*in the evening*)

el pan (*bread*)

el queso (*cheese*)

la mantequilla (*jam*)

el carne (*meat*)

coles de Bruselas (*sprouts*)

aqua (*water*)

berenjena (*aubergine*)

unca como ... (*I never eat*)

comemos en / el jardín /el comedor/ la cocina (*we eat in the garden / the dining room / the kitchen*)

Tener hambre/ sed (*to be [have] hungry / thirsty*)



delicioso (*delicious*)

asco (*revolting*)

repugnante (*disgusting*)

saboroso (*tasty*)

muy / demasiado / un poco (*very / too / a little*)

salado / azucarado / amargo / ácido /  
crujiente (*salty / sweet / bitter / acidic /  
crusty*)

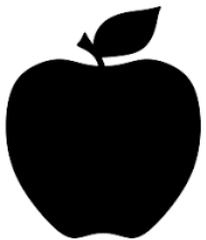
la semana pasada/ el fin de semana pasado/ sábado  
(*last week / last weekend / on Saturday*)

fui a / visitamos(*I went to / we visited*)

un restaurante / McDonald's

fue el cumpleaños de X / mi cumpleaños (*it was X's  
birthday / my birthday*)

la comida española/ inglés / china / india (*French food /  
English / Chinese / Indian*)





## Les opinions

Pienso que/ en mi opinión/  
en lo que concierne/ en cuanto a mi/ a mi modo  
de ver / según yo/mi amigo

*(I think that / in my opinion / with regards to /  
when it comes to me / from my point of view /  
according to me / my friend)*

Cuando era más joven... *(when I was younger)*  
Cuando tenía... años *(when I was ... years old)*  
Comía *(I used to eat)*  
Bebía *(I used to drink)*  
Hacía *(I used to do)*  
Me gustaba *(I used to like)*

**R** – range  
**O** – opinions  
**T** – tenses  
**A** – adjectives  
**T** – tie together  
**E** – extend

## Qu'est-ce qu'on devrait faire pour rester en forme / bonne santé

Se debe *(you / one must)*  
Se debería *(you / one should)*  
Voy a *(I'm going to)*  
Tiene que *(you must / one must)*  
Es importante *(it's important to)*  
siempre *(always)*  
No *(not)*  
Nunca *(never)*  
evitar *(to avoid)*  
fumar *(to smoke)*  
beber *(to drink)*

drogarse *(to take drugs)*  
Levantarse *(to get up)*  
Acostarse *(to go to bed)*  
Relajarse *(to relax)*  
descansar *(to relax / unwind)*



## KEY GRAMMAR

### Present tense conjugation

THE **INFINITIVE** WILL END IN –AR (most common), –ER OR –IR

The infinitive starts with ‘to’ in English.  
jugar= to play; comer = to eat; vivir = to live

#### -ar verbs

Juego = I play  
jueges  
juege  
jugamos  
jugáis  
juegen

#### -re verbs

como= I eat  
comes  
come  
comemos  
coméis  
Comen

#### -ir verbs

vivo= I live  
vives  
vive  
vivimos  
vivís  
viven

### 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

*ir + 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

This is when we want to say ‘I **will** do x, y, z’

Most of the time put these endings on to the **INFINITIVE**

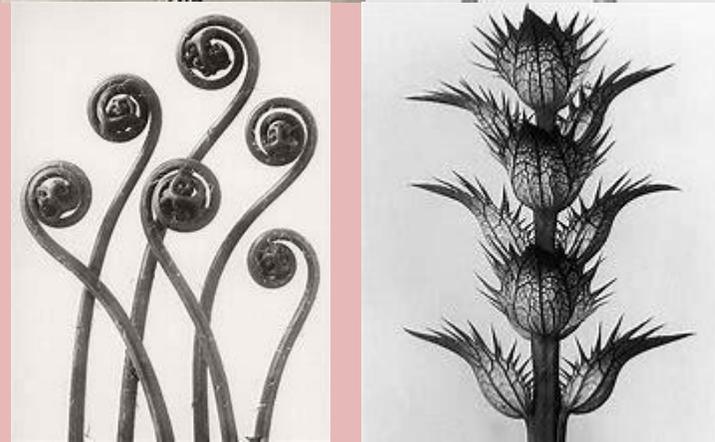
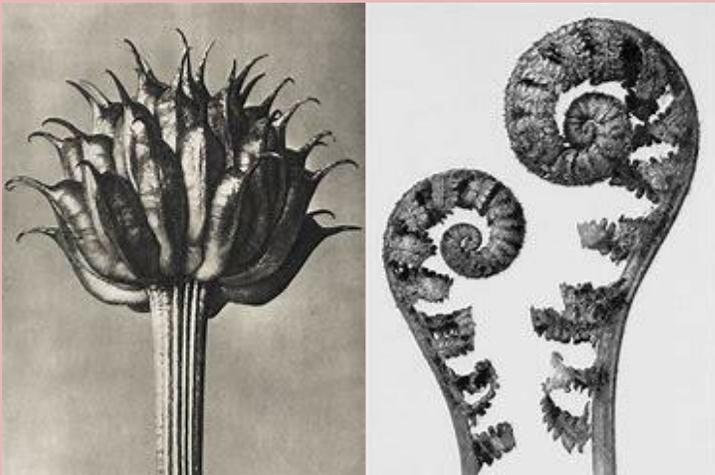
(yo)	hablar-é
tú)	hablar-ás
(él/ella)	hablar-á
(nosotros)	hablar-emos
(vosotros)	hablar-éis
(ellos/ellas)	hablar-án

**Note:** tendré (I will have), haré (I will do)  
Saldré (I will go) , diré (I will say), Vendré (I will return)

# ART TERMINOLOGY YOU SHOULD KNOW LEARN AND USE

## Karl Blossfeldt - Photographer

Karl Blossfeldt was a German photographer, sculptor, teacher, and artist who worked in Berlin, Germany. He is best known for his close-up photographs of plants and living things, published in 1929 as *Urformen der Kunst*. He was inspired, as was his father, by nature and the ways in which plants grow. He believed that "the plant must be valued as a totally artistic and architectural structure."



### 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

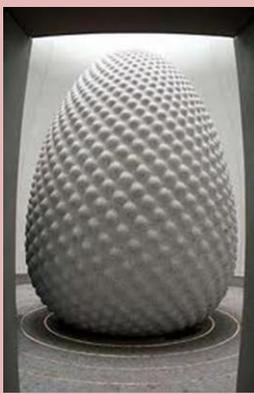
### Line

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

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.



Phillip Randall-Page - sculptor



Tom Hare – weaving with willow to create natural form structures



Kate Malone - ceramacist



## Andrew Mckeown



Suzannah Blaxill - Poppy Seed Head in Charcoal

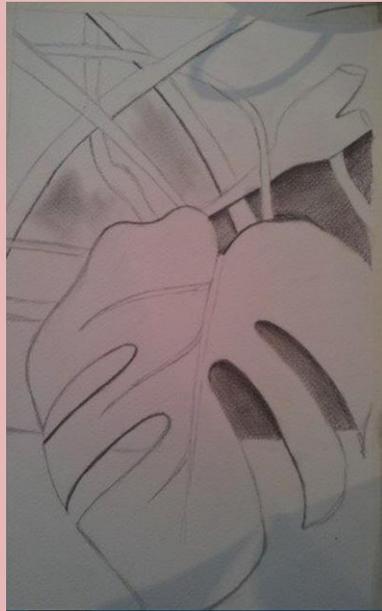


# Natural Forms – Collections

Recording in different Art Media



Pencil



3D relief



Burnished coloured pencils



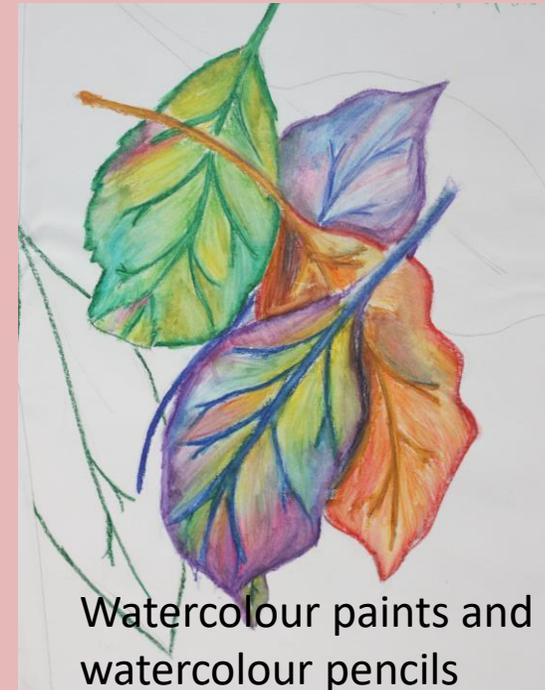
Recording a collection of Natural Forms in a group using graphite pencils



Coloured Pens



Acrylic Paint



Watercolour paints and watercolour pencils



# Printing

Printing is the process of making images that can be transferred onto other surfaces. It can be used to make one or more identical images or to create repeating patterns on papers and textiles. Please view this site for details. <https://www.bbc.co.uk/bitesize/guides/z38s6yc/revision/1>

Printing techniques include:

silkscreen printing

block printing

monoprinting

etching



One of the most famous wood block prints - Under the Wave off Kanagawa, aka The Great Wave, Katsushika Hokusai, 1830-32

## Silkscreen printing

The most successful silkscreen prints use bold, simple shapes and designs with limited colours. Andy Warhol's Cow is a good example of this.



**Lino cut** Printmaking time lapse- Korean Tiger by Emils Salmins ( multiple layers)

<https://www.youtube.com/watch?v=eOzri-Xpa9k&safe=active>

Block Printing

<https://www.youtube.com/watch?v=h-lK2twnrBo&safe=active>

Wood block prints – How Gauguin produced his prints. This is well worth watching:

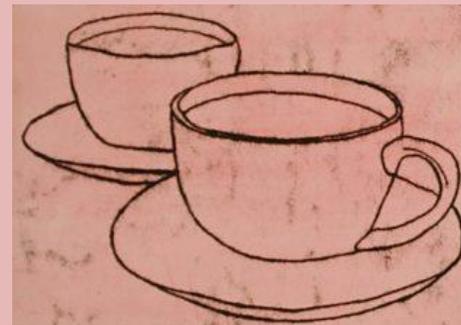
<https://www.youtube.com/watch?v=0WSJTC3EXdM&safe=active>

How to make transfer drawings – Gauguin's process:

<https://www.youtube.com/watch?v=bn-pztbu8lo&safe=active>

## Mono printing –

Monoprinting is the process of making a print using 'mark making'



Student work using layered paper and stencil print



## Natural Forms – Collections Leaves



**William Morris –**  
Arts and Crafts Artists/ Craftsman  
and Designer



## Henri Matisse

Paper cuts

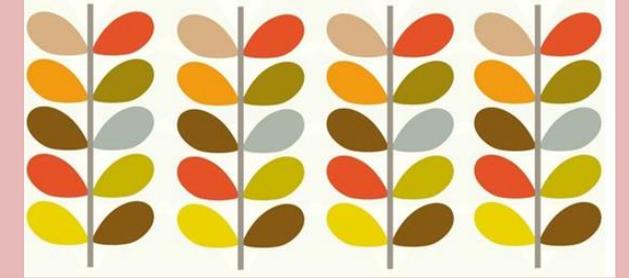


## Angie Lewin - printmaker



## Orla Kiely – print designer

<https://orkiely.com/at-home-colouring>



## Vanessa Arbuthnott-

Textile Printer



# Year Ten Term Three Film Music

## 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.

## 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 3 – 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.

### 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.

Star Trek  
Soundtracks  
are epic!



## Melody – what is the lead line doing?

High or low. **Range**



Big or Small.



**Direction** = Ascending Descending



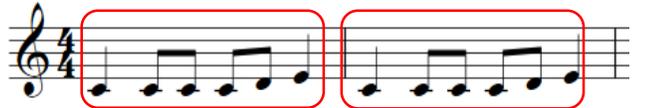
**Chromatic** The melody uses notes that aren't in the scale / key of the piece.



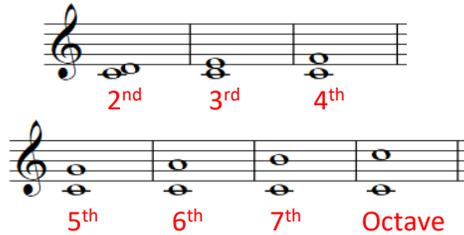
**Sequence** Doing the same shape idea but at a different pitch.



**Repetition** Doing the same thing again, without any changes.



**Interval** The distance between two notes



\*Count the start note & end note

**Ostinato** A short repeated idea.



**Ornaments** Trills



**Mordents**



## MUSIC GCSE KEY VOCABULARY

## Harmony - what are the chords and the tonality?

**Key Signature**

The sharps or flats at the start of a piece of music, showing what key the music is in.

**Modulation**

Musical word for key change. Most common changes: to **Dominant** or **relative Major/Minor**.

**Identifying The Tonality...**

- Tonal** - In a major or Minor Key
- Atonal** - There is no sense of key
- Modal** - Uses 'old-fashioned' scales called modes
- Pentatonic** - The music only uses 5 notes

**Chords**

- Triad** - A chord with three notes (See below)
- Power Chord** - Only playing the Root and Fifth of a triad (used in Rock music)
- Dissonance** - Clashing notes played together
- Chord Sequence** - The order the chords in a piece of music follow (containing cadences at the ends of phrases)

**Cadences**

The last two chords in a phrase. Only sounds 'complete' if ends on chord I.

**Sounds Complete**

<b>Perfect Cadence</b>	V Dominant	I Tonic
<b>Plagal Cadence</b>	IV Subdominant	I Tonic

**Sounds Incomplete**

<b>Imperfect Cadence</b>	I Tonic	V Dominant
<b>Interrupted Cadence</b>	V Dominant	Minor Chord

## Dynamics – how loud or quiet? How is it changing?

Marking	Italian Term	Meaning
pp	Pianissimo	Very Quiet
P	Piano	Quiet
mp	Mezzo Piano	Moderately Quiet
mf	Mezzo Forte	Moderately Loud
f	Forte	Loud
ff	Fortissimo	Very Loud
	Crescendo	Getting Louder
	Diminuendo	Getting Quieter
sfz	Sforzando	Sudden Accent

**Baroque Period:** Dynamics were rarely used (no crescendos and diminuendos). Use of **Terraced Dynamics**.

**Classical Period:** Some dynamics, to add contrast.

**Romantic Period:** Lots of crescendos & diminuendos and a large range of dynamics to add expression.

### Describing What You Hear

Comment on any changes - don't sum up the whole example with one word (unless it doesn't change!)  
**The music starts... then... the music ends...**

## MUSIC GCSE KEY VOCABULARY

## Structure – the way the music is built

**Structure** – The order that things happen in.

**First... then... this is followed by... at the end.**

### Binary Form - Music in two parts

Section A and Section B.



Section B contrasts Section A in some way. Usually both sections are repeated.

### Ternary Form - Music in three parts

Section A, Section B, Section A.



The 2<sup>nd</sup> Section A can be an exact repeat of the 1<sup>st</sup> Section A, or a slightly altered version.

You must know the individual structures of each set work.

Beethoven = Sonata Form (see the set work Knowledge Organiser)

### Song Form

**Intro Verse Chorus Middle 8 Bridge Outro**

**Instrumentation:** The instruments you can hear and what they are doing

**Rock and Pop instruments**

Electric Guitar



Acoustic Guitar



Bass Guitar



Drum Kit



Synthesiser/Keyboard



Remember to revise the Gaelic and African instruments in Afro Celt

**Instrumental Ensembles**

- Solo - 1 performer
- Duet - 2 performers
- Trio - 3 performers
- Quartet - 4 performers

**MUSIC GCSE KEY VOCABULARY**

**Instruments Of The Orchestra**



**Types Of Voices**

- Soprano (Female)
- Treble (Boy)
- Alto (Female)
- Countertenor (Male Alto)
- Tenor (Male)
- Bass (Male)

*\*SATB Choir: Soprano, Alto, Tenor & Bass*

**Other Vocal Terms**

- A capella:** Singing without any accompanying instruments.
- Chorus:** Music written for a choir.
- Backing Vocals:** Sing harmonies / support the lead singer.

**Tempo and Time:** The speed and the timing of the music

**Working Out The Tempo**

Tap your toe to the pulse of the music and think, 'how fast am I tapping'.

*\*Don't tap your whole foot – it could be seen as distracting others and an exam violation!*

**Rubato** *\*Translates as 'to steal time'*

Not sticking strictly to the tempo - to add feeling (*Romantic Period – especially Beethoven!*)

**Syncopation** Playing off (or in-between) the beat / pulse

**On The Beat**

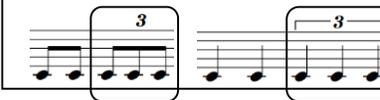
Playing on one of the beats that you would 'tap your toe' to

**Off-beat**

Playing in-between the beats you would 'tap your toe' to

**Triplet**

Three notes played evenly in the space of two notes:



**Pause**

If this symbol is written, stop the pulse of the music & pause on the note.



Marking	Meaning
<b>Allegro / Vivace</b>	Fast or Lively
<b>Allegretto</b>	Quite Fast (Not as fast as Allegro)
<b>Moderato / Andante</b>	Moderate / A Walking Pace
<b>Adagio / Lento</b>	Slowly
<b>Accelerando</b>	Gradually Speed Up
<b>Ritardando / Rallentando</b> rit. rall.	Gradually Slow Down
= 60 (60 bpm)	60 beats per minute
= 120 (120 bpm)	120 beats per minute

**Anacrusis:** An unstressed pickup or lead-in note(s) that comes before the first beat of the bar.



The Bach starts with an Anacrusis!

## Time Signatures and Metre: How is the pulse organised?

## MUSIC GCSE KEY VOCABULARY

## Style and Genre: Identifying the styles of music

### Time Signatures

Written at the start of the music (and anywhere it changes) to show how many beats there are per bar, plus what type of beat

#### Simple Time Signatures *\*Each beat can be divided into two equal halves*



4 crotchet beats per bar



3 crotchet beats per bar



2 crotchet beats per bar

#### Compound Time Signatures *\*Each beat is dotted and can't be divided into two equal halves*



4 dotted crotchet beats per bar (12 quavers)



3 dotted crotchet beats per bar (9 quavers)



2 dotted crotchet beats per bar (6 quavers)

**Listening Examples** Go to Youtube to hear some examples of different metres:

2/4	Slaidburn March	<i>*A march is usually in 2/4 (Left, Right, Left, Right... = 1, 2, 1, 2...)</i>
3/4	Shostakovich's Waltz No.2	<i>*A waltz is a dance, usually in 3/4</i>
4/4	All That Jazz (from Chicago)	<i>*Chicago is a Musical</i>
5/4	Take Five (By Dave Brubeck)	<i>*Listen out for the jazz style</i>
7/4	The start of Money (By Pink Floyd)	<i>*Listen out for the opening bass riff</i>
6/8	We Are The Champions (By Queen)	<i>*Queen are a famous British Rock Band</i>
12/8	The Way You Make Me Feel (By Michael Jackson)	<i>*Count 1&amp;a 2&amp;a 3&amp;a 4&amp;a</i>

Baroque Period 1600-1750	Classical Period 1750-1810	Romantic Period 1810-1910
Bach, Vivaldi, Handel	Mozart, Haydn, Beethoven	Chopin, Schubert, Wagner
<b>Ornaments</b> <b>Terraced Dynamics</b> <b>Major &amp; Minor</b> Keys <b>Harpichord</b> <b>Small Orchestra</b> (Mostly Strings) <b>Basso Continuo</b>	Balanced, <b>regular phrases</b> <b>Alberti Bass</b> Wider range of <b>dynamics</b> <b>Pianoforte</b> introduced <b>Wider range of mood</b> <b>Orchestra got bigger</b> <b>Elegant/Graceful</b> style	Use of the <b>leitmotif</b> Music <b>more expressive</b> Huge range of <b>dynamics</b> Use of <b>chromatic</b> chords Unusual <b>Key Changes</b> <b>Large Orchestra</b> Use of <b>Rubato</b>

### Film Music

\***Genre** - Action, Adventure, Horror, Romance, War, Sci-fi, Western...

\*Composers - John Williams, James Horner, Jerry Goldsmith

\*Think, how do the **musical features represent what is happening on-**

**screen?** E.g. Car Chase: Fast tempo, loud dynamics, sudden changes in melody direction...War Film: Military instruments, fanfare, monophonic to represent isolation...Horror Scene: Dissonant chords and use of repeated pattern to build tension...

\***Leitmotif** - A short musical idea linked to a specific character / thing

**Fusion** -Mixing more than one style of music together. For example... **Bhangra** - Came to UK in 1980s. Mixing traditional Indian music & pop.





# Year Ten Term Four Popular Music

## 'Africa' by Toto



### 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 Introduction is in **B major** and uses **3 chords**:

A  
C# minor  
G# minor

The Verse is in **B major**:

B major    D#m    G# m    B/F#  
A/E    C# m

The Chorus is in **A major**:

F# minor    D  
A    E  
And then a slightly tricky ending before heading straight back into the introduction  
C# minor    E    F# minor    E    A

### 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

#### Instrumental

Performed on the synthesizer.

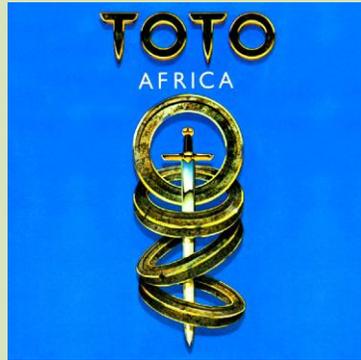
Completely homophonic in parallel harmony

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.



### Dynamics

Most of the song is mezzo-forte whilst the choruses are forte.

### 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.

### Harmony

The majority of the song is in B major whilst the choruses are all in A major.  
Diatonic throughout

### 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.

### 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.

### Pop & Rock Music

- \***Pop** - Commercial music which appeals to lots of people
- \***Rock** - Generally 'more aggressive' but also includes rock-ballads.
- \***Instruments** - (See instruments sheet!)

### Rock/Pop Song structure:

<b>Intro</b>	The beginning. Sets the mood & style. Usually just instruments.
<b>Verse</b>	Tells the story. Lyrics change each time but tune stays the same.
<b>Chorus</b>	The main message of the song. Same words and tune each time.
<b>Bridge</b>	A section that links two other sections.
<b>Middle 8</b>	A contrasting section of new ideas – usually 8 bars long.
<b>Outro</b>	Extra bit of music to finish off the song.



# 'Africa' by Toto

## Melodic Analysis

**Riff A – bars 1 & 2:** A distinctive syncopated rhythm pattern mostly repeating chord IV and concluding with chords vi and ii:

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:

## Chorus 3

A new electric guitar riff is heard on the recording in the last bar of each phrase:

## 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



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 E  
I bless the rains down in Africa

F#m D A (C#m E F#m E)  
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

## Drama - terms 3 & 4

### Approaches to text: Analysis, interpretation, rehearsal, performance & evaluation

#### Study Focus

The focus of these two terms work is to give you an experience of a variety of play texts from a variety of cultural and historical sources. We will approach the texts from the points of view of theatre director, actor and scenic or stage designer. Wherever possible we will work on the texts in the way that was intended when they were written and that is, how they can be made to work on the stage for a contemporary audience. This will most obviously be in preparation for your component 2 examination, **'performing from text'**. This drama course is **holistic** so, the knowledge and understanding that you gain here will be crucial in your Component 3 written examination. It is vital that you remember this. The practical approaches that we take here to each individual text; the first reading, initial analysis, tailored rehearsal techniques, staging plan, design concept, *superobjective* and performance techniques, are the things that you will need to adopt and apply in your written examinations on staging the key set text (C1 section A) and reviewing how others have performed a piece of live theatre (C1 section B). You will encounter a range of theatre concepts such as atmosphere, mood and timing that it is vital that you understand both in, how to create these in practise in performance and how to identify and write about in your written examinations.

Our study of Brecht's, 'The Exception & The Rule' will give you a good basic understanding of this major theatre practitioner's main political and theatrical ideas and theories in preparation for your component 1 examination.

#### In short and in summary

- You will work practically on a number of scenes from a variety of plays so that you:
- 1) **Broaden** your knowledge of theatre so that you have a body of texts to choose from for your C2 examination- Performing from Text
- 2) **Develop** your performance, acting, directing and design skills so that you learn the acting and directing skills that you need to perform your C2 exam.
- 3) **Deepen** your understanding of how meaning is created and communicated in theatre practice. Needed in all components.

### Component 3 section B- Evaluating Live theatre 10% of final grade Reviewing A Play

In your component 3 you will have about 35 minutes to answer a question on a piece of theatre that you have watched. You will have needed to prepare for this. You can be asked about any aspect of an actor, or director, or designer's work. You will have a choice of two questions and answer one only. The following guideline is to assist you in planning for this section of the examination.....At the beginning put:

The name of the Production: And Playwright:  
Date watched

The name of the Company:

The Venue:

#### You will use two thinking skills: Analysis & Evaluation

**Analysis:** Breaking the performance down into the *'things'* (elements & Media) that it is made from. These are the same things you will have thought about (and I would have shouted about) when you were making your own play.

**Evaluation:** This is your judgement about the quality, intelligence, wisdom of the choices the company made in producing and performing their play response to the Brief. So, you are going to say if their ideas worked - how effective they were, how moving- **how thought provoking- how watchable** –etc. (use the evaluative vocabulary on this sheet).

You should review the Elements of Production & Performance (see full list at the end) this includes the set, the props, the costume, the lighting (LFX) and the sound (SFX).

Please review the company's interpretation of the play. Examine what it made you think and feel – what it meant to you; its themes and issues.

You should also review the acting and directing too, of course.

#### *The Elements of Performance\**

This sounds posh and really it is very simple. It just means all those things that are involved in **staging** a play for an audience. **The Elements of Performance** include; How the **actors** modified their **voices** and their **bodies** to show their **characters** and what they were thinking and feeling. So, you will talk about their; **tone**, **accent** and **pitch** and their **facial expression**, **gestures** and **posture**. You can also write about how quickly or slowly they moved and spoke. This is called their **tempo- rhythm** and can show if the character is nervous or confident or excited. **Pace** is how quickly a scene is played or how quickly an actor picks up their cue. **The Elements of Performance** include the use of **costume**, set and **props** as well as the Designer's use of lighting and **sound**. Lighting is used to highlight things and to create the scene's required **atmosphere** through colour and intensity. It also involves the ways that the director has **placed** the action on the stage – centre stage, upstage etc. and the moves that the actors make.

## Rehearsal techniques to learn, remember & use in performance & in written work

- **Four of Stanislavski's Psychological Techniques – of rehearsal**

**The Character's Given Circumstances-** doing your research work and creative work to find out & establish everything about your character- their background, age, class, status, ethnicity, personality, life experience that most affect them, where have they just come from – everything about their physical, financial, emotional, mental, relationship situation that makes them the way that they are... in this moment.

**The Actor's Objective (the character's motivation).** What the character wants in this situation (these Given Circumstances) and what the actor needs to achieve in the scene.

**Emotion memory-** the past feelings and emotions that you have actually felt in your life that are similar to the ones that the character is feeling in the scene (and that you may not have directly experienced) that you can lend to the situation you are playing.

**The Creative If-** something that an actor can use that is both honest and can lift you from the plane ( level )of Everyday Reality and onto the plane of the imagination.

- **Five Brechtian Rehearsal and preparation Techniques**

**Gestus** – finding a gesture, physical action or voice that captures exactly what the character's role in society is- are they an exploiter or are they the exploited.

**Speaking in 3<sup>rd</sup> Person** about your character- this will help you distance yourself from your role so that you can present your character at arms length as Brecht wanted so that you can remind the audience that you are playing a character in a play not a real person in real life

Also

**Hot Seating-** Asking an actor –in – role questions about the character's past, present thoughts, feelings, attitude, relationships in fact anything that will help them discover more about their character and develop a deeper connection with their character.

**Role on a Wall** – Making an outline drawing on a wall and filling it in with all the facts and details about the character so that you develop the role and learn about them

**Status work** – various status exercises that help an actor find out their status in the scene so they know how to speak, act and behave in relation to the other characters in the scene.

**Improvisation** – trying out different episodes from the characters past, present and future to discover more about them and help the actor to build the role and get into character.

## Assessment Objectives (AOs) GCSE drama

**AO 1-** Create and develop ideas to **communicate meaning** for theatrical performance.

**AO2** – Apply theatrical skills to **realise artistic intentions** in live performance.

**AO 3** – Demonstrate knowledge and **understanding** of how drama and theatre is developed and performed.

**AO 4** – Analyse and evaluate your work and the work of others.

## You will work on scenes from some or all of the following texts

***The Ash Girl-*** Timberlake Wertenbaker

***The Life of the Insects*** Karel & Josef Capek

***Spring Awakening*** – Fran–k Wedekind

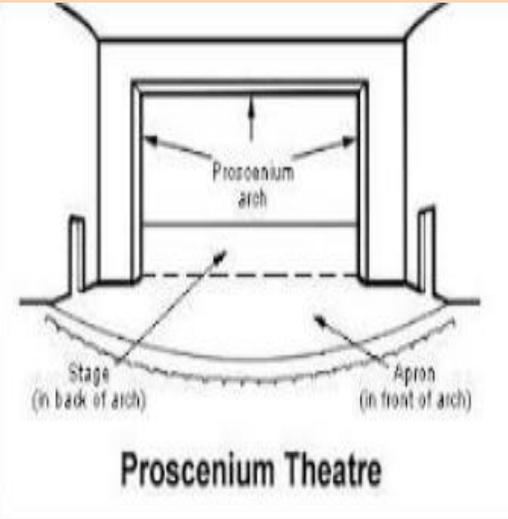
***The Exception & the Rule*** – Bertolt Brecht

***Lemons Lemons Lemons*** - Sam Steiner

## Ground Plans – Actor audience relationships

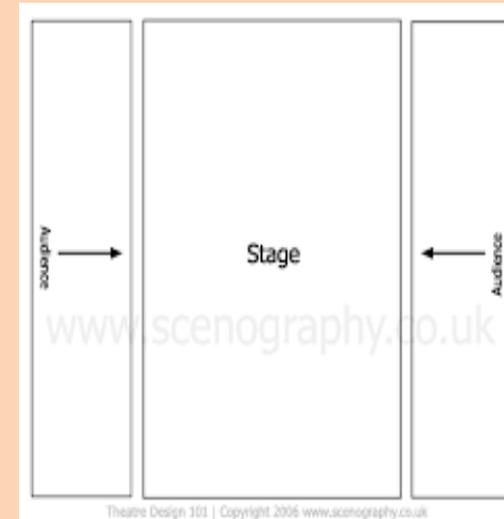
The Ground plan chosen for a production of a play sometimes depends on the way that the theatre is set up and built- the Globe theatre in London is a reproduction of one of Shakespeare's original theatres and has a thrust stage just as the original would have had. Each ground plan or actor/ audience relationship has its own challenges, restrictions and opportunities, They do have a hugely significant impact on the way that a production is rehearsed, designed, performed and received by an audience. The proscenium arch became popular after theatres reopened in 1660. Before they closed (1642) Thrust staging was the norm. A key thing for you to remember when being asked in a written examination which ground plan you would choose as either a theatre director or theatre designer to stage a given scene in your set play is, that each Ground plan informs what you can and cannot do in a performance and each has a very different impact on the audience. You need to decide which ground plan best suits the ideas that you have for the scene, the meaning that you want to communicate and the effect you want to have on the audience. You then need to remember the restrictions that your chosen ground plan brings. Your examination board are keen that you understand these.

# Ways of arranging the actor / audience relationship in theatre - Ground Plans



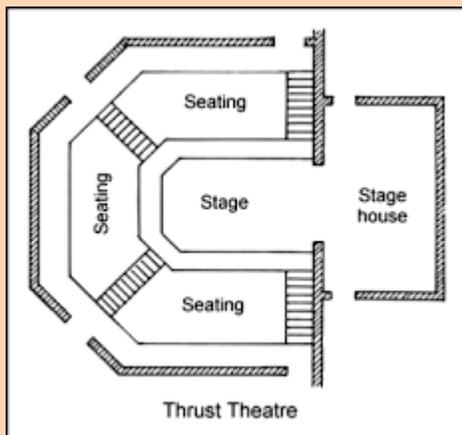
## Proscenium Arch

The stage in our school hall is a good example. There are wings at the side where actors can hide from the audience. There is a pelmet at top which hides the lighting rig. The hiding of the actors out of character and the theatre machinery maintains an illusion that the play is real. The arch and wings act like a picture frame focussing the audience's attention



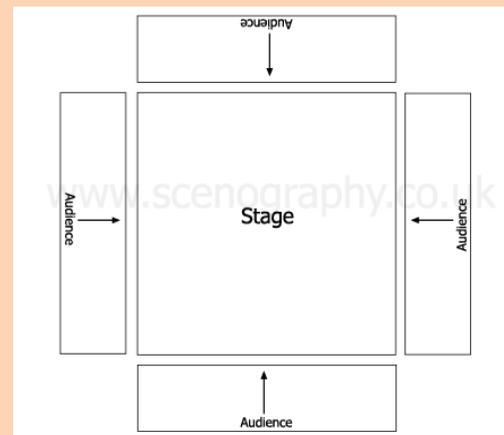
## Traverse

Experienced directors and many actors enjoy the challenge of staging & performing a play with the audience on two sides. Audiences too can enjoy being able to see themselves across the stage. It gives me the sense that we are all in it together- the actors and audience all collaborating in the performance



## Thrust staging

This was the popular actor/ audience relationship in Shakespeare's time. The stage extends- thrusts into the audience who watch from 3 sides. It allows actors to share asides and soliloquys with the audience. Scenery must be the bare minimum so that the audience's view from each side is not blocked



## In the round

This is of course even more challenging to direct in and perform in. When it works it is very powerful and enjoyable for all. Minimal set is needed so all sections of the audience can see without obstruction.

## FILM STUDIES TERMS 3 & 4 THE NEA

NEA = 30% of whole GCSE (Production = 20%, Evaluative Analysis = 10%)

### PRODUCTION:

#### EITHER...

A filmed extract from a genre film (2 mins – 2,5 mins)

#### OR...

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.

If you are filming, you can use other people but they will not be assessed for their performance/s.

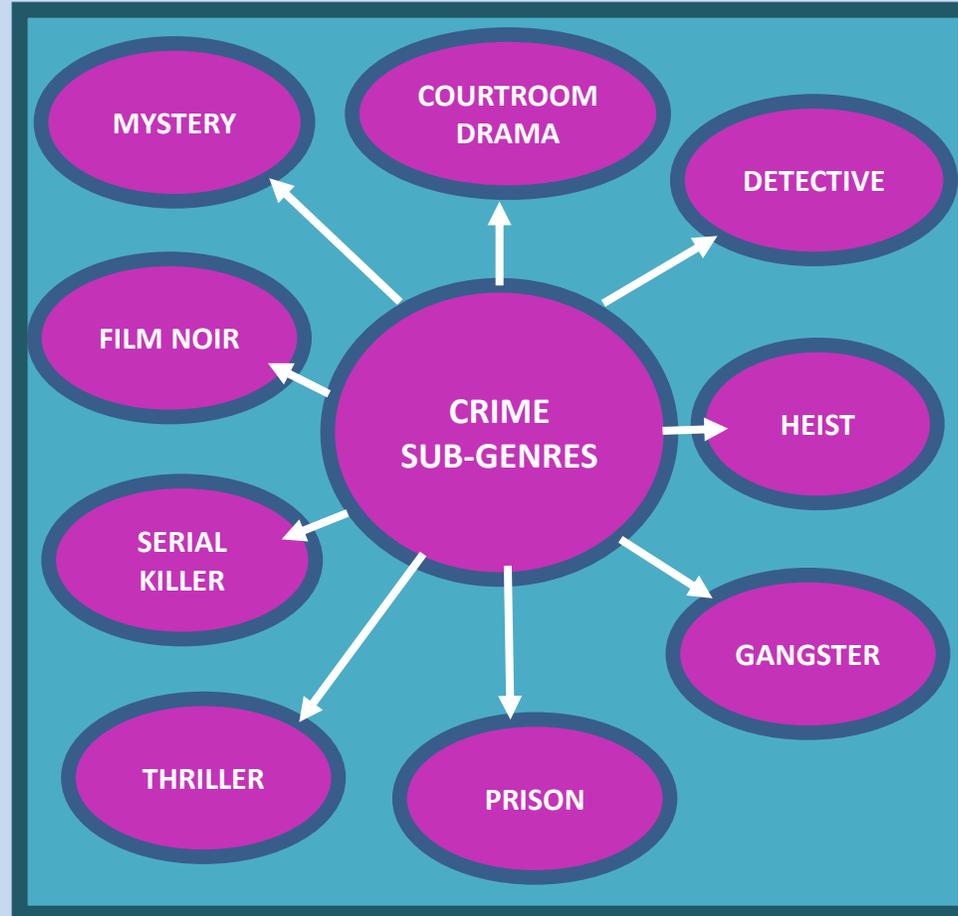
The genre that we will be working with is...

# CRIME

IMPORTANT INFORMATION ABOUT NEA

## OUR QUALIFICATION IS CALLED EDUQAS GCSE FILM STUDIES

<https://www.eduqas.co.uk/qualifications/film-studies-gcse/>



CRIME HAS MANY FACES...WHICH SUB-GENRE WILL YOU CHOOSE?

SCREENPLAY/SEQUENCE - GENRE OPENINGS

# SCREENPLAY GUIDANCE...

## WHAT DOES A SCREENPLAY LOOK LIKE?

### WHAT IS A SCREENPLAY?

A screenplay is a written work by screenwriters for a film, television program or video game. In them, the movement, actions, expression and dialogues of the characters are narrated.

The screenshot shows a screenplay in the StudioBinder software interface. The screenplay text is as follows:

**FADE IN:**

**1 EXT. SUBURBAN HOME - NIGHT**

WE OPEN on a modern suburban home. The front window illuminated by the lights inside. We see the silhouette of a small human figure as it runs back and forth. We push in closer as we slowly see a BOY running around the house.

**CUT TO:**

**2 INT. SUBURBAN HOME - KITCHEN - NIGHT**

A GREEN BALL sits on a counter top. A young hand snatches it. It belongs to FILBERT (9), wiry, lost in his own imaginary world. Dressed as a Knight. A toy sword in his other hand.

**FILBERT (V.O.)**

This is my castle. I am sworn to protect it. Anyone that stands in my way shall bear the wrath of the almighty--

Just then, the babysitter walks by. BECKY (23), trendy, distracted. She is mid-phone call with Filbert's Mom, TRACY.

**BECKY**  
(into phone)

Oh yeah, he's being good. He's just fighting orcs or trolls.

**INTERCUT PHONE CONVERSATION**

**TRACY**

Oh that's perfectly normal.

Filbert lifts his sword into the air, lets out a big battle cry, and sprints from the kitchen to --

**HALLWAY**

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.

**FILBERT'S POV**

IN SLOW MOTION - The ball tumbles down the stairs. WE HEAR each bounce echo as the ball travels down the steps.

Annotations on the left side of the screenshot explain the following elements:

- SCENE HEADING:** One line description of the location and time of day.
- ACTION:** The description of the actions in a scene.
- CHARACTER:** Identifies the character who is speaking.
- DIALOGUE:** The lines of speech your character says.
- INTERCUT:** Instructions when cutting to multiple locations.
- SUBHEADER:** Used when there are minor changes in a location.

Annotations on the right side of the screenshot explain the following elements:

- FADE IN:** Marks the start of the screenplay.
- SCENE NUMBER:** Generally numbered only in the shooting script.
- TRANSITION:** Used as transitional instructions for editing.
- EXTENSION:** Clarifies where a character is when they can't be seen.
- PARENTHETICAL:** Provides info on how the actor should say the line.
- SHOT:** Indicates the camera angle or movement in a scene.

SCREENPLAY TERMINOLOGY	DEFINITION
SLUGLINE	ALSO KNOWN AS SCENE HEADING
ACTION	THE DESCRIPTION OF WHAT ACTIONS CAN BE SEEN IN THE SCENE
CHARACTER NAME	THE NAME OF THE CHARACTER
DIALOGUE	THE WORDS THE CHARACTERS ACUTALLY SAY...
PARENTHETICAL	PROVIDES INFORMATION ON HOW THE LINE SHOULD BE DELIVERED
EXTENSIONS	CLARIFIES WHERE A CHARACTER IS IF NOT ON SCREEN

## WE WILL USE FREE SOFTWARE CALLED CELTEX

## GENERAL INFORMATION TO HELP YOU WITH YOUR NEA

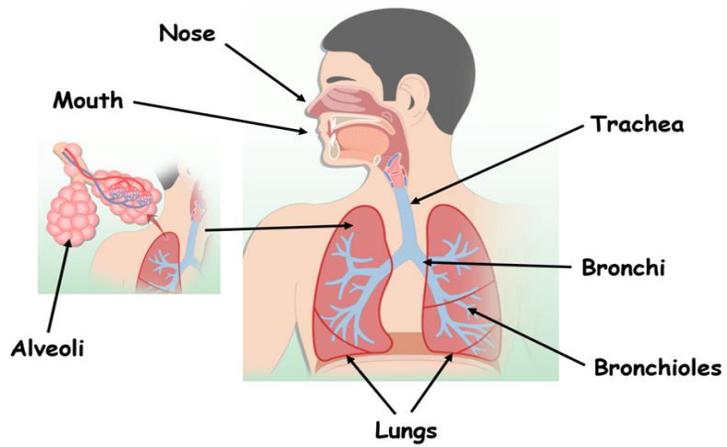
KEY TERMINOLOGY (GENERAL)	DEFINITION
GENRE	THE TYPE OF FILM EG. ROMANCE, COMEDY, SCIENCE FICTION, THRILLER
STEREOTYPES	WIDELY HELD BUT FIXED AND OVER SIMPLIFIED IMAGE OR IDEA OF A PARTICULAR TYPE OF PERSON OR THING
CONVENTIONS	AN ACCEPTED WAY OF DOING SOMETHING...THE ASPECTS OF A MEDIA PRODUCT THAT MAKE 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.



SCREENPLAY/SEQUENCE - GENRE OPENINGS

## Pathway of Air



We breathe in air through the mouth and nose

It travels down the trachea (Cilia catch particles of dust)

Near the lungs the trachea splits into two tubes called Bronchi (one enters the right lung and one enters the left lung)

Once in the lungs the bronchi split into smaller bronchi before into even smaller tubes called bronchioles

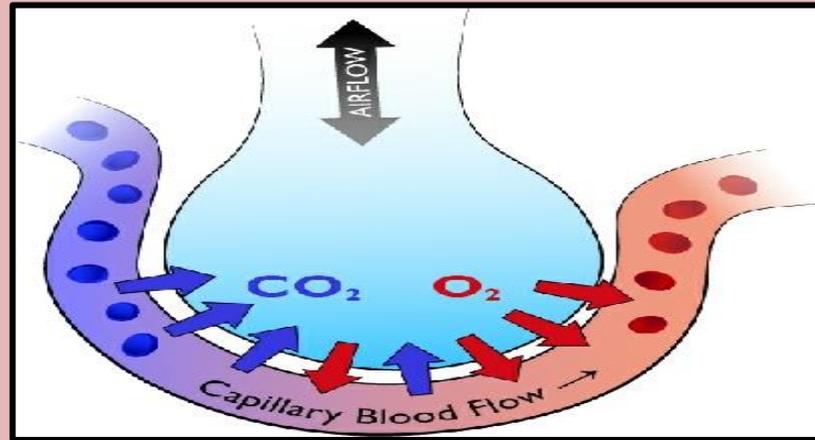
At the end of each bronchiole are openings to the alveoli, there are several alveoli coming from one bronchiole, forming little clumps like grapes

Gaseous exchange occurs in the alveoli, capillaries carrying blood surround each alveoli resulting in oxygen entering the blood stream and carbon dioxide exiting the blood stream into the alveoli.

## 1.3 Respiratory System

### Gaseous Exchange

- Takes place in the alveoli through diffusion
- Oxygen (high concentration) diffuses through the capillaries into the blood stream and sent to the heart.
- Carbon dioxide (high concentration) in the capillaries replaces oxygen (exchanged) in the alveoli so that it can be removed from the body.



### Alveoli

#### Function of Alveoli:

To bring oxygen into the body and remove carbon dioxide.

#### Key features of the alveoli that assist in Gaseous Exchange:

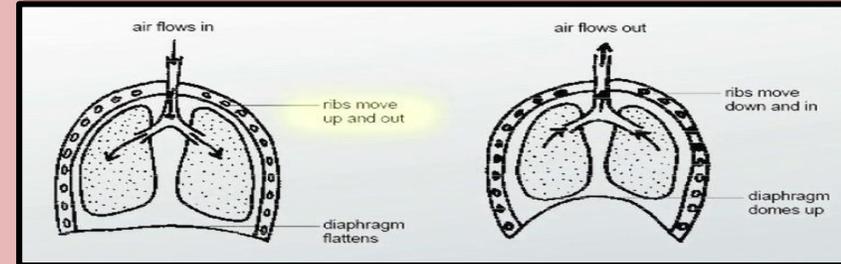
- Large surface area
- Moist thin walls (one cell thick)
- Short distance for diffusion
- Lots of capillaries
- Large blood supply
- Movement of gas from high concentration to low concentration

Oxygen combines with haemoglobin in the red blood cells to form oxyhaemoglobin.

### How we breathe in:

#### Inspiration:

- The diaphragm contracts and flattens.
- The intercostal muscles contract which causes the rib cage to rise.
- Both these actions cause the chest cavity to increase in size / volume.
- This reduces the pressure in the chest cavity, due to this the air passes from the higher pressure outside of the lungs to the lower pressure inside the lungs.
- This causes the lungs to expand and fill the chest cavity



### How we breathe out:

#### Expiration:

- The diaphragm relaxes and bulges up, returning to its original dome shape.
- The intercostal muscles also relax causing the ribs cage to lower.
- Both these actions cause the chest cavity to decrease in size / volume.
- The reduction in the size of the chest cavity increases the pressure of the air in the lungs and causes it to be expelled.
- The air passes from the high pressure in the lungs to the low pressure in the bronchi and trachea.

#### Additional muscles used during inspiration and expiration during exercise:

##### During inspiration:

When exercising the **PECTORALS** and **STERNOCLEIDOMASTOID** muscles contract assisting the performer inhale air. These allow the chest cavity to further increase in size (have a larger volume) so more air can enter the lungs.

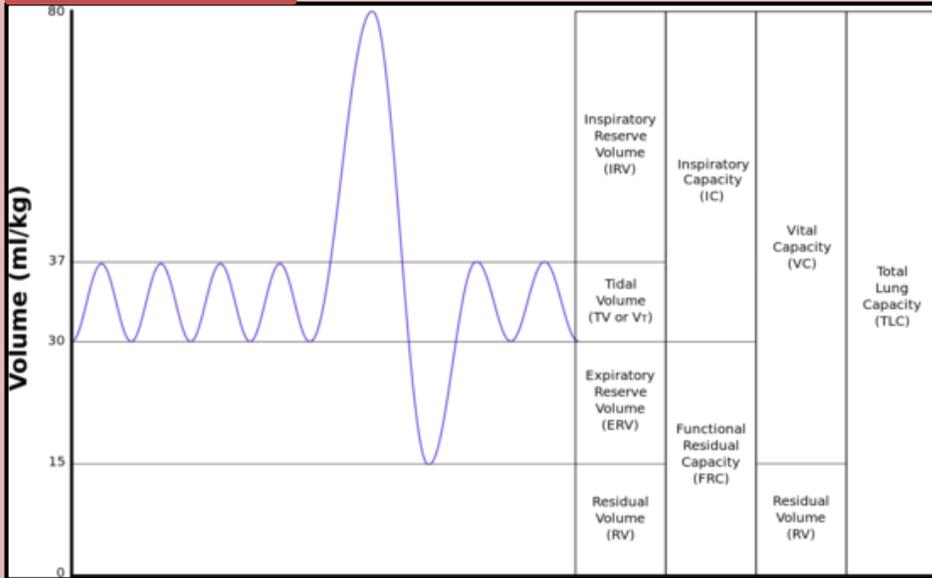
##### During expiration:

When exercising the **ABDOMINAL** muscles contract assisting the performer exhale air. They help force air out of the lungs faster and so speed up expiration.

## Lung Volumes

- 1) Respiratory rate: Breaths per minute
- 2) Tidal volume: amount of air inhaled / exhaled per breath
- 3) Minute Volume: Respiratory Rate x Tidal Volume - amount of air inhaled per minute
- 4) Residual volume: the volume of air that remains in the lungs after maximal expiration.
- 5) Expiratory reserve volume (ERV): The additional air that can be forcibly exhaled after the expiration of a normal tidal volume.
- 6) Inspiratory reserve volume (IRV): The additional air that can be forcibly inhaled after the inspiration of a normal tidal volume.

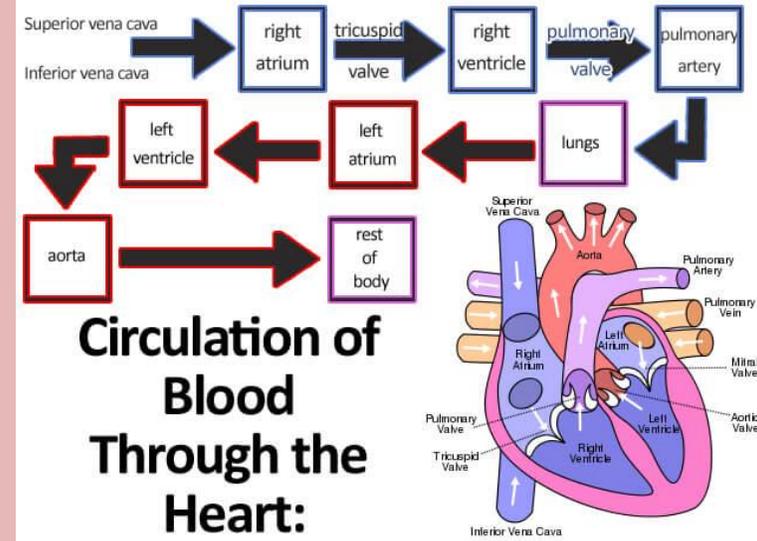
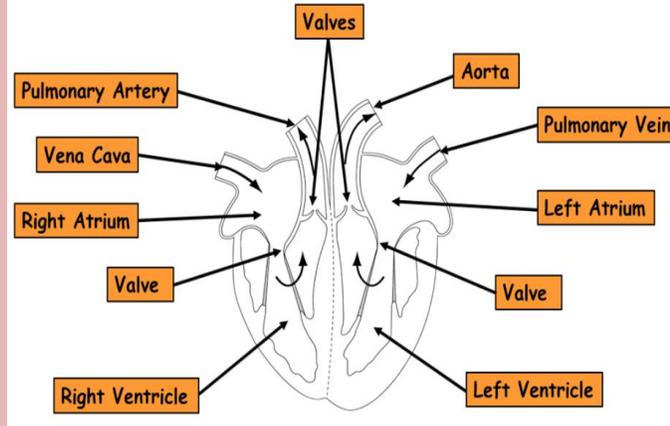
## Spirometer trace



### During exercise the following happens:

- 1) Respiratory rate = increases
- 2) Tidal volume = increase
- 3) Minute volume = increases
- 4) Residual volume = remains the same
- 5) Expiratory reserve volume (ERV) = decreases
- 6) Inspiratory reserve volume (IRV) = decreases

## 1.3 Cardiovascular System



The right atrium contracts (systole) ejecting deoxygenated blood through a valve and into the right ventricle.

The right ventricle is relaxed (diastole) and fills with deoxygenated blood

The right ventricle contracts (systole) pushing the deoxygenated blood through valves to the pulmonary artery

The pulmonary artery carries deoxygenated blood away from the heart to the lungs. The blood becomes oxygenated

The vena cava is the main vein bringing the deoxygenated blood back to the heart and into the right atrium



The pulmonary vein transports the oxygenated blood back to the heart and into the left atrium, which fills with oxygenated blood

The aorta carries oxygenated blood away from the left ventricle to the working muscles the blood then become deoxygenated

The left ventricle contracts (systole) pushing the oxygenated blood through valves to the aorta

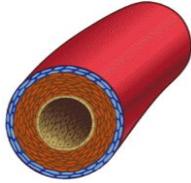
The left ventricle is relaxed (diastole) and fills with oxygenated blood

The left atrium contracts (systole) ejecting oxygenated blood through a valve and into the left ventricle

## Blood Vessels

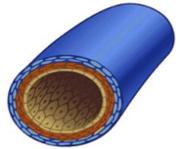
### Artery

- Thick muscular walls
- Thick elastic walls
- Small lumen (internal diameter)
- Carry blood at high pressure
- Carry blood away from the heart
- Usually carry oxygenated blood (except the pulmonary artery)



### Vein

- Thin walls
- Large lumen (internal diameter)
- Carry blood at low pressure
- Contain valves
- Mainly carry deoxygenated blood (except the pulmonary vein)



### Capillary

- Very thin walls (one cell thick)
- Small lumen (internal diameter)
- Link smaller arteries with small veins
- Allow gaseous exchange
- Carry blood at low pressure



## 1.3 Cardiovascular System

$$\text{Cardiac Output} = \text{Stroke Volume} \times \text{Heart Rate}$$

**Cardiac Output** = amount of blood leaving the heart per minute

**Stroke Volume** = amount of blood ejected from the heart per beat

**Heart Rate** = the number of times the heart beats per minute

### Redistribution of blood

When we exercise blood is redistributed. The working muscles need more oxygen than other inactive areas of the body such as the stomach. Blood is diverted away from inactive areas to the working muscles.

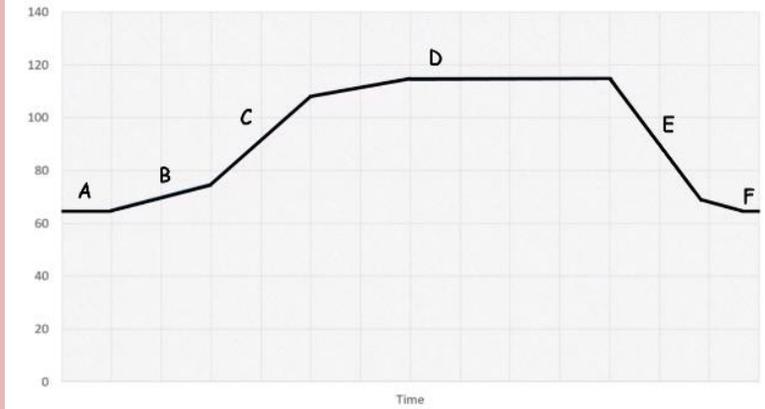
**Vasoconstriction** means that the blood vessels constrict to make them smaller. Chemical changes signal the nervous system to constrict blood vessels to inactive areas.



**Vasodilation** means that the blood vessels dilate to make them bigger. Chemical changes signal the nervous system to dilate blood vessels that supply active areas.



### Interpreting heart rate graphs



**A** = Heart rate is at its lowest at rest

**B** = Immediately before exercise resting heart rate will increase. This is called an **anticipatory rise**; this is due to the release of the hormone adrenaline.

**C** = When you start to exercise the heart rate increases sharply. This is due to the demand of oxygen. **Cardiac output** increases

**D** = During continuous exercise heart rate levels because the heart rate is sustaining the amount of oxygen needed.

**E** = Immediately after exercise heart rate decreases sharply, this is because exercise has stopped and the demand for oxygen has reduced.

**F** = Heart rate slowly returns to its resting rate

## 1.4 Aerobic and Anaerobic Exercise

Aerobic Exercise	Anaerobic Exercise
<ul style="list-style-type: none"> <li>• Uses oxygen for energy production</li> <li>• Includes activities that are of a long duration</li> <li>• Includes activities that are of a moderate intensity</li> <li>• The heart and lungs can supply all the blood and oxygen to the working muscles to produce energy aerobically</li> </ul>	<ul style="list-style-type: none"> <li>• Does not use oxygen for energy production</li> <li>• Include activities that are of a short duration</li> <li>• Includes activities that are of a high intensity</li> <li>• The heart and lungs cannot supply blood and oxygen to muscles fast enough to use so energy is produced anaerobically</li> </ul>
<p><b>Sports and activities:</b> Long distance cycling:</p>  <p>Marathon Running:</p> 	<p><b>Sports and activities:</b> Shot put:</p>  <p>Sprinting:</p> 
<p><b>Aerobic equation:</b>  <math>\text{Glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{Heat} + \text{Energy}</math></p> <ul style="list-style-type: none"> <li>• Glucose and oxygen combine to release energy aerobically</li> <li>• This process produces carbon dioxide, water and heat (and energy)</li> </ul>	<p><b>Anaerobic equation:</b>  <math>\text{Glucose} \rightarrow \text{lactic Acid} + \text{Energy}</math></p> <ul style="list-style-type: none"> <li>• Lactic acid is produced as a waste product when carbohydrates are broken down without oxygen during anaerobic respiration</li> <li>• This causes muscles to become tired and work less efficient</li> </ul>

## 1.4 Excess Post-Exercise Oxygen Consumption (EPOC)

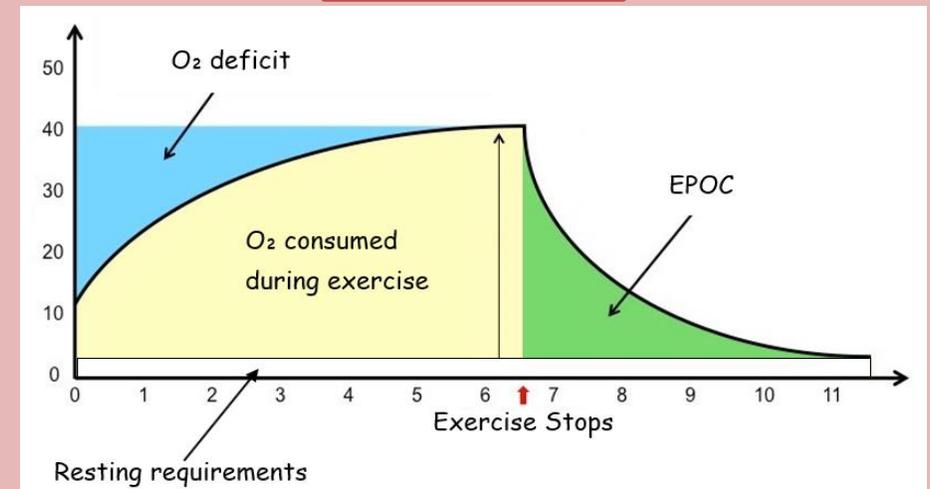
### EPOC:

- Is the additional amount of oxygen consumed after anaerobic exercise.
- Often referred to as Oxygen debt

### EPOC:

- Refers to the amount of oxygen needed to recover after exercise
- Enables lactic acid to be converted to glucose, carbon dioxide and water
- Explains why we breathe deeply and quickly after vigorous exercise

### Analysing EPOC:



### Explanation

- The **resting requirement** identifies how much oxygen is required at rest
- When we start to exercise the demand for oxygen increases. it takes time to get the oxygen to the working muscles, not all the oxygen can be provided (anaerobic) we get an **O<sub>2</sub> deficit**
- When we stop exercising the demand for oxygen remains higher (to pay back the deficit) this is **EPOC**

## 1.4 Recovery process from Vigorous Exercise

Recovery process	Explanation	Sporting Example
<b>Cool down</b>	<p>A cool down is important after vigorous exercise. Light exercise and stretching help to:</p> <ul style="list-style-type: none"> <li>To keep the breathing/heart rate elevated ensures blood flow to the muscles which helps convert the lactic acid to glucose, carbon dioxide and water to prevent muscle soreness</li> </ul>	Any sport or activity after vigorous exercise
<b>Massage</b>	<p>A massage helps the delayed onset of muscular soreness (DOMS). This is when muscle soreness does not happen immediately but one or two days after a period of intense exercise</p> <p>The massage:</p> <ul style="list-style-type: none"> <li>Reduces inflammation of a tender area</li> <li>Increases blood flow, so increases oxygen delivery to the muscles which helps the removal of lactic acid</li> </ul>	Games players may use an ice bath after an intense match to help recovery
<b>Ice baths</b>	<p>Getting into an ice bath 5 to 10 minutes after intense exercise helps:</p> <ul style="list-style-type: none"> <li>Aid and repair micro tears in muscle fibres preventing DOMS</li> <li>Reduce swelling of an injured area</li> <li>When you get out an ice bath the warmer temperature dilates blood vessels which allows oxygenated blood to rush to the muscles removing lactic acid and other waste products</li> </ul>	Games players may use an ice bath after an intense match to help recovery
<b>Manipulation of diet Carbohydrates</b>	<p><b>Carbohydrates</b></p> <p>Foods high in carbohydrates should be consumed soon after exercise this aims to:</p> <p>Replace glycogen stores</p>	Games players after an intense match to help recovery
<b>Rehydration</b>	<p><b>Rehydration</b></p> <p>Water or isotonic drinks should be consumed before during and after vigorous exercise, this helps to:</p> <p>Replace fluids that are lost during exercise</p> <p>Prevent dizziness and nausea that are symptoms of dehydration</p>	<p>Endurance athletes such as runners</p> <p>Any performer that sweats needs to rehydrate</p>

### 1.5 Immediate effects of exercise

These occur as soon as you start exercising:

Getting hot	Heat is a by-product of energy production, the harder we train the hotter we get
Getting sweaty	Sweat glands produce sweat to cool you down, sweat evaporating from the surface of your skin removes some body heat
Having red skin	Blood vessels dilate close the surface of the skin to help you lose heat, this makes you look red
Increased depth and rate of breathing	This allows more gaseous exchange to occur more quickly. More oxygen can be delivered to the working muscles and more carbon dioxide can be removed
Increased heart rate	This allows gases to be transported around the body. Oxygen can be delivered to the working muscles and carbon dioxide can be removed

### 1.5 Short-term effects of exercise

These occur anytime between 4 to 36 hours after you finish exercising:

Tiredness and fatigue	When we are exercising energy stores are being used up this will lead to tiredness and fatigue
Light headedness or nausea	When we exercise, we lose fluids, this can lead to dehydration, Light headedness and nausea are symptoms of being dehydrated
Aching muscles	Blood vessels dilate close the surface of the skin to help you lose heat, this makes you look red
Cramp	Cramp is an involuntary muscular contraction. A cause of cramp is a depletion of energy stores or dehydration and a lack of electrolytes due to sweating
DOMS	DOMS can occur due to micro tears in the muscles from vigorous activity

### 1.5 Long-term effects of exercise

These occur after months or even years of training. They result in positive adaptations to the body that result in improved performance

Change in body shape	A change in body shape can improve performance. An increase in muscle mass will assist in strength and power sports such as sprinting and rugby. A reduction of body fat will assist a long-distance runner
Improved stamina	Improved stamina will allow performers to last longer in an activity without getting tired. For example, performing to a high standard for 90 minutes in football
Increase in size of the heart (cardiac hypertrophy)	An increase in the size of the heart will allow more blood pumped per beat (stroke volume) when exercising. This will allow more oxygen to be delivered to the working muscles
Lower resting heart rate (bradycardia)	Because the heart can pump more blood per beat it will not have to work as hard at rest therefore resting heart rate will be lower

# RO41 Reducing the Risk of Sports Injuries: LO2 Understand how warm ups and cool downs prevent injury

## Physical benefits of a warm up

- Warming up muscles/preparing the body for physical activity
- Increase in body temperature
- Increase in heart rate
- Increase in flexibility (range of motion) of muscles and joints
- Increase in pliability of ligaments and tendons
- Increase in blood flow and oxygen to muscles
- Increase in the speed of muscle contraction
- Release adrenalin(helping delivery of oxygen to muscles)
- Delay onset of lactic acid/fatigue
- Reduce risk of injury/muscle strain
- Improve performance/technique/practice/rehearse skills

## Physical benefits of a cool down:

Reduce/Remove/Lower/Circulate

- Helps the body's transition back to a resting state
- Gradually lowers heart rate
- Gradually lowers temperature
- Circulates blood and oxygen
- Gradually reduces breathing rate
- Removes waste products such as lactic acid
- Reduces the risk of muscle soreness and stiffness
- Aids recovery by stretching muscles, i.e. lengthening and strengthening muscles for next work-out/use
- Reduces risk of blood pooling
- Reduces risk of joint damage

## Key components of a warm up: PMDSS

Pre Match Dictates Sporting Success

- Pulse raising, i.e. exercises that slowly increase heart rate and body temperature (e.g. jogging, cycling, skipping)
- Mobility, i.e. exercises that take the joints through their full range of movement (ROM) (e.g. arm swings, hip circles)
- Dynamic movements (e.g. change of speed and direction)
- Stretching (e.g. developmental stretches, dynamic stretches linked to sport – 'open and close the gate' groin walk) Lengthens muscles in preparation for exercise
- Skill rehearsal phase, i.e. rehearsing common movement patterns and skills which will be used in the activity to prepare muscle groups and joints (e.g. dribbling drills for football, passing drills for netball)

## Key components of a cool down

Pulse lowering, i.e. exercises which gradually lower heart rate and reduce temperature (e.g. easy movements, light running, stretching)

Stretching, i.e. maintenance stretches, static stretches (e.g. hamstring stretches)

\*Ice bath (not considered a formal part but can be used)

## Psychological benefits of a warm-up

- Heighten or control arousal levels (e.g. 'get in the zone' or settle nerves)
- Improve concentration/focus (selective attention) right frame of mind
- Increase motivation/drive (motivational talk/getting up for it/incentive to win)
- Mental rehearsal (thinking through/visualising/imagining each element of routine to increase focus and concentration and ignore distractions e.g. Gymnastics, High Jump)
- Increase confidence
- Reduce reaction time

## Specific needs which a warm up and cool down must consider:

- Characteristics of the individual/group, i.e.
  - Size of group
  - Age of participants
  - Experience of participants
  - Individual fitness levels
  - Any medical conditions participants may have
- Suitability as preparation for a particular activity/sport
- Environmental factors (e.g. weather/ temperature if outdoors, available facilities, space).
- Time available

# RO41 Reducing the Risk of Sports Injuries: LO3 Know how to respond to injuries within a sporting context

## What do you need to know?

## Types of Injury

## Causes of injury

## Symptoms of injury

## Treatment of injury

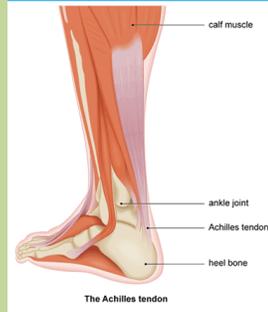


### Acute Injuries

An injury caused by sudden trauma where pain is felt immediately. Acute injuries include soft tissue injuries, such as sprains and strains, open and closed fractures, concussion, abrasions, contusions, burn blisters.

### Chronic injuries

An overuse injury caused by continuous stress. Chronic injuries include Achilles tendonitis, shin splints, golfer's elbow, tennis elbow, overuse blisters.



Sport Injury	Description
Tendonitis	Inflammation of a tendon
Broken bone	A break in the continuity of the bone is caused by high force impact
Torn ligament	A tear in the fibrous tissue that connects one bone to another
Jumper's knee	An aching in the inferior patella region, common in athletes
Shin Splints	Pain in the lower part of the leg due to repeated trauma to the connective muscle tissue surrounding the tibia
Stress fracture	Commonly occurring in weight bearing bones such as the tibia due to repeated stress and/or continuous heavy weight
Dislocation	An abnormal separation in the joint where two or more bones meet
Tennis elbow	An overuse injury causing pain in the lateral part of the elbow
Golfers elbow	A painful inflammation of the muscles on the inside of the forearm
Bruised muscles (contusions)	Trauma causing blood to collect around muscle tissues causing pain
Strains	An injury to a muscle or tendon in which the muscle fibres tear as a result of overstretching
Sprains	An injury in a joint caused by the ligament being stretched too far
Concussion	An injury to the brain caused by trauma and resulting in a temporary loss or impairment of function
Abrasions	A cut or scraped area on the skin resulting from injury or irritation
Cramp	A sudden involuntary, spasmodic muscular contraction causing severe pain

### Injuries related to children

Some injuries are specifically related to children during the growing process.

**Sever's disease:** heel pain caused by inflamed growth plate.

**Osgood Schlatter's disease:** pain in the knee from an inflamed tendon.

### Exam Tip

When asked to explain how an injury can happen, make sure you are specific. For example, saying a bad tackle causes a fracture is too vague. A better answer would be a bad tackle that causes the performer to fall awkwardly can cause a fracture.

# RO41 Reducing the Risk of Sports Injuries: LO3 Know how to respond to injuries within a sporting context

Example injury	Different types of treatment
Cramp or for muscle rehab	Massaging
Chronic injuries or late stage acute injuries Post injury rehab Pre-activity treatment e.g. deep heat	Heat (Heat) pads , (Deep heat) cream, Hot water bottles , (Heat) lamps, (Heat) blankets (can be used to treat hypothermia), Massage/friction can be used as a heat treatment (to improve rehabilitation), Hot tub / hot bath.
Broken bones/dislocations	Splints/Slings/Taping/Plaster (pot)
Abrasions (cuts and grazes)/blisters	Bandaging/Plasters/ creams
Muscle strain/pull/tear/ bruise (dead leg) Sprain-ligament, tendon injuries Overuse injuries like tennis elbow Concussion	RICE---Rest, Ice, Compression, Elevation

<b>R</b>	<b>Rest- it is important to rest the injury immediately to avoid making it worse.</b>
<b>I</b>	Ice-the injured area needs to be cooled to cause the contraction of blood vessels and thereby restrict blood flow in that area. This results in less swelling and a faster recovery. Ice packs should be applied to the area for a least 10 minutes to achieve this.
<b>C</b>	Compression- bandaging the injury reduces swelling and gives support.
<b>E</b>	Elevation- keeping the injured area above the level of the heart reduces blood flow, which helps to prevent this.

## Emergency action plan (EAPS)

An emergency action plan (EAP) explains what action and procedures need to be followed in the event of an emergency. It has three main sections:

1. Emergency personnel- in the event of an emergency, it is important to know whom to contact and how. This part of the plan should include details of the first responder, qualified first aiders, the coach, and in some venues the doctor/nurse.
2. Emergency communication- the EAP must contain details of contact numbers for the emergency services (999) and the location of the nearest telephone.
3. Emergency equipment- details of the location of emergency equipment must be included in the EAP. A first aid kit, evacuation chair, wheelchair, stretcher, defibrillator, inhaler and ice packs are all examples of emergency equipment.

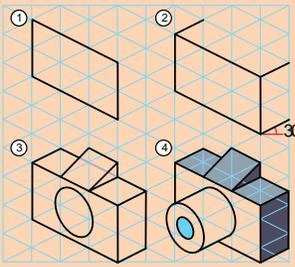
<b>S</b>	<b>See play if a player goes down.</b>
<b>A</b>	Ask the player what happened and how they feel. Check facial expressions, and posture (position either standing or lying down).
<b>L</b>	Look at injured limbs for obvious signs of injury: bleeding, bruising, swelling, deformity. Take the player off if there are significant signs of injury.
<b>T</b>	Touch the injured site if the player will let you. Gently palpate to find source of pain. If you are unsure, don't touch or move the limb until a qualified person can assess the player.
<b>A</b>	Active movement: Can the player move the limb, with or without pain? If unable to move – take the player off.
<b>P</b>	Passive movement: If A applies, move the limb/joint to full extent and note reaction.
<b>S</b>	Strength testing (and play on): Is the player up and running or rather trying to “run-it-off”? Whatever the case, keep a close eye and take the player off if in doubt.

# RO41 Reducing the Risk of Sports Injuries: LO4 Know how to respond to common medical conditions

Medical condition	Description
Epilepsy	<p>A medical condition causing abnormal brain activity that leads to seizures</p> <p><b>Symptoms</b></p> <ul style="list-style-type: none"> <li>• Seizures (repeated)/fits/twitching/rolling on the floor/Auras/changes in the way things look/smell/feel/taste/sound/blurred vision</li> <li>• Feeling that events have happened before/déjà vu</li> <li>• Tingling sensations/'pins and needles'(in your arms/legs)</li> <li>• Sudden intense emotion/fear/joy</li> <li>• Muscles in your arms/legs/face may become stiff/tight teeth/jaw clenching</li> <li>• Smacking your lips/making random noises</li> <li>• Chewing/swallowing</li> <li>• Rubbing your hands/moving your arms around/picking at clothes/fiddling with objects</li> <li>• Unable to respond to anyone/unaware of surroundings/dizziness/staring (into space)</li> <li>• No memory of the event</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Emergency care plans in place for the individual.</li> <li>• Keep calm, provide reassurance, remove bystanders.</li> <li>• Keep airway clear, turn on side if possible, nothing in mouth</li> <li>• Keep safe, remove objects, do not restrain.</li> <li>• Time, observe, record what happens.</li> <li>• Stay with person until recovered from seizure.</li> </ul>
Diabetes	<p>Type 1 – occurs independently of the person’s lifestyle / usually is diagnosed early on in a person’s life / there is a genetic predisposition or is reliant on insulin (injections). Type 2 – usually occurs in later in life with aging / can often occur due to a poor lifestyle / (In most cases) it is preventable or not always reliant on insulin (injections) or can be controlled through diet.</p> <p><b>Symptoms</b></p> <ul style="list-style-type: none"> <li>• Increased thirst or appetite</li> <li>• Going to the toilet lots, (Extreme)tiredness/ drowsiness / fatigue/ fainting /collapse/unconscious/ coma</li> <li>• Weight loss or weight gain</li> <li>• Uncharacteristic behaviour/ irritable/confusion/memory loss/pale/cold/sweaty skin</li> <li>• Shallow/rapid breathing</li> <li>• High or low sugar levels</li> <li>• Nausea/vomiting</li> <li>• Blurred vision/dizziness, dry mouth</li> <li>• Slow healing cuts/sores/irritating skin/tingling skin</li> <li>• Abdominal pain</li> <li>• Trembling or shaking</li> <li>• Red or swollen gums</li> </ul> <p><b>Treatment</b></p> <p><u>Type 1</u> Hypoglycaemia (high blood sugar). Give Insulin. Hypoglycaemia (low blood sugar) Give the individual sugar (e.g. fruit juice, sugary sweets).</p> <p><u>Type 2</u> Diet management</p>
Asthma	<p>A common lung condition that causes occasional breathing difficulties.</p> <p><b>Symptoms</b> Coughing, wheezing, shortness of breath/heavy breathing, tightness in the chest, pale/clammy skin, grey/blue lips (if attack is severe)</p> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Reassurance</li> <li>• Inhaler</li> <li>• Emergency services (if needed)</li> </ul>



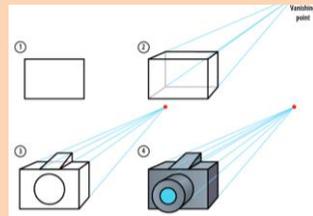
# How to creatively and effectively communicate your design ideas.



## Isometric

Isometric drawings look more realistic than oblique ones and are based on 30-degree lines. For support, use isometric grid paper to guide your angles:

- 1 Instead of drawing the 2D front view in oblique, you begin with an edge of the product – draw this as a vertical straight line.
- 2 From this line, create **construction lines** going off at 30 degrees.
- 3 Fill in the next vertical lines.
- 4 From these vertical lines, draw your next construction lines going off at 30 degrees (repeat steps 3 and 4 depending on the complexity of your drawing).
- 5 Within these construction lines, draw your product.

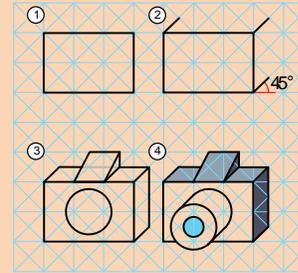


## One-point perspective

One-point perspective is often used in interior design, as it quickly creates an image with a good sense of depth that enables the customer to rapidly visualise the designer's idea. This then allows the designer and customer to work together to develop and adjust the idea to suit the customer's requirements.

One-point perspective is the easier type of perspective drawing.

- 1 Just like oblique drawing, start by drawing the front view in 2D.
- 2 From each corner, create construction lines to a point in the distance called a single **vanishing point**.
- 3 Draw your next vertical lines between your construction lines.
- 4 Join up your vertical lines with horizontal lines (keep these faint).
- 5 Draw your product within these lines

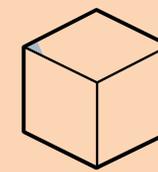


## Oblique

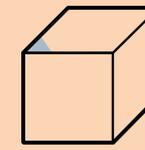
Oblique projection is the simplest method of creating 3D designs based on 45-degree lines. For support, use oblique grid paper to guide your angles:

- 1 Draw the front view in 2D.
- 2 From each corner, draw construction lines projecting out at 45 degrees.
- 3 On the construction lines, measure half the true length.
- 4 Draw the back of the product to complete the product.

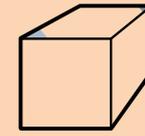
## Design and Technology: Timbers



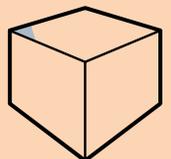
Isometric



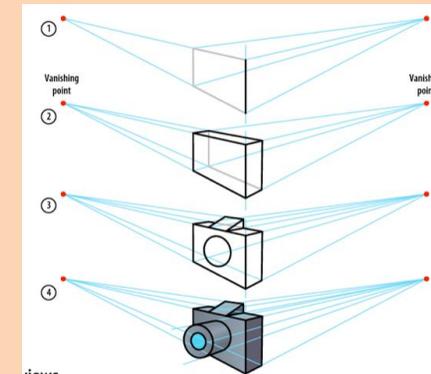
Oblique



One-point perspective



Two-point perspective



## Two-point perspective

Two-point perspective is often used by architects when developing their ideas in 3D, as it gives a speedy realistic interpretation. Like interior designers, the architects can work alongside their customer to develop their ideas to the customer's requirements. Two-point perspective uses two vanishing points either side of the object to produce a more realistic representation of the product.

- 1 Just like isometric drawing, you begin with an edge of the product – draw this as a vertical straight line.
- 2 From each corner, create construction lines to two vanishing points.
- 3 Draw in your next vertical lines between the construction lines.
- 4 From these vertical lines, draw construction lines going off to the vanishing points.
- 5 Draw in your product between your construction lines.

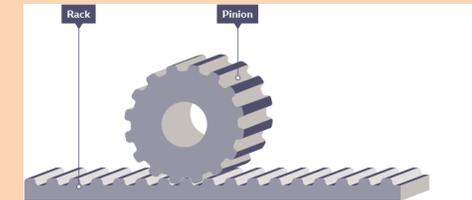
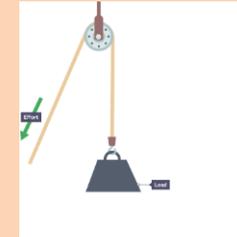
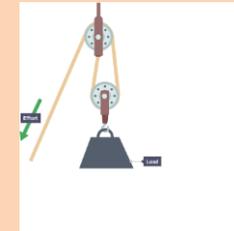
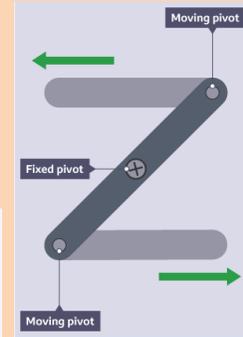
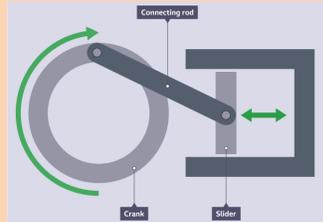
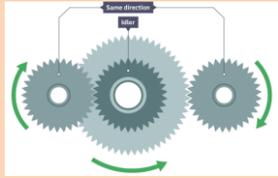
Name	Who are they?	Known For	Why they are influential
<b>Alessi</b>	Company, established in Italy in 1921	Designer and mass producer of functional but visually appealing homeware and kitchen products	Uses famous designers, such as Philippe Starck, to create iconic kitchen products such as the iconic spider like Juicy Salif lemon squeezer and retro kettles, setting a standard for other homeware companies
<b>Apple</b>	Company, established in the USA in 1976	Producer of consumer electronics and software using cutting-edge technologies, e.g. iPad, iWatch, iPod, iPhone, iTunes	<ul style="list-style-type: none"> <li>• Ground-breaking design: products looked completely different to anything before</li> <li>• Breaking with tradition and legacy, Apple's iPod made digital music mainstream</li> <li>• A loyal customer base</li> </ul>
<b>Heatherwick Studio</b>	Design studio, established in the UK in 1994	Around 200 designers, architects and makers have worked on projects from perfume bottles to Routemaster buses and Singapore University buildings	Stretches the boundaries of materials, craftsmanship and artistic thinking, showing that products and buildings can be unusual, experimental and interesting
<b>Joe Casely-Hayford</b>	Fashion designer, born 1956	Noted for his original but wearable designs that push barriers of conformity, made by master craftspeople using traditional English tailoring methods	Sets standards for British tailoring that combines style with character and is popular with celebrities
<b>Pixar</b>	Animation studio, established in the USA in 1979	Among the first to develop computer-animated feature films	Uses new techniques and technologies to make popular and successful films, including <i>Toy Story</i> and <i>Finding Nemo</i>
<b>Raymond Loewy</b>	Industrial designer (1893–1986)	<p>‘The father of modern design’</p> <ul style="list-style-type: none"> <li>• Emphasised the importance of combining simplicity with functionality, working with more than 200 companies on designs ranging from refrigerators to planes, trains and spacecraft</li> </ul>	<ul style="list-style-type: none"> <li>• Introduced the idea that if two products have the same price, function and quality, the products with better aesthetics will be more popular</li> <li>• His designs are recognisable today, including the Coca-Cola bottle, Le Creuset Coquelle dish and logos for Shell and BP</li> </ul>
<b>Tesla</b>	Automotive and energy storage company, established in the USA in 2008	Produces electric cars that don't compromise on power or quality, have zero emissions, are affordable and can be charged at home	Leads electric car design and technology, including the <i>Tesla</i> Model X SUV (2016)
<b>Zaha Hadid</b>	Architect (1950–2016)	<ul style="list-style-type: none"> <li>• Integrated geometric forms with expressive, sweeping fluid forms</li> <li>• Promoted architecture as a visual art form, with buildings intended to give aesthetic pleasure</li> </ul>	<ul style="list-style-type: none"> <li>• Overcame racial and gender barriers to establish an architecture practice that has designed more than 1000 iconic buildings worldwide</li> </ul>

# Mechanical devices used to produce movement

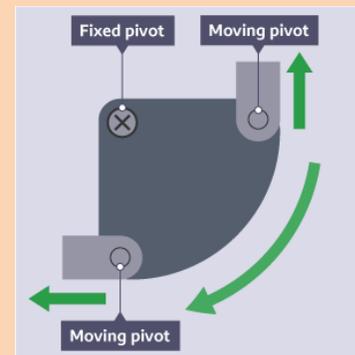
- 4 Types of movement
- 3 Classification of levers
- MA, VR and efficiency (=MA/VRx100%)
- Linkages (bell crank and reverse motion)
- Cams (pear shaped, eccentric and drop)
- Followers (roller, knife and flat)

	Pear-shaped	Eccentric/circular	Drop (Snail)
<b>Effect of shape</b>	<ul style="list-style-type: none"> <li>• Motionless (dwells) for about half the cycle</li> <li>• During the second half it rises and falls</li> </ul>	<ul style="list-style-type: none"> <li>• Circular to give a smooth continuous movement as the follower rises or falls</li> </ul>	<ul style="list-style-type: none"> <li>• Gives a slow rise with a spiral cross-section and then a sudden fall</li> </ul>
<b>Example</b>	<ul style="list-style-type: none"> <li>• Opens and closes valves in a car engine</li> </ul>	<ul style="list-style-type: none"> <li>• In a fuel pump or in steam engines</li> </ul>	<ul style="list-style-type: none"> <li>• Used in hammers/punches or machines needing a sudden drop</li> </ul>

Roller	Knife edge	Flat
<ul style="list-style-type: none"> <li>• Used when higher speeds are required, such as in engines</li> <li>• Rolling motion reduces friction so it will wear better</li> <li>• Has separate parts in the roller mechanism and contends with forces pushing them to the side</li> </ul>	<ul style="list-style-type: none"> <li>• Used when accuracy is required, such as in an embroidery machine, as the cam's profile is followed closely</li> <li>• Suffers from a rapid rate of wear and contends with forces pushing them to the side</li> </ul>	<ul style="list-style-type: none"> <li>• Used when higher load bearing capabilities are required, such as in a steam engine</li> <li>• Has reduced forces pushing it, but suffers from increased friction</li> <li>• The larger surface area means it could rotate, but has larger load carrying abilities</li> </ul>



	Class 1	Class 2	Class 3
<b>Reason for mechanical advantage</b>	A large input movement can produce a small output movement but with greater force	A large input movement can produce a smaller output movement with greater force, but the fulcrum is at one end	Limited; the force applied by the user is greater than the output force
<b>Example</b>	Pliers or crowbar	Wheelbarrow or nutcracker	Tweezers or spade



- Pulleys and belts (v-belt, velocity ratio, input and output speeds)
- Cranks and sliders
- Gear types (simple and compound gear train, idler gear, RPM calculations, bevel gears and rack and pinion)

## Non-ferrous metals

These do not contain iron, so have a higher resistance to rust and corrosion. They are not magnetic and tend to be more malleable than ferrous metals.

Type	Properties	Composition	Melting point	Example uses
Aluminium	Greyish white: corrosion resistant, malleable, ductile, easily machined, good heat/electrical conductor, excellent strength-to-weight ratio, polishes well	Pure metal	660°C	Aircraft, foil, window frames, engine parts, drinks cans
Copper	Reddy brown: corrosion resistant, malleable, ductile, tough, easily machined, good heat/electrical conductor, good hot or cold working, polishes well	Pure metal	1100°C	Electrical wire, gas and water pipes, printed circuits, roofing
Brass	Yellow: corrosion resistant, easily machined, good heat/electrical conductor, casts well, harder than copper, polishes well	Alloy: 65% copper 35% zinc	900–940°C	Plumbing fittings, door fittings, locks, musical instruments

## Ferrous metals

Ferrous metals contain iron (ferrite), so most have magnetic properties. Small amounts of other metals or elements may provide other properties. Ferrous metals are vulnerable to rust when exposed to moisture, except for stainless steel and wrought iron.

Type	Properties	Composition	Melting point	Example uses
Mild steel	Tough, ductile, malleable, magnetic, high tensile strength, easily joined, poor corrosion resistance	Iron + 0.1–0.3% carbon	1400°C	Screws, nails, bolts, girders, car body panels
Stainless steel	<ul style="list-style-type: none"><li>Corrosion resistant, hard, tough, sometimes magnetic, resists wear, difficult to cut</li><li>Specific properties can be altered by varying the alloyed metals</li></ul>	<b>Alloy:</b> Carbon steel + 10.5–18% chromium 8% nickel 8% manganese	1400°C	Kitchenware, sinks, cutlery, medical equipment
Cast iron	Hard skin, brittle, soft core, good in compression, self-lubricating, magnetic	Iron + > 2–6% carbon	1200°C	Machine parts, vices, brake discs, manhole covers

## Key terms

**Ductility:** ability of a material to deform by bending, twisting or stretching; ability to be drawn out without breaking. Ductility in metals increases with temperature.

**Malleability:** ability of a material to be permanently deformed in all directions without fracture. It increases with temperature.

**Hardness:** ability of a material to resist deformation, indentation or penetration. Hard materials can resist abrasion, drilling, impact, scratching, and wear and tear.

## Properties

The mechanical properties of metals define how they react to forces. A large force will deform metal. A temporary change is called elastic deformation and the metal will spring back into shape. A permanent change is called plastic deformation and the metal stays in the new shape. Three properties are **ductility**, **malleability** and **hardness**. All ductile materials are malleable but not all malleable materials are ductile.

Hard materials are often brittle, with a low resistance to impact, and break easily. This property is important for cutting tools such as saws, drills and files. Diamond is the hardest naturally occurring material and is measured at 10 on the Mohs scale (a scale that measures hardness). The mineral, talc is 1, aluminium is 2–2.9 and steels are 5–8.5.



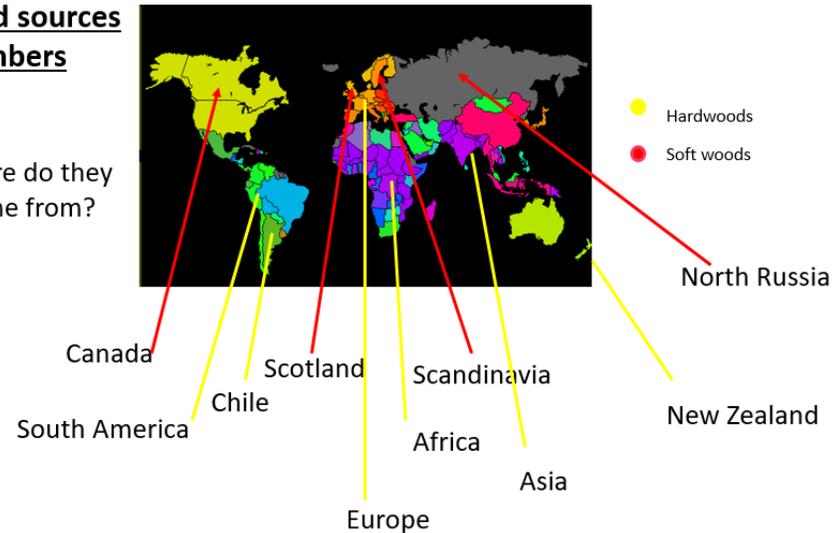
## Summary

### Key points to remember:

- Metals are categorised as ferrous or non-ferrous.
- A mixture of two or more metals is called an alloy.
- Metals have useful mechanical properties such as ductility, malleability and hardness.

**World sources of timbers**

Where do they come from?



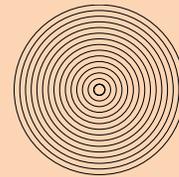
**Natural Timbers**

Softwoods are generally cheaper than hardwoods as they are more available, since they grow quicker. But because man-made boards are manufactured they are cheaper than timbers. Man-made boards also come in a better variety of sizes since they don't depend on tree growth.

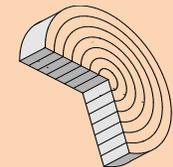
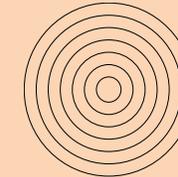
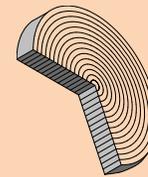
**Stock forms** for both include; sheets, dowel, planks, etc.

**HARD WOOD** trees **GROW SLOWER** so the **GROWTH RINGS** are **SMALLER**, which makes the **GRAIN CLOSER** and **MORE DENSE**.

**SOFTWOOD** trees **GROW QUICKLY** their **GROWTH RINGS** are **WIDER**, which makes the **GRAIN WIDER**. The timber is **LESS DENSE**.



Closer wood grain



Wider wood grain



Hardwoods come from Deciduous Trees. These trees lose leaves in winter and grow fruit and flowers in spring.		
Material	Key info	Examples
Ash	Flexible, tough and shock resistant	Sports equipment Tool Handles
Beech	Fine finish, tough and durable	Toys, furniture and veneers
Mahogany	Easily worked, durable, high quality finish	High-end furniture
Balsa	Very soft and spongy. Light	Modelling
Oak	Tough, durable and hard	Flooring, furniture and veneers



**DECIDUOUS** trees have **FLAT BROAD LEAVES** that change colour during the year and usually **LOSE THEIR LEAVES IN WINTER**.

There are a few exceptions to the rule, such as **HOLLY**, which is a **HARDWOOD** but **KEEPS ITS LEAVES ALL YEAR ROUND**.

**DECIDUOUS** trees take a **LONG TIME TO MATURE** and as a result, tend to be more **EXPENSIVE** than **SOFTWOODS**.

**Softwoods** come from **Coniferous Trees**. These have thin, needle-like leaves and grow all year round. Often have pine cones and sometimes nuts and seeds.

Material	Key info	Examples
<b>Larch</b>	Durable, tough, good water resistance and finishes well	Furniture, flooring and used outdoors
<b>Pine</b>	Light, easy to work with but can split	Cheap furniture, construction and decking
<b>Spruce</b>	Easy to work with, high stiffness but can decay quickly	Furniture, musical instruments and construction



**LARCH**



**PINE**



They can be identified their **CONES**, **NEEDLE-SHAPED LEAVES** and their **TRIANGULAR SHAPE**.

**CONIFEROUS** trees are **QUICK GROWING** and take around **10 YEARS** to **REACH MATURITY** before being felled.

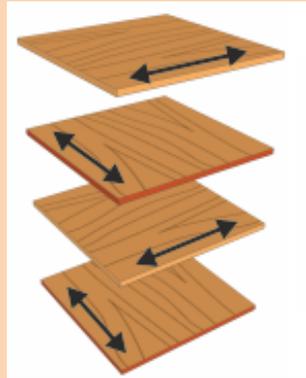
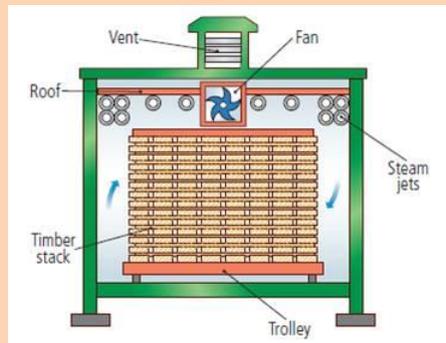
This makes **CONIFEROUS** trees extremely **SUSTAINABLE** as they are **RENEWABLE**.

Manufactured boards are made from wood chips/dust/ layers and glue.		
Material	Key info	Examples
<b>Chipboard</b>	Prone to chipping but good compressive strength. Not-water resistant	Flooring, low-end furniture, flat-pack
<b>MDF</b>	Rigid and stable. Easy to finish. Absorbs liquid easily	Flat-pack furniture and kitchen unites
<b>Plywood</b>	Very stable. Exterior veneer can be used from more expensive woods	Shelving, furniture, toys

**Primary Processing of Papers and Boards**

Trees are cut then converted into planks by cut using saws It is then seasoned to reduce the moisture in the wood. This is done by either:

- Air-drying** – Planks are stacked and air allowed to circulate; causing evaporation
- Kiln-drying** – Where planks are put into a kiln and dried rapidly. This process is more costly than air-drying



Manufactured boards can be either be made by lamination or compression

**Lamination** – Layers of woods and adhesive are layered and compressed together. Usually with a more expensive wooden veneer on the top

**Compression** – Wood is shredded, heated and compressed with adhesive under extreme pressure

### 1.1 Timber Conversion

After a tree is felled (chopped down) and then cut into manageable lengths, it is then converted into planks. At this point is in known as timber. Timber is supplied in two main types of finish. **Rough Sawn** or **planed all round (PAR)**. Rough sawn timber is not planed and is rough all around to touch. It is often used for exterior tasks or where the finish is not important. PAR has a much smoother finish as it has been planed down on all sides. It is used for furniture and internal features such as windows or doors. Finishes such as varnish or paint can be easily applied. Planed timber is less absorbent than rough sawn timber.



Timber is available in many different shapes and sizes, standardized to enable different varieties to be used together.

### 1.2 Seasoning

Once timber is converted into a workable form, it is **seasoned** in order to reduce the moisture content. Typically a newly felled tree will have a moisture content of over 50% and is known as green timber. The moisture content needs to be reduced to below 20% for most exterior applications, below 15% for interior work and below 10% for interior areas that are constantly heated.

Uneven evaporation of the water content can cause some common faults such as twisting, cupping and bowing which can render the timber useless for many tasks. If the end grain dries too quickly, it can cause the plank to split.



There are two methods of seasoning; air-drying or kiln drying. Air dried timber is stacked so that air can circulate around the planks and evaporation can take place. It takes approximately one year per 25mm of plank thickness to season and in the UK the moisture content typically reduces to around 18%.

Kiln-dried timber (A kiln is basically a Giant Oven) can have a much lower moisture content and it is a much faster process, meaning the timber can be sold much sooner. It costs more than air drying, as heat and pressure is used but no additional land is required to store the timber while seasoning takes place. Kiln dried timber is less prone to faults and the heat also kills off bacteria and insects that may attack the timber.

### 1.3 Manufactured Board

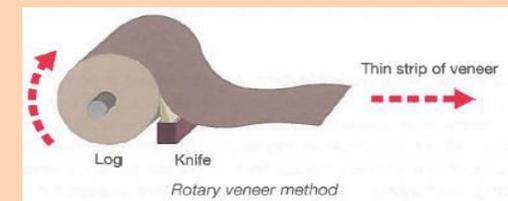
Natural timber is combined with the adhesive to make manufactured boards. They can be made from waste, low-grade and recycled timber and are usually produced in pale brown natural finish. Each manufactured board is produced in a slightly different way, the two main processes used are **lamination** and **compression**.

Plywood and block board use the lamination method where layers of wood are bonded together using an adhesive. Medium Density Fibreboard (MDF), chipboard, oriented strand board (OSB) and hardboard use the compression method where wood is shredded, chipped or pulped, then heated and compressed under high pressure, in most cases using adhesives to bond the particles together.



### 1.4 Veneer

Some manufactured boards are covered in a thin slice of natural timber called a **veneer**. These natural wood slices are taken from the trunk of a tree and are bonded to the surface of cheaper sheet materials. Veneers are commonly seen on medium density fiberboard (MDF) and plywood. There are two methods of veneer production; rotary and knife cut. Rotational veneer production produces the longest sheets and involves rotating a whole trunk on an industrial machine similar to a wood turning lathe. It is a bit like a huge pencil sharpener creating one long ribbon of veneer.



### Advantages and disadvantages of manufactured boards

Manufactured Boards	
Advantages	Disadvantages
Available in large sheets, very stable which saves time and energy joining arrow planks together.	Adhesives used to bond the boards can contain hazardous particles that can cause cancer.
No defects such as warping. Twisting, cupping and splitting which occur in natural wood, meaning less waste.	Machining and sanding some boards especially MDF, causes very small particles of dust to be released, easily breathed in, even through a mask.
They do not have knots or resin pockets which can be hard to work around, avoiding waste and protecting tools from damage.	Tools can blunt easily owing to the adhesives in the boards.
Smooth finish which requires very little preparation.	Many traditional wood joints cannot be used effectively with manufactured board.
Makes use of low grade, recycled and waste wood.	Edges can be hard to finish.
Available in many different finishes, veneers and laminates.	Most boards are prone to absorb moisture if not treated.

Name	Characteristics	Uses
<b>Blockboard</b> 	Stable, tough, relatively heavy, finishes well, indoor use owing to adhesives used.	Furniture, doors, shelving, indoor construction.
<b>Hardboard</b> 	Flexible in large sheets, even strength, easily damaged by water unless treated. Inexpensive.	Furniture and picture frame backings. Internal panelling.
<b>Oriented Strand Board (OSB)</b>	Rigid and even strength in all directions, good water resistance.	Construction hoarding, interior and exterior house building.

### Additional Soft Woods

Name	Characteristics	Uses
<b>Redwood</b> 	Easy to work and machines well. Some rot resistance.	Outdoor furniture, beams, posts, decking, veneers.
<b>Cedar</b> 	Easy to work, can blunt tools, finishes well, naturally resistant to rot.	Outdoor furniture, fences cladding for buildings, roof shingles.

Wood is considered to be a sustainable product, as new trees can be grown to replace those used for timber and fuel.

The main issue facing timber production is that in many parts of the world, it is being used at a far greater rate than it is being replanted. The result is an unsustainable supply of timber, which is frequently illegally obtained. This is causing many problems to the land in the countries where it is happening.

Some countries are suffering from **DESERTIFICATION** due to **DEFORESTATION**. This activity is also thought to be a contributing factor in **GLOBAL WARMING**.



FSC runs a global forest certification system with two key components:

- [Forest Management](#)
- [Chain of Custody](#)

This system allows consumers to identify, purchase and use wood, paper and other forest products produced from [well-managed forests](#) and/or [recycled materials](#).

FSC's "[tick tree](#)" logo is used to indicate that products are certified under the FSC system. When you see the FSC logo on a label, you can buy forest products with confidence that you are helping to ensure our forests are alive for generations to come.

What is the FSC? <http://www.fsc-uk.org/en-uk/about-fsc/what-is-fsc/fsc-principles>

# AQA Design & Technology 8552 Materials and Working Properties Papers and Boards.

## 1. Paper

Type	Description and uses
Layout paper	<ul style="list-style-type: none"> <li>lightweight, thin white paper</li> <li>used for initial ideas</li> <li>takes colour media well</li> <li>low cost</li> </ul>
Tracing paper	<ul style="list-style-type: none"> <li>thin, translucent paper</li> <li>making copies of drawings</li> <li>high cost</li> </ul>
Cartridge paper	<ul style="list-style-type: none"> <li>good quality white paper</li> <li>available in different weights</li> <li>general purpose work</li> <li>can be used to make simple models</li> <li>medium cost</li> </ul>
Bleedproof paper	<ul style="list-style-type: none"> <li>smooth, hard paper</li> <li>used with water-based and spirit-based felt-tip pens</li> <li>medium cost</li> </ul>
Grid paper	<ul style="list-style-type: none"> <li>printed square and isometric grids in different sizes</li> <li>a guide for quick sketches and working drawings</li> <li>low cost</li> </ul>

## 2. Selection of materials or components

When selecting materials and components considering the factors listed below:

- Functionality: application of use, ease of working
- Aesthetics: surface finish, texture and colour.
- Environmental factors: recyclable or reused materials, product mileage.
- Availability: ease of sourcing and purchase.
- Cost: bulk buying.
- Social factors: social responsibility.
- Cultural factors: sensitive to cultural influences.
- Ethical factors: purchased from ethical sources such as FSC.

## 3 Boards

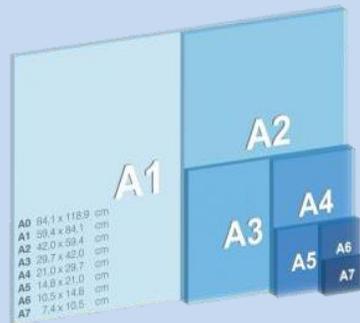
Type	Description and uses
Corrugated card	<ul style="list-style-type: none"> <li>strong and lightweight</li> <li>used for packaging protection and point of sale stands</li> <li>available in different thicknesses</li> </ul>
Duplex board	<ul style="list-style-type: none"> <li>large foam-based board</li> <li>different finishes available including metallic and hologrammatic</li> <li>used for food packaging, e.g. take-away pizza boxes.</li> </ul>
Foil lined board	<ul style="list-style-type: none"> <li>quality cardboard with a aluminium foil lining</li> <li>ideal for ready made meals or take away meal cartons</li> <li>The foil retains the heat and helps keep the food warm</li> </ul>
Foam core board	<ul style="list-style-type: none"> <li>very light, very stiff and very flat.</li> <li>It has a white, rigid polystyrene foam centre, with smooth white paper laminated onto both faces.</li> <li>It is easy to cut with a knife, a mount cutter or on a wall cutter</li> <li>great for modelling</li> </ul>
Ink jet card	<ul style="list-style-type: none"> <li>Has been treated so that it will give a high quality finish with inkjet ink</li> <li>available in matt and gloss</li> </ul>
Solid white board	<ul style="list-style-type: none"> <li>top quality cardboard made from quality bleached wood pulp.</li> <li>used for hard backed books and more expensive items</li> <li>excellent print finish</li> </ul>

## 4. Paper and Boards- Stock sizes and weights

Paper and board is available in sizes from A0 (biggest) to A7 (smallest). The most common size is A4.

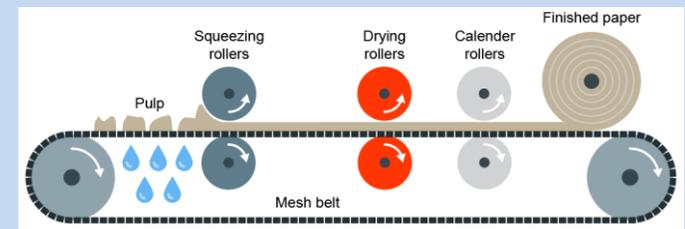
Each size is half the one before, e.g. A4 is half the size of A3.

They are also sold by weight: GSM –grams per square metre. **Card** thickness or caliper is traditionally measured in **Microns**. 1000 Microns = 1mm, so the higher the value, the thicker the card or paper.



Type	Weight or thickness	Uses	Relative cost (10=high)
Newsprint	50gsm	Newspapers	1
Layout Paper	60gsm	Sketches and tracing	3
Tracing Paper	70 gsm	Tracing	4
Sugar Paper	90gsm	Cheap mounting work	2
Inkjet/Photo paper	150-230gsm	Photos/Pres entations	9
Board (Card)	230-750 microns	Model-making	5
Mount Board	230-1000 microns	Model-making, High picture quality mounting	9
Corrugated Card	3000-5000 microns	Packaging protection	5

## Primary Processing of Papers and Boards



Paper is made by first making pulp. Pulp is a mix of tree fibres and water. This is cooked and bleached white, and adding any other additives.

The pulp is then drained and goes through **Calendering** where the pulp is drained and goes through rollers to convert it to its stock forms

### The 6 R's

The 6 Rs are an important checklist. They are used by designers to reduce the environmental impact of products. They can also be used to evaluate the environmental impact of other products.

The hierarchy of sustainability places the strategies that are best for the planet about those that have a greater negative impact on the environment.

1

Reduction is often the result of having re-thought a design or action. Materials and energy are saved due to efficient manufacturing practices and the use of clever design, incorporating sustainable materials.

- Modern materials that are lighter and stronger than traditional ones have contributed to the miniaturisation of products, saving material and energy in manufacture and use.
- Reducing the complexity or number of parts a product uses and reducing the number of different materials in a product makes recycling easier.

### 2 . Reuse

Reusing products multiple times for the same purpose is also known as **primary recycling**. Reusing a product in a different way from the one it was designed for is known as **secondary recycling**.

The classic glass milk bottle is reused many times before it reaches the end of its useful life, as which point it is recycled. A plastic milk bottle, however, is intended to be used only one, although it can have many different subsequent uses.

Donating to and buying from charity shops extends the life of products and in recent years there has been a resurgence of in products having second lives, thanks to websites such as eBay, Freecycle or Gum tree.

It is also becoming popular for furniture and other household items to be **upcycled** with a coat of paint and some minor repairs or adaptations, extending their useful life by many years.



REDUCE



REUSE



RECYCLE

### 3. Recycle

**Tertiary recycling**, although a very important stage, is lower down the hierarchy of preferred options because most materials that are recycled this way tend to be of lower quality than the original material. It takes a lot of energy to recycle materials.

This form of recycling requires the reprocessing of the material and in many cases involves chemicals and/or heat to recover the recycled materials. In an ideal world, tertiary recycling would remove all recyclable materials from our household waste so that only biodegradable materials would be left. Only very few parts of the world are set up to cope with this level of processing.

### 4. Rethink

Consumers have a growing number of choices to make about where and on what they spend their income. Greener and more sustainable options are not always the cheapest or the best, but making informed decision and rethinking ones spending power can play a huge part in conserving resources.

Deciding on the design of a product, e.g. the materials being used in its production, will directly affect its sustainability. The types of questions designers need to ask are:

- Are the materials locally sourced?
- Are they sustainably produced?
- Is it essential to use this material, of which there is a finite supply?

By rethinking how the product is likely to be made, the product can often be redesigned in a more responsible way.

### 5 . Refuse

The first stage in the process is to ask whether the proposed product, part, purchase or even journey is required at all. Asking the question 'Is it really necessary?' can play a major role in reducing the demand on materials. Simply not using something saves 100% of what you have chosen not to use. Example include:

- Using your own carrier bag rather than purchasing a new one.
- Walking or cycling to school instead of being driven.
- Not using products such as some pesticides that are known to be harmful to the environment.
- Not eating (or using) products that are over-farmed, over-fished or on the endangered list.

### 6 . Repair

Being able to repair a product when it is broken or worn is a way of extending its life and delaying the purchase of a new one. Repairing is a positive option over replacement as it means that only some parts of the product are replaced. This creates jobs for skilled people who conduct repairs and stimulates a spare parts market.

Unfortunately, repairing products has become harder over years. Growing number of products are not design to be repaired. There are a number of reasons why items may be designed this way, but it is usually because they are cheaper to replace than repair. Some products, especially modern electronic products, are designed to last only a few years as technology dates quickly and older products will be superseded by newer, faster, more efficient models. This is called **planned obsolescence**.

## Life Cycle Assessment

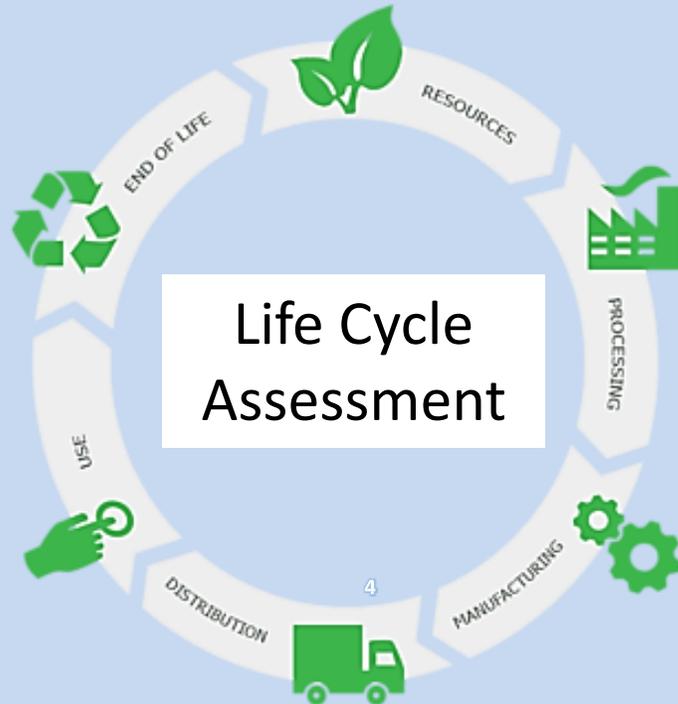
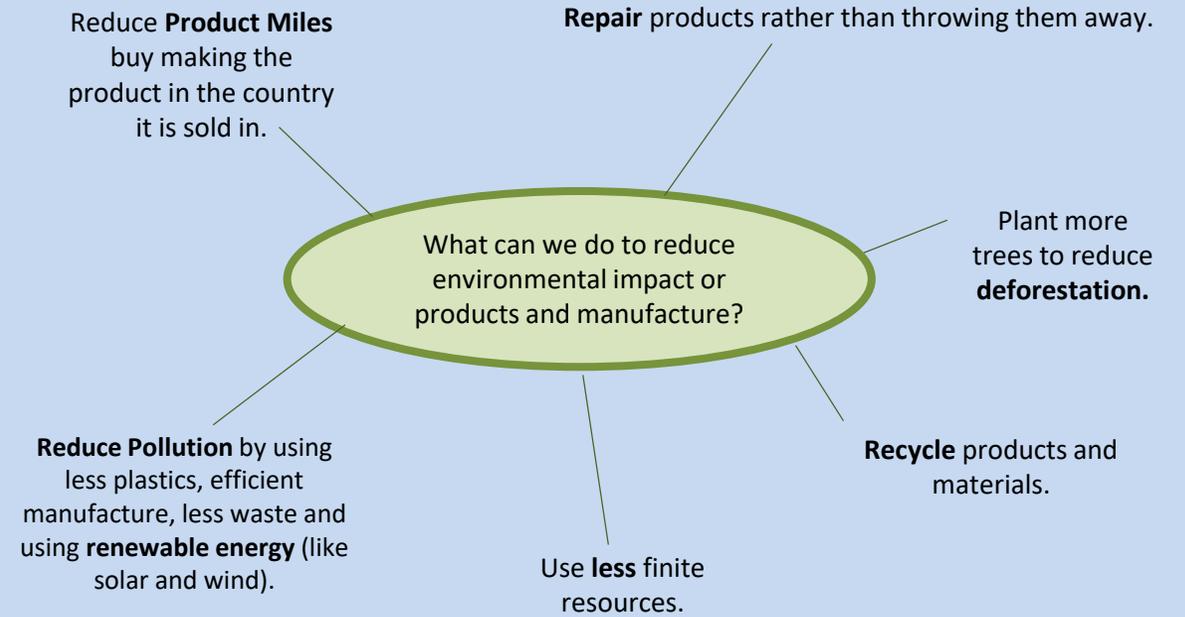
This is when a designer looks at the environmental impact a product makes over its life time and how it could be reduced. Including:

- Impact of materials
- Impact of processes
- Product Miles (how far a product has to travel to get from factory to consumer)
- Impact while in use
- Impact when disposed of (6Rs)

**Planned obsolescence** - Planned obsolescence is when a product is deliberately designed to have a specific life span e.g. disposable cups, mobile phones, lightbulbs, printer Ink, disposable cameras for example. This can have a big environmental impact as customers are throwing away lots of products, and resources are being used to create new ones.

**Design for maintenance** - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.

**Disposability** - Some products are designed to be disposable.



## Renewable materials from managed resources.

### Technologies that have a **POSITIVE** impact:

- Use of renewable energy.
- Using recyclable materials.
- Consideration to the 6r's.
- Designing products with low power consumption.
- Designing products with fewer components and reduced weight.
- Designing products that are upgradable extending their life.
- Creating products that are sourced, produced and sold locally.

### Technologies that have a **NEGATIVE** impact:

- Use of components that are hard to repair.
- Use of fossil fuels for power.
- Products with high power consumption.
- Products that have built in **planned obsolescence**.
- Components that are shipped globally.

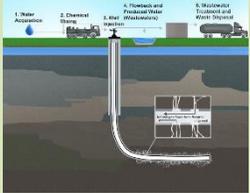
**Sustainability** is maintaining our planet and its resources and making a minimal negative impact

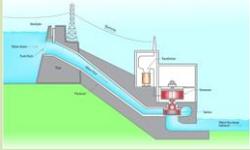
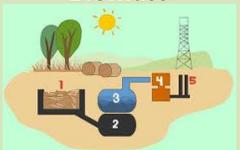
<b>Finite Resources</b> <i>Will run out of eventually</i>	<b>Infinite Resources</b> <i>Can be re-grown and re-bred. Will not run out of</i>
Plastics	Paper
Metals	Boards
Synthetic/Polymers (Textiles)	Natural Timbers
	Cotton
	Leather

# AQA Design & Technology 8552 Energy, Materials, Systems and Devices

## Energy Generation and Storage.

Power can be generated from renewable and non-renewable sources. Non-renewable power is generated from fossil fuels. Most electricity is created by rotating a turbine which turns a generator. Fossil fuels are burnt to create heat which superheats the water. The steam rotates the turbine which is linked to the generator to supply the electricity.

Non-Renewable Energy Sources	This is when certain sources of energy will run out eventually	
<b>Fossil Fuels</b> 	<ul style="list-style-type: none"> <li>Coal, Oil and Gas</li> <li>Burned to create steam, turned in turbines to create electricity.</li> </ul>	<ul style="list-style-type: none"> <li>Burning creates CO<sub>2</sub> which adds to <b>Global Warming</b></li> <li><b>Non-renewable.</b></li> <li><b>Unsustainable.</b></li> </ul>
<b>Nuclear Power</b> 	<ul style="list-style-type: none"> <li>Nuclear Fission controls the reactor (that creates the electricity). This requires <b>Uranium</b> which is non-renewable.</li> </ul>	<ul style="list-style-type: none"> <li><b>Radiation poisoning</b> can be fatal and cause physical deformations</li> <li>Nuclear waste has to be disposed of properly and is hazardous for thousands of years.</li> <li>Accidents and waste can severely damage the environment and cause radiation poisoning.</li> </ul>
<b>Fracking</b> 	<ul style="list-style-type: none"> <li>Shale gas is trapped within the earth's crust.</li> <li>Fracking is the process which removes it so it can then be burnt to create electricity.</li> <li>It involves drilling the earth's crust and sending high pressure water, sand and chemical mixtures into the rock to release the gas.</li> </ul>	<ul style="list-style-type: none"> <li>Contamination of groundwater.</li> <li>Air pollution due to the toxic chemicals.</li> <li>Large volume water use in water-deficient regions.</li> <li>Fracking-induced earthquakes.</li> </ul>

Renewable Energy Sources	Energy that comes from the plants non-finite resources is renewable. It includes:	
<b>Solar</b> 	<ul style="list-style-type: none"> <li>Low maintenance costs.</li> <li>Improvements in technology mean the efficiency is always improving.</li> </ul>	<ul style="list-style-type: none"> <li>Only produce energy during daytime.</li> <li>Production is less in winter. – fewer daylight hours.</li> </ul>
<b>Wind</b> 	<ul style="list-style-type: none"> <li>Low cost</li> <li>Produce more power in winter when demand is higher.</li> </ul>	<ul style="list-style-type: none"> <li>Do not create power when not enough wind or it is too windy.</li> <li>Harmful to wildlife.</li> <li>Ugly.</li> </ul>
<b>Hydro-Electrical</b> 	<ul style="list-style-type: none"> <li>Is a form of energy that harnesses the power of water in motion.</li> <li>has the ability to generate electricity without emitting greenhouse gasses.</li> </ul>	<ul style="list-style-type: none"> <li>High set up costs both financially and environmentally.</li> <li>Has to be created by flooding land – damaging wildlife habitats.</li> </ul>
<b>Tidal</b> 	<ul style="list-style-type: none"> <li><b>Tidal</b> energy comes from using energy from waves</li> <li>Predictable and consistent.</li> </ul>	<ul style="list-style-type: none"> <li>Machinery has to be located some distance from land making repair and maintenance difficult.</li> </ul>
<b>Biomass</b> 	<ul style="list-style-type: none"> <li>This is fuel from natural sources e.g. crops, scrap woods and animal waste.</li> <li>Growing biomass crops produces oxygen and uses up CO<sub>2</sub>.</li> </ul>	<ul style="list-style-type: none"> <li>Vast amounts of land and water needed to produce the crops which contribute to food shortages in developing countries.</li> <li>It is a very expensive.</li> </ul>

### Storing Energy

**Pneumatics:** A form of compression is used to store gas or air under pressure. They are commonly used to controlling production lines. They are accurate, efficient and low maintenance..

**Hydraulics:** Very similar to Pneumatics but uses a liquid, most commonly Oil. Extremely powerful and using in manufacturing industrial applications.E.g. Wheelchair lifts.

**Kinetic:** Energy that is generated by movement. This is stored by items like springs in a “clickable” pen or balloons,

**Batteries:** Electrical power can be stored in batteries. Battery technology has vastly improved alongside the power consumption of modern electronic devices helping save valuable finite resources. Rechargeable batteries are capable of being charge d and discharged thousands of times reducing the resources needed. The time it takes for rechargeable batteries to reach full charge has also improved in recent years making their use much more convenient.

**Disposal of Batteries** – Batteries must be disposed of correctly as they contain toxic electro chemicals. If placed in the normal bin and they end up in land fill sites, it will degrade over time and release harmful chemicals and metals into the soil and water.

# Hospitality and Catering - AC 1.1

Images taken from \*Google

## Nutrients

You need to describe clearly the functions of:

- Carbohydrates (simple and complex)
- Protein
- Fat
- Vitamins A/B/C/D/E/K
- Calcium
- Iron
- Fibre
- Water

In the human body.

Why do we need it? What does it do?

Nutrient	Function
Carbohydrates	Provides energy
Fats	Provides energy and insulation
Proteins	Needed for growth and repair
Vitamins	Helps form bodily tissues (hair, skin, teeth, nails) and are needed for chemical reactions in the body
Minerals	Uptake of vitamins, bodily tissues and chemical reactions

## You do not need to include:

What happens if we do not eat it or if we eat too much (that comes later).



**AC1.1** Describe functions of nutrients in the human body

Outlines the functions of a limited range of nutrients in the human body.

Describe functions of a range of nutrients in the human body.

Describe clearly functions of a range of nutrients in the human body..

## Carbohydrates

- It provides energy. One gram of carbohydrate in the form of starch or sugars provides 3.75kcal (16kJ).
- The body's tissues require a constant supply of glucose, which is used as a fuel. The main source of glucose is carbohydrate but it can also be taken from protein. If the diet is low in carbohydrate, a greater percentage of dietary protein is used to provide glucose, which means less is available for the growth and repair of body tissues. Thus, carbohydrate in the diet has a protein-sparing effect.

## Fats

- Fat provides energy; 1 gram provides 37 kJ (9 kcal). Foods that contain a lot of fat provide a lot of energy. Fat is a carrier of fat-soluble vitamins and is necessary for their absorption.
- A high intake of saturated or trans fatty acids can have adverse effects on health.

	Men	Women
<b>Energy (calories)</b>	2500	2000
<b>Fat (g)</b>	95	70
<b>Saturated Fat (g)</b>	30	20

## Proteins

Protein is essential for growth and repair of the body and maintenance of good health. Protein also provides energy; 1 gram provides 17 kJ (4 kcal). Different foods contain different amounts and different combinations of amino acids (the building blocks of proteins). Protein from animal sources (e.g. meat, fish, eggs and dairy products) contains the full range of essential amino acids needed by the body. However, vegans and vegetarians can get all the amino acids they need by combining different plant sources of protein, e.g. pulses and cereals.

## Vitamins

- Vitamins are nutrients required by the body in small amounts, for a variety of essential processes.
- Most vitamins cannot be made by the body, so need to be provided in the diet.
- Vitamin D can be made by the body in the skin when it is exposed to sunlight.
- Vitamins are grouped into fat-soluble vitamins and water-soluble vitamins.
- Requirements for vitamins change across life stages.

## Calcium/iron/Fibre

Fibre makes a small contribution to energy  
Minerals are inorganic substances required by the body in small amounts for a variety of different functions.  
Minerals are involved in the formation of bones and teeth; they are essential constituents of body fluids and tissues; they are components of enzyme systems and they are involved in normal nerve function.  
The body requires different amounts of each mineral; people have different requirements, according to their age, sex, physiological state (e.g. pregnancy) and sometimes their state of health. The Department of Health has published Dietary Reference Values (DRVs) for minerals for different groups of healthy people.

## water

- Regular fluid intake is essential for our bodies to function properly.
- The amount of fluid needed varies between people and according to age, time of year, climatic conditions, diet and levels of physical activity.
- We can obtain our fluid requirements from a number of sources such as water and other drinks, as well as the food we eat.
- We have sensitive mechanisms to maintain our body water but attention should be given to children and older people who may not recognise the sensation of thirst so easily, to ensure they consume enough fluids.

Regular fluid intake and water replacement are essential before, during and after exercise.

**AC1.1 Describe functions of nutrients in the human body**

Outlines the functions of a limited range of nutrients in the human body.

Describe functions of a range of nutrients in the human body.

Describe clearly functions of a range of nutrients in the human body..

**Diets and lifestyles**

You must start by writing a paragraph about what the following are and how it affects their diets: Vegetarian – Vegan -Pescatarian –Allergies –Diabetes -Religions (Sikh, Muslim, Jew) –Coeliac

**Compare the needs of two specific groups**

You must then include the nutritional needs of a 2 chosen groups of people, listing similarities and differences. You must try and mention all the nutrients that you spoke about in 1.1.

**Example:**

**Carbohydrates**

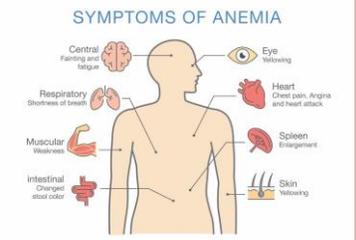
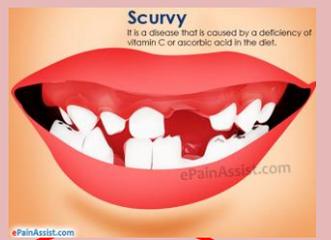
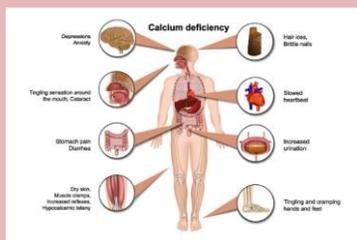
Both adults and children need carbohydrates in their diet because both require energy. Children need energy for there varied physical activity eg playing, running and adults for working. A similarity is that children and adults should eat 45-65% of their daily diet in order to get the right amount of carbohydrates.

A difference is that adults should consume 2000 – 2500 calories a day and children should eat 1000 – 1400 calories a day.

<p><b>AC1.2</b> Compare nutritional needs of specific groups</p>	<p>Outlines nutritional needs of two specific groups. Comparison may be implied.</p>	<p>Compares nutritional needs of two specific groups giving some reasons for similarities and differences.</p>	<p>Compares nutritional needs of two specific groups giving clear reasons for similarity and differences.</p>	<p>Compares nutritional needs of two specific groups giving clear and in depth reasons for similarity and differences.</p>
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For this assessment criteria you need to discuss what can happen to the body if we eat an excess amount (too much) of a nutrient or an insufficient amount (too little) of a nutrient.

<p><b><u>Carbohydrates</u></b></p> <ul style="list-style-type: none"> <li>-Some studies suggest that populations with a high intake of fibre-rich foods experience a lower incidence of large bowel cancer than populations with low intakes of these foods.</li> <li>-Too much energy in the diet can lead to excess weight gain.</li> </ul>	<p><b><u>Fats</u></b></p> <ul style="list-style-type: none"> <li>-If energy intake and expenditure are unbalanced then the excess energy is stored in the body as fat, which may over time result in an individual becoming overweight or obese.</li> <li>-A high fat intake, and in particular a high intake of saturated fatty acids (saturates), has been associated with a raised blood cholesterol level, which is one of the risk factors for coronary heart disease.</li> </ul>	<p><b><u>Proteins</u></b></p> <ul style="list-style-type: none"> <li>-Any excess protein can be used to provide energy. 1g of protein provides 17kJ (4 kcal) but carbohydrate, and to a lesser extent fat, should be the main sources of dietary energy. At present, protein provides around 16% of energy on average in the British diet.</li> </ul>
<p><b><u>Vitamins – Examples Vitamin C/D/A</u></b></p> <ul style="list-style-type: none"> <li>-Severe deficiency of vitamin C leads to scurvy. Acute high doses of vitamin C are occasionally associated with diarrhoea and intestinal discomfort.</li> <li>-Deficiency of vitamin D results in poor calcification of the skeleton.</li> <li>-Vitamin A deficiency is a serious public health problem worldwide,. It can lead to night blindness.</li> </ul>	<p><b><u>Minerals - Examples Calcium/iron/Fibre</u></b></p> <ul style="list-style-type: none"> <li>-Iron deficiency anaemia is the most common nutritional deficiency in the world, often affecting women and young children. Nutritional deficiencies of other minerals are rare in the UK.</li> <li>-insufficient calcium in bones can result from an inadequate supply of vitamin D which is essential for absorption of calcium. In children, vitamin D deficiency results in rickets and, in adults, osteomalacia, in which bones become weak owing to lack of calcium.</li> </ul>	<p><b><u>Water</u></b></p> <ul style="list-style-type: none"> <li>-Dehydration can impair physiological and performance responses, and in extreme cases can be fatal.</li> <li>-It can be dangerous to drink too much water as water intoxication can lead to hyponatraemia</li> </ul>



<p><b>AC1.3</b> Explain characteristics of unsatisfactory nutritional intake</p>	<p>Outlines key characteristics of unsatisfactory nutritional intake. Evidence is mainly descriptive with limited reasoning.</p>	<p>Explains characteristics of unsatisfactory nutritional intake. There is evidence of reasoning and relating characteristics to specific groups.</p>	<p>Explains with clear reasoning characteristics of unsatisfactory intake of a range of nutrients. Explanations are related to specific groups.</p>			
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# Knowledge organiser AC 1.4

Images taken from \*Google  
 Image taken from: Hospitality and Catering level 1/2 Anita Tull and Alison Palmer

## What to do?

You need to discuss here how cooking can affect nutritional value of food eg add fat or remove vitamins. You can then link this in to your cooking choices when you create your menu.



Cooking method	How nutrients are affected
Boiling	<ul style="list-style-type: none"> <li>Up to 50% of vitamin C is damaged when green vegetables are boiled in water</li> <li>Vitamins B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> are damaged by heat and also dissolve in the water</li> <li>Some calcium and sodium dissolves in the water that food is boiled in</li> <li>Starch (carbohydrate) is <b>gelatinised</b> when cooked in a liquid, which makes it easier for the body to use</li> </ul>
Steaming	<ul style="list-style-type: none"> <li>Steaming is the best method for conserving vitamin C, as only about 15% is lost because the food does not come into direct contact with the boiling water</li> </ul>
Poaching	<ul style="list-style-type: none"> <li>Vitamins B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> are damaged by heat and dissolve in the water</li> </ul>
Baking	<ul style="list-style-type: none"> <li>The high heat used in baking can easily over-cook protein and damage B vitamins and vitamin C</li> </ul>
Grilling	<ul style="list-style-type: none"> <li>When food such as meat is grilled, up to 40% of B vitamins can be damaged</li> <li>The high heat used in grilling can easily over-cook protein</li> </ul>
Stir frying	<ul style="list-style-type: none"> <li>The fat used in stir frying increases amount of vitamin A the body can absorb from some vegetables</li> <li>The heat will damage some vitamin C and B vitamin but, as they are only cooked for a short time, the damage is minimal</li> </ul>
Roasting	<ul style="list-style-type: none"> <li>The high heat used in roasting will destroy most of the vitamin C and some B vitamins</li> </ul>
All cooking methods	<ul style="list-style-type: none"> <li>Protein is <b>denatured</b> and <b>coagulated</b> by heat, which makes it easier for the body to use</li> <li>Protein can be over-cooked, which will make it harder and more difficult for the body to use</li> <li>Fat/oil is damaged by repeatedly being heated to fry foods, and it breaks down into substances that are harmful to the body</li> </ul>

AC1.4 Explain how cooking methods impact on nutritional value	Outlines how cooking methods impact on nutritional value. Evidence is mainly descriptive with limited reasoning.	Explains how a range of cooking methods impact on nutritional value. Reasoned statements are presented.		
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# Knowledge organiser AC 2.1

## Factors to consider

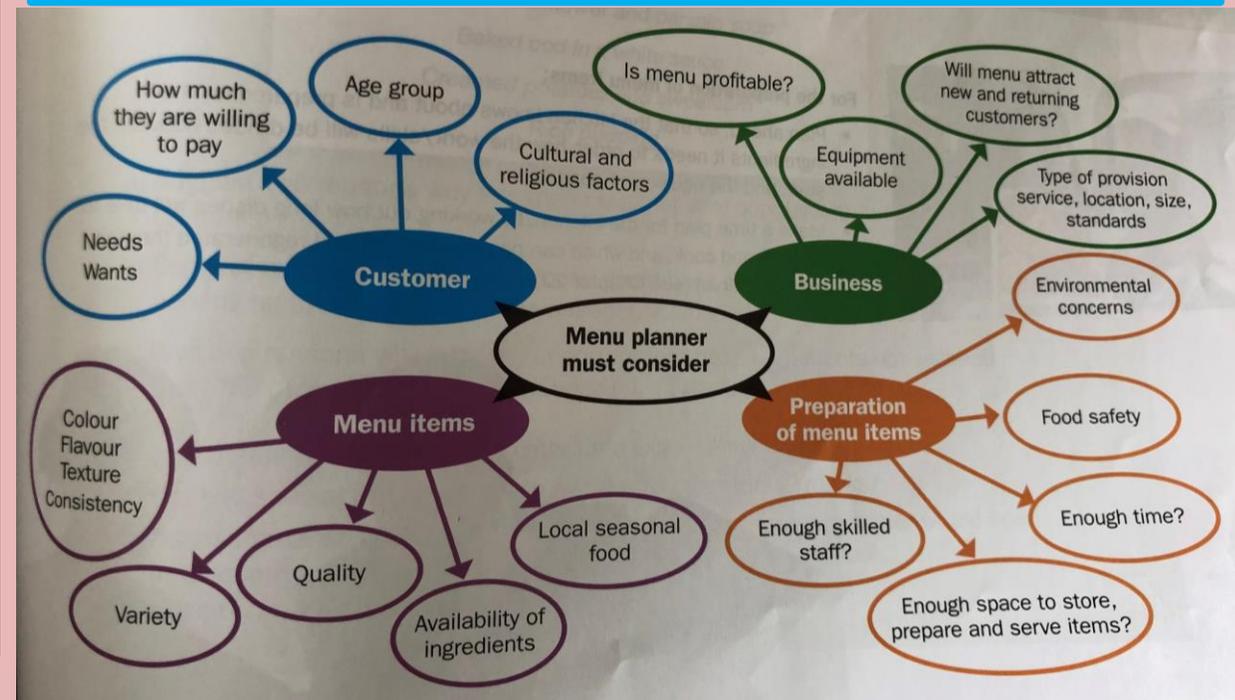
You need to discuss all the factors to consider when designing your menu. A factor is something that influences a decision.

Examples:

- If you are designing a budget meal you will not include expensive ingredients
- If you are designing a menu suitable for an apprentice to make, you will not include a method suitable for a highly skilled chef.
- If you trying to lower food miles, you will not use lots of food imported from other countries.
- If you are designing a menu for a child you will not include foods that are choking hazards.



## À la Carte menu/Meal menu/Speciality menu/Table d'hôte Menu



Images taken from \*Google

Image taken from: Hospitality and Catering level 1/2 Anita Tull and Alison Palmer

<p><b>AC2.1</b> Explain factors to consider when proposing dishes for menus</p>	<p>Outlines factors to consider when proposing dishes for menus. There may be some omissions.</p>	<p>Explains factors to consider when proposing dishes for menus. Explanation has some reasoning.</p>	<p>Explains factors to consider when proposing dishes for menus. Explanations are clear and well-reasoned.</p>	
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**TIPS FOR SAVING ENERGY IN THE KITCHEN**

SavvyEcoSolutions.com

A well organized, energy efficient kitchen can save us money and give us the satisfaction of well run appliances and equipment.

- 1 **USE DISHWASHER ONLY WHEN FULL AND AIR DRYING DISHES**  
instead of using the dishwasher's drying cycle can save 15-50% dishwasher's energy use.
- 2 **REPLACE WITH ENERGY STAR APPLIANCES**  
when ready to replace old appliances in the kitchen like fridge, oven, exhaust fan, dishwasher, etc.
- 3 **USE MICROWAVE OR TOASTER OVEN**  
rather than conventional oven when reheating leftovers or cooking smaller items
- 4 **AVOID RINSE HOLDING SETTING OF DISHWASHER**  
This uses 3-7 gallons more hot water per use.
- 5 **ADD AERATORS TO TAP FAUCET**  
Choose tap faucet with flow rate of no more than 1gpm for maximum savings.
- 6 **KEEP OVEN DOOR CLOSED WHILE COOKING**  
The temperature can drop 25 degrees each time door is open.
- 7 **HAND WASHING BEATING AN EFFICIENT, FULL DISHWASHER**  
is not easy. Hand washing an 8 place setting load in 4 gallons (2 minutes from an efficient faucet) of warm water would be similar to washing with an efficient dishwasher. Scrape and soap plates with tap off, rinse plates in two small basins of warm water.

"I have a greater appreciation for kitchen appliances, having played one." Anthony Daniels

References: <https://blog.constellation.com/2016/01/01/31-ways-to-save-energy-in-your-home/>  
<https://www.treehugger.com/kitchen-design/built-in-dishwashers-vs-hand-washing-which-is-greener.html>



**What can you do?**

For this criteria you need to be able to discuss what you can do to help the environment when you/ the apprentices cook the meals.

You need to discuss how you can:

- Save water
- Save electricity
- Save gas
- Get electrical equipment fixed rather than replaced
- Prevent food waste
- Use local food to reduce food miles
- Minimal packaging
- Recycle packaging
- Go paperless where possible



**AC2.2** Explain how dishes on a menu address environmental issues

Outlines how dishes on a menu address environmental issues. There may be some errors.

Explains how dishes on a menu address environmental issues. Explanation includes reasoning.

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# Knowledge organiser AC 2.3

## 5 Senses



Sight



Touch



Smell



Taste

### Presentation

Try and explain how you will present your food on the plate and any techniques you may use.



### Meet the needs

You need to identify here why the meals you have chosen are suitable for adults and children.

-You should be able to identify specific nutrients that they needs. You may discuss the popularity of the dish, the taste, smell, textures.

-You may include which ingredients you would be able to source locally (markets, butchers, fishmongers).

-If its suitable to be eaten hot or cold or both.

-If it can be a take away or eat-in.

Dish	How it meets the needs of children and adults	Preparation skills/techniques and cooking methods
Triple chocolate brownie accompanied with meringue kisses, raspberry coulis and chocolate sauce.	<p>This dish will be suitable for adults and children, there are a number of nutrients in this dish that these age groups need.</p> <ul style="list-style-type: none"> <li>This product is sweet which will appeal to the taste buds of younger people.</li> <li>There is a variety of colours to appeal to the child.</li> <li>There are no hard foods so it does not have a choking hazard.</li> <li>The product is high in calcium which is good for children's bone development and will help adults bones remain strong.</li> <li>The product has simple carbohydrates which will give short bursts of energy to the adults and children. It also contains complex carbs which means the energy should also last them a while.</li> <li>Can use British raspberries making them cheaper (depending on the season) and fresher.</li> </ul>	<p>-Weighing and measuring – Sieving –mixing –melting –straining – boiling – baking – simmering.</p>
Battered fish and chips with mushy peas.	<ul style="list-style-type: none"> <li>Will get carbohydrates from the chips with is a complex carb keeping them full and energised for quite a while which means they will have energy for the flip flops leisure place.</li> <li>Classic British dish that will be familiar to children</li> <li>Vitamins and one of your 5 a day will come from the mushy peas</li> <li>A healthy source of protein will come from the fish including omega 3 oils.</li> <li>Some fat will come from the frying of the fish which is essential in a child's diet.</li> <li>This dish will have a variety of colours on the plate, golden browns with a contrasting green making it stand out.</li> <li>The fish can be caught from British waters making it local, appealing and fresh.</li> </ul>	<p>-mixing – battering-coating-frying-filleting-cutting-boiling-simmering-baking-washing-peeling</p> <p>Baking the fish will make it healthier as I'm not submerging it in fat.</p>
Stuffed chicken breast wrapped in bacon accompanied with fresh spinach flavoured pasta and tomato sauce.	<ul style="list-style-type: none"> <li>Extra iron available as the pasta has been flavoured with spinach.</li> <li>Chicken cut in half for presentation purposes.</li> <li>Protein to help adults with their growth and repair.</li> <li>Complex carbohydrates to give slow releasing energy.</li> <li>Variety of vitamins and minerals found in the tomato sauce.</li> <li>Can use British chicken making it local, by buying it from the butchers it can be traced back to birth.</li> </ul>	<p>- Weighing and measuring – sieving – kneading –rolling – tenderising – de-boning – dicing – wrapping – baking – boiling – simmering.</p>

You need to include this amount of detail for all 4 meals  
Remember you will be making 2 of them

AC2.3 Explain how menu dishes meet customer needs	Outlines how menu dishes meet customer needs in general terms. Evidence is mainly descriptive with limited reasoning.	Explains how menu dishes meet needs of specified customers. Some evidence may be in general terms and descriptive. Explanation includes reasoned statements.	Explains how menu dishes meet needs of specified customers. Explanations are comprehensive and credible.
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## Knowledge organiser AC 2.4

### Timings

Must add up to 3.5 hours (210 mins)!

Either use format:

10 minutes

1 minute

3 minutes

or

1:00

2:30

10:00

### Hygiene

Check your time plan and ensure you have added the following throughout: Wearing an apron, washing hands with hot soapy water and drying with a blue paper towel, washing pots with hot soapy water, tying hair up, taking jewellery off, wiping down surfaces, using anti-bacterial spray on surfaces where there is no food, store food in the fridge.

### Health and safety

Check your time plan and ensure you have added the following throughout:

Oven gloves, checking oven settings, using knife correctly, checking electrical equipment for faults and following safety manual, probing meat to 75c, checking fridge is 0-4c, making sure hot food is served no lower than 63c, no cross-contamination of raw/cooked food.

### Contingencies – these are steps you can put in place if your method is not quite right working

Check your time plan and ensure you have added the following throughout:

Using a hand whisk and then moving to an electric whisk if there are still lumps, adding more flour if the mixture is too sticky, adding more liquid if the mixture is too dry, placing back in the oven if it is not the correct temperature or not baked, mixing for longer if not combined.

<b>AC2.4 Plan</b> production of dishes for a menu	Plan outlines key actions required with some omissions and errors that require amendment. There is limited consideration of contingencies.	Plan has some detail and is mainly appropriate but may have some omissions and errors that require amendment. There is some consideration of contingencies.	Plan has detail with some minor omissions. Plan does not require changes to achieve planned outcome, but would benefit from minor amendments. There are well considered contingencies.	Plan is comprehensive and detailed, incorporating well considered contingencies for most situations.
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# Knowledge organiser AC 2.4

Colour code each dish on the time plan so its clear which you are working on.

<p>9.40</p>	<p>Collect a mixing bowl and begin to combine the cream cheese, tomato puree and chopped tomatoes for the chicken breast filling. Once mixed place in the centre of the chicken breast and gently fold in the sides and slowly roll it up ensuring the filling does not leak out. Place three rashers of bacon on a clean board and roll the bacon around the breast. Place on a baking tray.</p> <p>Remove the sponge from the oven once it is golden brown and ensure it is baked thoroughly, allow to cool.</p>	<p>Wash hands after handling raw meat.</p> <p>Use oven gloves, place on cooling rack.</p> <p>Put peelings in the bin.</p>
	<p>Wash and slice the vegetables and place into boiling water for seven minutes, drain and refresh.</p> <p>Place the chicken breast into the oven and cook for 25-35 minutes 200 degrees.</p> <p>Once the sponge has been removed from the tray, get a round cutter and cut out circles of sponge.</p>	<p>Set the timer</p> <p>Ensure work area and cutter are clean.</p>
	<p>Wash up any equipment that is dirty and clear area and clean workspace.</p> <p>Place sugar and egg whites into a bowl and whisk until light and fluffy to create successful meringues. Place in fridge.</p>	<p>Ensure bowl is clean and dry or meringue won't work. Make sure no yolk in mix.</p>

<p><b>AC2.4 Plan</b> production of dishes for a menu</p>	<p>Plan outlines key actions required with some omissions and errors that require amendment. There is limited consideration of contingencies.</p>	<p>Plan has some detail and is mainly appropriate but may have some omissions and errors that require amendment. There is some consideration of contingencies.</p>	<p>Plan has detail with some minor omissions. Plan does not require changes to achieve planned outcome, but would benefit from minor amendments. There are well considered contingencies.</p>	<p>Plan is comprehensive and detailed, incorporating well considered contingencies for most situations.</p>
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