KNOWLEDGE ORGANISER

£2

NAME & FORM

YEAR 9

SPRING TERM

English Knowledge Organiser – Prejudice Scheme Y 9

Definition of Prejudice

Prejudice = a negative opinion that is
predetermined and is not based on reason or actual experience

Prejudices come from a variety of origins:

- Historical prejudice (slavery, wars, terrorism…)
- Roles in society (women = mothers/housekeepers, men = workers)
- Media depiction
- Family/peer opinions
- Laws and the government (gay and transgender rights)
- Scapegoating (Jews in Nazi Germany)
- Ignorance/lack of education
-

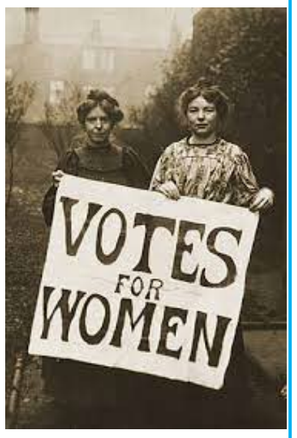
Can you think of any more examples? Write them below:

Slang = informal language that is used in relaxed situations usually verbally.

Slang can often be part of a person's dialect and there is specific examples of slang from different places.

But there is also many common slang words that are used across the world by English speaking people, such as:

- Swear words
- Insults
- Idioms
- Colloquial words such as 'knackered', or 'gobsmacked'



UK DIALECTS

- Scottish
- Geordie
- Scouse
- Yorkshire
- Welsh
- Brummie
- West Country
- R.P (Received Pronunciation)
- Essex
- Cockney

Can you think of any examples of 'slang'?

How has it entered our language?

Slang I use	How it has entered language

Slang enters our language in lots of different ways:

Portmanteau:

- **Email**
- **Hangry**
- **Emoticons**

Acronym:

- **LOL**
- **BRB**

New words:

- **Flex**
- **Binge-watch**

Abbreviations:

- **Brill**
- **Insta**

Repurposing old words:

- **Extra**
- **Wig**
- **Fire**

English Knowledge Organiser Y9 Prejudice Spring 2

Women Rights' Timeline: **Read the key events for the dates below, based on the progress of Women's Rights. Consider which event you think is most significant.**

1660- Margaret Hughes becomes the first professional actress.

1866- A law forbids women to work more than 10 hours a day.

1869- John Stuart Mill publishes his book The Subjection of Women.

1885- Women first play tennis at Wimbledon

1886- Women are allowed to vote in county and borough elections.

1914- Britain gets its first policewomen.

1919- A new law opens certain professions to women.

1922-Ivy Williams is the first woman called to the bar of England and Wales.

1925- Ethel Mary Colman is the first woman Lord Mayor in Britain (of Norwich).

1928- In Britain, all women over 21 are allowed to vote the same as men.

1975- Women gain the right to maternity pay.

1983- Mary Donaldson becomes the first woman Lord Mayor of London.

Look/cover/check
Complete the blank side of the timeline

1680 – 1834
Transatlantic slave trade

1686 – 1733
Nanny of the Maroons leads escaped Jamaican slaves

1841 - 1853
Solomon Northup kidnapped into slavery for 12 years

1854 - 1857
Mary Seacole nurses soldiers in the Crimean war

Task: *LOOK/COVER/SAY*

- Label the class pyramid
- Define and give examples of each class

Upper class

- ✓ Rich; usually inherits wealth
- ✓ Aristocracy (earls, dukes etc)
- ✓ Private schools, country houses

Middle class

- ✓ Professional/ highly educated
- ✓ Doctors, teachers, skilled tradesperson such electrician etc

Lower/ working class

- ✓ Lower income
- ✓ Usually less formal education
- ✓ Often manual work
- ✓ Shop assistant,

Key vocabulary: colonialism = forcibly taking over or controlling another country

Examples of four *countries that were part of the British Empire.*

1. Canada
2. India
3. United Kingdom
4. Australia

Look/Cover/Say

1. **Passionate** = feels/believes strongly
2. **Endurance** = stamina/resilience
3. **Determined** = strong resolve
4. **Courageous** = Brave
5. **Resourceful** = can overcome difficulties
6. **Independent** = doesn't need others

Look/Cover/Say

1. **Passionate** =
2. **Endurance** =
3. **Determined** =
4. **Courageous** =
5. **Resourceful** =
6. **Independent** =

English Knowledge Organiser The Great Debate SUM1

Use of prompt cards	Use researched ideas.	Use of persuasive language techniques.	Body language and facial expression	Variation of tone in your voice.	Use of Standard English and complex vocabulary.
Helps create eye contact with the audience.	This will give you a convincing argument.	This will engage and hook your audience.	It will engage the audience and give you greater presence.	It can show emotion and your passion.	It shows you are well informed on the topic and confident.

What words can you use to impress your audience? Here are a few to get you started…

Devastating	Severity	Stereotyped	Violence	Witness	Disturbingly
Controversial	Crisis	Prejudiced	Abusive	Perpetual	Atrocious
Alarmingly	Stigma	Discriminatory	Substantial	Nonsensical	Deliberate

Which vocabulary can you use to move your speech along?

At the beginning: Firstly, primarily, I'd like to begin with, to start with…

To build your argument: Furthermore, on top of this, in addition to, moreover…As a result…

To bring in a counter argument: It could be argued… although some may disagree… understandably, sometimes… outrageously, some say…

To finish: In conclusion… Finally…To sum up…In summary…

The 5 S's.

Stride: Walk to the platform with energy and purpose.

Stand: Don't distract your audience in the first instance by moving around- get them to focus on you.

Smile: It relaxes you and helps you engage with the audience.

Speak: Be ready to start speaking- you are in control

Stay: When you have finished, look around, nod or smile and take applause before leaving the stage.

Spelling Bee Words:

Reaction- A response to something.

Controversial- Something easy to argue.

Informative-Provides facts/statistics.

Topical- Something of interest.

Underestimate- Think less of something.

Statistically- Based on a numerical fact.

Nationally- Around the nation

Political- relating to the government.

Argumentative- Likes to disagree.

Confrontation- A hostile or argumentative situation.

Persuasive techniques:

Tick these off as you use them.

- **Direct address**-using words like 'you' to the audience.
- **Alliteration-** repeating the same starting letters for effect.
- **Rhetorical Question-** a question that is not expected to be answered.
- **Facts and statistics-** e.g. 1 in 10 of us, 30 000 people…
- **Anecdote-** a personal story.
- **Expert opinion-** a quote from a doctor, professor etc.
- **Figurative language-** use metaphors, similes etc for effect.
- **Repetition**- repeating a word or phrase for effect.
- **Rule of 3-** Using three words in a list for effect.
- **Emotive language-** Words that create an emotive response.

Successful ways to open a speech…

Quote

Opening with a relevant quote can help set the tone for the rest of your speech. *E.g. "Yesterday is not ours to recover, but tomorrow is ours to win or lose."*

"What If" Scenario

Immediately drawing your audience into your speech works wonders. Asking a "what if" question invites the audience to follow your thought process. *E.g. What if you woke up every morning, cold, shivering on the street?*

"Imagine" Scenario

A similar method, but more relevant for sensational examples. It puts your audience members directly into the presentation by allowing each member to visualize an extraordinary scenario. *E.g. Imagine a world where everybody was treated equally…*

Question

Ask a rhetorical or literal question. *How would you feel if you had to walk ten miles every morning…?*

Statistic

Use a surprising, powerful, personalized statistic that will resonate with the audience to get your message across right away *e.g. 1 in 2 people get cancer…*

Powerful Statement/Phrase

A statement or phrase can catch the audience's attention by keeping them guessing as to what you're about to say next. *E.g. half of the world's coral reef has been destroyed in the last 30 years.*

How to structure the rest of your speech?

1)Begin by explaining the points you will make. *E.g. Today, I will be sharing with you…*

2)Begin your first argument, using a range of persuasive devices. *Firstly, can you believe that…*

3)Bring in a shocking fact for your audience to remember. *E.g. Shockingly, a startling 60 %..*

4)Introduce a counter argument. *E.g. while many may argue that…*

5)Bring in another argument. *Furthermore…*

6)Bring In one final argument. *As a result…*

7)Conclude by really emphasising your personal view. *E.g. in conclusion, the main thing I want you to remember is…*

Watercolour painting

Key tips:

- Start light and build up the dark colour.
- Allow each section to dry before adding more paint.
- If you overwork your paper it will bobble and rip.
- Watercolour painting is like Shrek- it has layers!

KEY WORDS – test yourself! (definitions on the next page)
Shadow- Highlight- Tone- Cross hatching- Hatching- Mark Making- Layering- Shape- Form- Detail

Artist Research

Year 9 Spring term

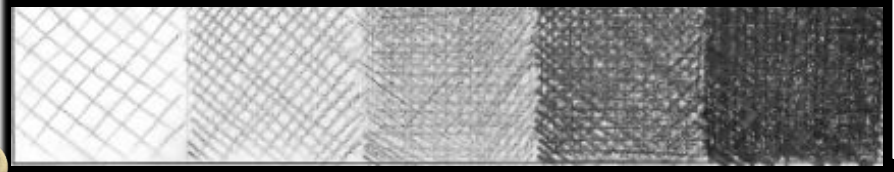
Mark Making techniques

Stippling

Hatching

Scumbling

Cross hatching



In the style of:

When creating a piece of art in the style of an artist it is very important you thoroughly understand their techniques in order to copy them effectively.
Besides using their techniques, you also need to take pride in your work and be as neat as possible. Here are some things to consider:

- Have you layered up mark making?
- Have you paid attention to detail?
- Have you shown highlights and shadows?
- Are the proportions correct?
- Have you used a combination of hatching and cross hatching?
- Is your work as neat as it can be?

KEY WORDS AND MEANINGS:	
Mark Making	The different lines, dots, marks, patterns, and textures we create in an artwork.
Hatching	A shading technique which uses a series of thin, parallel lines that give the appearance of shadow in varying degrees.
Cross hatching	The drawing of two layers of hatching at right-angles to create a mesh-like pattern.
Stippling	The creation of a pattern simulating varying degrees of solidity or shading by using small dots.
Scumbling	Scumbling is a shading technique achieved by overlapping lots of little circles.
Tone	Tone in art simply refers to how light or dark a colour is. Each colour has an almost infinite number of tones.
Layering	Simply placing one layer of colour/material/tone/technique over another.
Form	Form refers to objects that are 3-Dimensional, or have length, width, and height.
Highlight	The lightest part or one of the lightest parts of a painting, drawing, etc.
Shadow	A dark area where light from a light source is blocked by an opaque object.

Colour code: BLUE= Tier 3 words ORANGE= Tier 2 words Look out for colour coding during lessons!

Drama Knowledge Organiser

Year 9 Hamilton/Theatre Design Knowledge Organiser

Keywords:

Episodic Theatre – Scenes that stand alone and are constructed in small chunks, rather than creating a lengthy and slow build of tension

Ensemble – A group of actors who work together to create/perform a show

Evaluation - To evaluate something is to measure its worth. To evaluate drama and theatre you must be able to recognise what was and wasn't successful onstage and recognise all the elements that contribute to the impact of a production

Connotations - Refers to a meaning that is implied by a word apart from the thing which it describes explicitly

Musical Theatre - a form of theatrical performance that combines songs, spoken dialogue, acting and dance.

Previously learnt keywords and terminology

Synchronisation Monologue Soliloquy Thought tracking Multi-role Flashback Still image Narration Split focus Pitch Pace Pause Tone Volume Accent Gesture Posture Facial Expressions Projection Diction

Lighting

Spotlight Fresnel Birdie Strobe Gels Par can Flood Follow spot Gobo

Lin Manuel Miranda wrote and starred in Hamilton. Hamilton averages a whopping 144 words per minute with **20,520** total words!

Roles & responsibilities of the theatre

* Set Designer
* Costume Designer
* Director
* Lighting Designer
* Sound Designer
* Performer
* Stage Manager
* Understudy
* Technician

Alexander Hamilton
1757 - 1804

Evaluation sentence starters

I thought it was effective…

The piece was successful….

They achieved their objective…

I was unsure about…

I wasn't keen on…

An area to develop is…

A positive aspect was…

A negative aspect was…

List the songs you have listened to from Hamilton

* **Alexander Hamilton**
* **10 Duel Commandments**
* **You'll be back**
* **Aaron Burr Sir**
* **Schuyler Sisters**
* **Guns and Ships**
* **Helpless**
* **A Winter's Ball**

Stage Positioning		
Upstage Right	Upstage Centre	Upstage Left
Centre Stage Right	Centre Stage	Centre Stage Left
Downstage Right	Downstage Centre	Downstage Left

Audience

Stage Configurations

Proscenium Arch

Theatre in the Round

Thrust

Traverse

Promenade

The Schuyler Sisters

Arron Burr

George Washington

Thomas Jefferson & James Maddison

Drama Knowledge Organiser

Script Writing and Devising

How do we format a script?

Characters are always typed in capital letters and in Bold, followed by a colon.

Stage directions within dialogue are typed in *italics* and in brackets.

LINDA: *(frustrated)* Have we come all this way just to look at the bleedin' estate? Mickey, we're fourteen.

LINDA beams at him. MICKEY can't take it and looks the other way.

MICKEY: Look

LINDA: What?

MICKEY: There's that lad lookin' out the window. I see him sometimes when I'm up here.

LINDA: Oh…he's gorgeous, isn't he?

MICKEY: What?

Stage directions are typed in *italics.*

Dialogue is indented from the character name.

KEYWORDS:

Devising	Performance
Stimulus	Audience
Character	Playwright
Brainstorm	Dialogue
Structure	Theatre

DEVISING TECHNIQUES:

Tableau	Monologue
Slow Motion	Narration
Thought-track	Direct Address
Flashback/forward	Role-Play
Split-focus	Multi-role

How do we devise?

BICS!

Devising

STRUCTURE
- Create a story board to come up with your story
- Highlight your key scenes and keep them in the piece

BRAINSTORM
- Themes
- What is your educational message?

IMPROVISE
- Don't just talk through – get up and just try out a scene
- Try different genres. The scene could work better as a comedy or more serious

Characters
- How do you know each other?
- Name /age

Minimalist Music

Year 9: Term 2

Key Vocabulary Minimalism Ostinati Phasing Diatonic Synchronisation Looping Transformation Counterpoint Motif/cell Static Harmony Polyrhythms

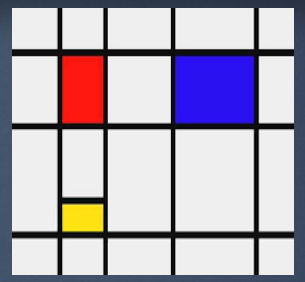
Background

- Emerged in America 1960's
- Famous composers include Steve Reich, Terry Riley and Philip Glass
- Was completely different in that it was experimental – using unusual sounds and very limited musical material.


Steve Reich


Terry Riley


Philip Glass



"The idea of minimalism is much larger than many people realize. It includes, by definition, any music that works with limited or minimal materials: pieces that use only a few notes, pieces that use only a few words of text, or pieces written for very limited instruments, such as antique cymbals, bicycle wheels, or whiskey glasses. It includes pieces that sustain one basic electronic rumble for a long time. It includes pieces made exclusively from recordings of rivers and streams. It includes pieces that move in endless circles. It includes pieces that set up an unmoving wall of saxophone sound. It includes pieces that take a very long time to move gradually from one kind of music to another kind. It includes pieces that permit all possible pitches, as long as they fall between C and D. It includes pieces that slow the tempo down to two or three notes per minute."
Tom Johnson – Minimalist Composer

Key principles of Minimalist Music:

- Based around a small idea –cell/ motif
- Constantly repeated elements – Ostinati
- Slight changes over time to become more complex (changes in dynamics, rhythms, adding notes to a melody etc.
- Building layers of sounds to create a thicker texture
- Using multiple rhythms at the same time

Listening Examples Steve Reich 'Clapping Music' - https://www.youtube.com/watch?v=QNZQzpWCTIA Philip Glass 'Music for 18 Musicians' - https://www.youtube.com/watch?v=PMsYuFrKUQ8 Daniel Bernard Roumain 'Metamorphosis' - https://www.youtube.com/watch?v=m3KDUCfAeHE&list=PLpTG9WYImrmVzxzJlkPUbQtPFyCfSOS9P Videos BBC 'Tones, Drones and Arpeggios' An interview with Philip Glass - https://www.bbc.co.uk/programmes/p05zf7xn

KEY WORDS AND MEANINGS (Tier 2 words in ORANGE, Tier 3 words in BLUE)	
Ostinati	Musical repetition
Counterpoint	Melodies that are against other melodies (played at the same time)
Polyrhyhms	Many rhythms played at the same time
Looping	When referring to old fashioned tape recorders – you literally loop a piece of tape so it repeats the music over and over
Phasing	When two melodies or rhythms go out of synch and back in synch again
Minimalism	A style in music that is repetitive, has gradual changes and is hypnotic
Static Harmony	Groups of notes that do not change much
Synchronisation	Bringing sounds together at the correct time
Motif/cell	A short melody/musical idea
Metric Displacement	Moving a melody to another art of the beat

Geography Knowledge Organiser — Unit 3 – Climate

Key concepts / words

Glacials – Colder periods of Earth's history with large ice sheets covering a large amount of the Earth.

Interglacials – Warmer periods of Earth's history without large ice sheets.

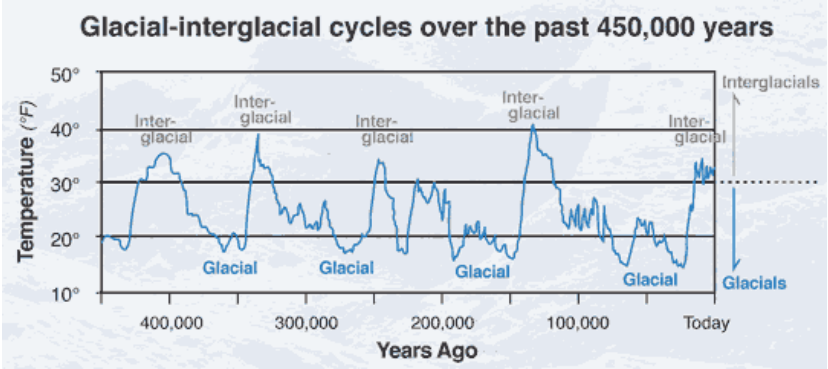
Solar radiation – The energy emitted by the Sun.

Deforestation – The cutting down of trees on a large scale.

Afforestation – the process of planting large numbers of trees on land which has few or no trees on it.

Atmosphere – a mixture of gases that surrounds the Earth. It helps make life possible by providing us with air to breathe, shielding us from harmful ultraviolet (UV) radiation coming from the Sun, trapping heat to warm the planet, and preventing extreme temperature differences between day and night.

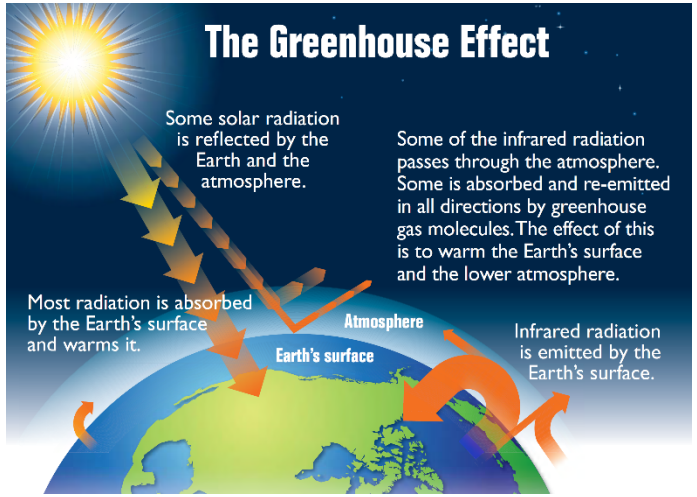
Fossil fuels – A fossil fuel is a hydrocarbon-containing material such as coal, oil, and natural gas, formed naturally in the Earth's crust from the remains of dead plants and animals that is extracted and burned as a fuel.



Throughout Earth's history, the climate has undergone natural cycles of climate change. The Earth would plunge into an "Ice Age" or "glacial" period, where massive sheets of ice covered much of the land. Eventually, the climate warmed, entering "interglacial" periods, allowing the ice to melt and plant and animal life to flourish. Over the past few hundred years, however, humans have significantly influenced the climate. The Industrial Revolution brought increased burning of fossil fuels, releasing heat-trapping gases and making the climate change faster than it naturally would.

Skill: analysing graphs – use **TEA**
Trend – The overall shape/pattern of the graph.
Evidence – Pick out specific data that fits into this pattern.
Anomaly – Any unusual data which does not fit the pattern.

The greenhouse effect - a natural process that warms the Earth's surface by trapping some solar radiation in the atmosphere, creating a temperature range suitable for life. Greenhouse gases, like carbon dioxide and methane, play a crucial role in this process by absorbing and re-radiating heat.



Human causes of climate change	Physical causes of climate change
1. Burning fossil fuels - The combustion of fossil fuels, such as coal, oil, and gas, releases large amounts of greenhouse gases, particularly carbon dioxide, into the atmosphere. This enhanced greenhouse effect traps more heat, leading to global warming and climate change. Human activities, like manufacturing and transportation, significantly contribute to these emissions. 2. Deforestation involves the clearing of forests, reducing the number of trees that absorb carbon dioxide. This contributes to an imbalance in the carbon cycle, as fewer trees are available to convert CO2 into oxygen. The released carbon, combined with the loss of a crucial carbon sink, amplifies the greenhouse effect and accelerates climate change. 3. Livestock farming, particularly cattle, produces methane during digestion and through manure decomposition. Methane is a potent greenhouse gas that contributes to global warming.	1. Volcanic activity - volcanoes release large amounts of gases, including carbon dioxide and sulfur dioxide, into the atmosphere during eruptions. These emissions can temporarily influence climate by reflecting sunlight back into space and cooling the Earth. 2. Variations in Earth's orbit - Earth's orbit changes over long periods, affecting its distance from the sun. These variations, known as Milankovitch cycles, can influence the Earth's climate by changing the amount and distribution of solar radiation, contributing to the onset of ice ages or interglacial periods. 3. Sun spots - In a cycle lasting around 10 years, sunspots will appear of the surface of the sun. The more dark spots appear, the more solar radiation is emitted, and therefore the earth receives more heat from the sun. This can cause a period of increased heating. If the sunspots are less numerous, the earth's climate may decrease.

Geography Knowledge Organiser

Unit 4 - Resources

Key concepts / words

Malnourishment – lack of proper nutrition, caused by not having enough to eat or not eating enough of the right things.

Poverty – lacking the financial resources and essentials for a minimum standard of living. Poverty-stricken people and families might go without proper housing, clean water, healthy food, and medical attention.

Fracking - drilling down underground and injecting a mixture of water, sand and chemicals into cracks in rocks at extremely high pressures. This releases the gas, making it available for collection and use.

Shale gas - a form of natural gas (mostly methane), found underground in shale rock.

Food insecurity

A situation where someone cannot reliably get the food and/or nutritional requirements they need to survive and thrive. What causes food insecurity?:

- Desertification, the process by which fertile land becomes arid and infertile makes it almost impossible to grow crops, making it difficult for communities to sustain themselves.
- Millions live with hunger and malnourishment because they simply cannot afford to buy enough food, cannot afford nutritious foods or cannot afford the farming supplies they need to grow enough good food of their own. Hunger can be viewed as a dimension of extreme poverty.
- Wars and political instability disrupt food production, distribution, and access, often displacing communities and creating conditions where obtaining sufficient and reliable food becomes a significant challenge, leading to food insecurity.

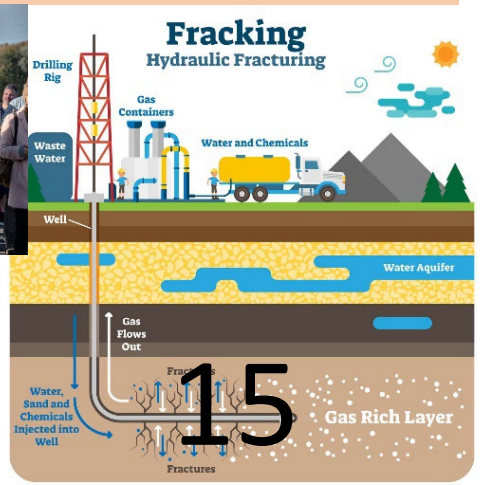
What can be done to combat food insecurity?

1. Reduce growth in demand for food and other agricultural products.
2. Increase food production without expanding agricultural land.
3. Protect and restore natural ecosystems
4. Increase fish supply.
5. Reduce greenhouse gas emissions from agricultural production.

The opportunities and challenges of fracking

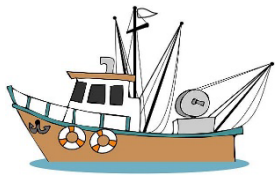
Opportunities	Challenges
• Shale gas is readily available in the UK • Will act as a bridging fuel until alternative technologies are developed. • The growth in the fracking industry can create more jobs.	• Contaminated water is pumped back into the ground and can affect water supplies. • Fracking uses a lot of energy. • 3% of the gas extracted is lost to the atmosphere – this is methane which is a greenhouse gas. • Can cause small earth tremors.

Energy company Cuadrilla started fracking in Preston New Road after the government overturned the council's refusal of permission for hydraulic fracturing to be carried out on the site. This led to lengthy protests from environmental groups and local communities.
Fracking was banned at the site following concerning tremors in 2019. The government issued a Plug and Abandonment notice on the two Preston New Road wells operated by Cuadrilla on 9 August. The company now has until 30 December, 2024 to finish drilling.

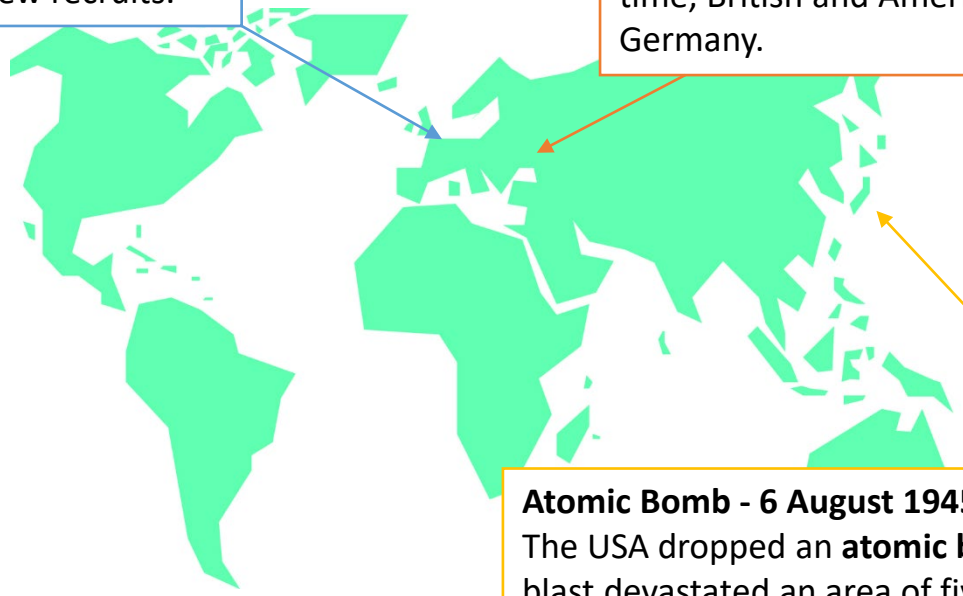


History Knowledge Organiser: *Turning point of World War 2*

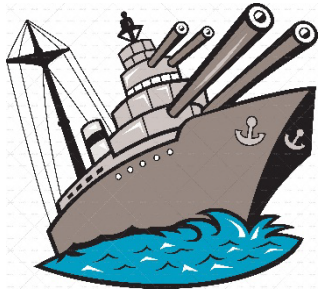
Dunkirk - 26 May to 4 June 1940 The Battle of Dunkirk was fought around the French port of Dunkirk during the Second World War, between the Allies and Nazi Germany. As the Allies were losing the Battle of France on the Western Front, the Battle of Dunkirk was the defence and evacuation of British and other Allied forces to Britain. By saving the British expeditionary Force, the British government had kept its professional army alive. It would be able to fight in future battles and train new recruits.



Stalingrad - <u>July 1942 – February 1943</u>
In the USSR, after 4 months of very fierce fighting in the city of Stalingrad, a large proportion of the German army surrendered. Gradually, Soviet forces (the USSR's forces) began to push the German army out of the USSR and back towards Germany. This was the first time the Germans had retreated in large numbers. At the same time, British and American bombers began air raids on Germany.



Pearl Harbour – 7th December 1941
The attack on Pearl Harbour was a surprise military strike by the Imperial Japanese Navy Air Service upon the United States (a neutral country at the time) against the naval base at Pearl Harbour in Honolulu, Hawaii. Hundreds of Japanese fighter planes descended on the base, where they managed to destroy or damage nearly 20 American naval vessels, including eight battleships, and over 300 airplanes. More than 2,400 Americans died in the attack, including civilians, and another 1,000 people were wounded. The attack led to the United States' formal entry into World War II the next day.



Atomic Bomb - 6 August 1945
The USA dropped an **atomic bomb** on the Japanese city of Hiroshima. The blast devastated an area of five square miles, destroying more than 60 per cent of the city's buildings and killing around 140,000 people. Three days later the USA dropped a second atomic bomb on the Japanese city of Nagasaki, killing around 74,000 people. The official US justification for the dropping of the two atomic bombs was to force the Japanese government to surrender, which it did on 14 August 1945. Some historians have speculated that the bombs might also have had another purpose - to send a warning to the Soviet Union about the strength of the American military

History Knowledge Organiser: *Holocaust and Genocide*

Timeline: Persecution of the Jewish community

1933

•The **SA** organised a **boycott** of Jewish shops and businesses.

•Books by Jewish authors were publicly burnt.

•Jewish civil servants, lawyers and teachers were sacked, and Jewish doctors and dentists could not treat **Aryans**.

•Science lessons about race were introduced which **taught that Jews were subhuman.**

1934

•Jewish shops were marked with a **yellow star**.

•Jews had to sit on separate seats on buses and trains. Many councils banned them from public spaces.

1935

•The **Nuremberg Laws** stripped Jews of German citizenship, outlawed marriage and sexual relations between Jews and Germans, and removed all the civil and political rights of the Jews. These laws were to be the foundation for much of the extreme persecution which took place later.

1938

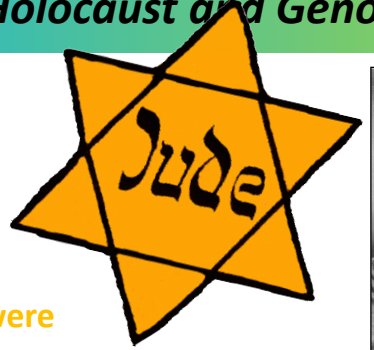
•Jews were ordered to register all wealth and property.

•Jews were forced to change their first names: males would be known as Israel, females as Sarah.

•**Kristallnacht** - *9 November* (The Night of Broken Glass). The **SS** organised attacks on Jewish homes, businesses and synagogues in retaliation for the assassination of the German ambassador to France by a Jew. During Kristallnacht, 400 synagogues and 7,500 shops were destroyed. Jews were then made to clear up the destruction on their hands and knees and pay a fine of one billion marks to the government. The remaining Jewish property was then confiscated.

1939

•The Nazis, who had been encouraging Jews to emigrate from 1933 onwards, now started "forced" emigration.



Scan the QR code to watch a short clip on Jewish persecution

Adolf Hitler – leader of the Nazi Party. He was a **great orator** (public speaker) who hypnotised his audiences. In his writings and speeches talked of destroying the Jewish race and passed laws against Jewish people. His **anti-Semitic beliefs** and policies were implemented soon after the Nazis came to power. He believed the **Aryan race** to be superior,

Heinrich Himmler was the Head of the SS. He was in overall charge of the *'Final Solution' and* believed that he was carrying out Hitler's instructions to exterminate the Jews. He made sure news about camps were secret; and had propaganda films made showing how well Jews were being treated.

German people of all jobs and backgrounds saw the Jews were being treated differently and did not protest. Many had even stopped buying goods at Jewish stores. Only a small number of German people stood up for the Jews.

Anne Frank was a German girl and Jewish victim of the Holocaust who is famous for keeping a diary of her experiences. Anne and her family went into hiding for two years to avoid Nazi persecution

History Knowledge Organiser:

Holocaust and Genocide

Death camps

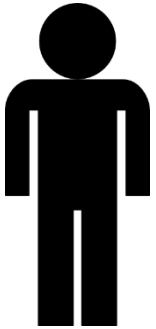
All over the world, Auschwitz has become a symbol of terror, genocide, and the Holocaust
The Germans isolated all the camps and sub-camps from the outside world and surrounded them with barbed wire fencing. All contact with the outside world was forbidden.

Key words:

Holocaust - the mass murder of Jewish people under the German Nazi regime during the period 1941–5. More than 6 million European Jews, as well as members of other persecuted groups such as Romani, gay people, and disabled people, were murdered at concentration camps such as Auschwitz.

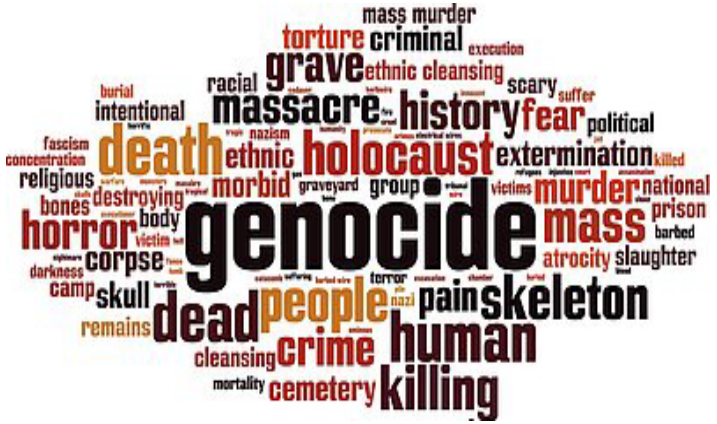
Genocide – The deliberate killing of a large number of people from a particular nation or ethnic group with the aim of destroying that nation or group.

Hitler's hate list



- Jewish people
- Gypsies (Sinti and Roma)
- Disabled people
- Homosexuals
- The 'Rhineland Bastards' (African/German heritage)
- Jehovah Witnesses
- THE ASOCIALS: anti-Nazis, communists, trade unionists, the homeless, prostitutes, alcoholics

Hitler played on fears that one day Germans would be outnumbered by inferior peoples



During the **Rwandan genocide** of 1994, members of the Hutu ethnic majority in the east-central African nation of Rwanda murdered as many as 800,000 people, mostly of the Tutsi minority. Started by Hutu nationalists in the capital of Kigali, the genocide spread throughout the country with shocking speed and brutality, as ordinary citizens were encouraged to take up arms against their neighbours. By the time the Tutsi-led Rwandese Patriotic Front gained control of the country through a military offensive in early July, hundreds of thousands of Rwandans were dead and 2 million refugees fled Rwanda.

The **Cambodian Genocide** was the murder of millions of Cambodians by the Khmer Rouge. The Khmer Rouge were led by Pol Pot and held radical totalitarian beliefs. They wanted to create a classless, rural, agricultural society where personal property, currency, religion and individuality did not exist. People associated in any significant way with the previous government, religion, or education were targeted for persecution, imprisonment, torture and murder. Some Cambodians were also exploited as forced labourers by the regime and died as a result of over-work and malnutrition. Ineffective rulers and their economic mismanagement caused significant shortages of food and medicine. Hundreds of thousands of Cambodians began to die from hunger caused by the famine and treatable diseases such as malaria .

RE Knowledge Organiser. Relationships

Key concepts / words

Gender Equality – All genders have the same rights

Responsibilities – Actions or duties you are expected to carry out.

Roles – The position of a person

Sacrament – an outward sign of an inward blessing / a ceremony blessed by God

Families and gender roles

Families are important in Christianity and essential for society. Through the family, values are learnt and faith is developed. Children should respect their parents as the 10 commandments teach ***'honour your mother and father'.***
Men and women should have equal roles as all God's creation and ***'God made man in His image'.***

Equal	Not equal
Jesus first revealed himself to women after his resurrection. ***'God made man in His image'*** – all equal ***'Neither Greek or Jew, slave or free, male of female, all one in Jesus'.*** – all equal Islam – ***'All equal as the teeth of a comb'*** – all equal	Jesus's disciples were men. Women are not ordained in the Catholic Church St Paul refers to '***women should learn in quietness***' and that women should not teach or assume '***authority over a man***'. In Islam women cannot be **Imams**. Men and women worship separately in the Mosque.

Adultery - Having sexual relations with someone other than your marriage partner.
Not allowed and a sin. Breaks the marriage vows and the 10 commandments teach ***'do not commit adultery'.***
Adultery may harm the family unit. In Islam it goes against the unity and peace of the Ummah and Muslims believe you will be judged in the afterlife on your actions in this life.

Marriage

Marriage is considered as God's intention – Adam and Eve were married.
Marriage is a **sacrament** and blessed by God.
Vows are taken to show commitment for example ***'till death do us part'.***
Marriage is the place to raise a family and have sex.

Divorce and remarriage

Catholics believe only death can end a marriage ***'til death do us part'.*** The sacrament with God is broken. The Bible teaches '***what God has joined together let no man separate'.***
Remarriage is seen as adultery and a sin ***'do not commit adultery'.***
Foe other Christians divorce maybe the 'lesser of two evils' for example if abuse or adultery has been committed – Jesus taught care and compassion 'Love your neighbour'.
In Islam divorce is a last resort and a three month reconciliation period must happen – **Iddah** period. Qur'an teaches '***Of all lawful things, divorce is the most hated by Allah'.***
A dowry provided at marriage in case of divorce and remarriage is allowed.

Key concepts / words

Adultery – Having sexual relations with someone other than your marriage partner

Divorce – Legally ending a marriage

Cohabitation - To live together in a sexual relationship without being married or in a civil partnership

Commitment - A sense of dedication and obligation to someone or something

Contraception - Methods used to prevent a woman from becoming pregnant during or after sexual intercourse

Purpose of sex	Sex is a gift from God. After the creation of human life God gave the blessing to ***'be fruitful and multiply'.*** Sex should take place within a committed relationship such as marriage. ***'One flesh'*** – you should only have one sexual partner and that should be once you are married. Many Christians believe in **Chastity**, the belief in no sex before marriage. Adultery is forbidden and the 10 commandments teach ***'Do not commit adultery'.*** Within Islam sex is a gift from Allah to reproduce and should be used within marriage. It is a Muslims duty to have children to strengthen the **Ummah.**
Contraception 	Catholics do not agree with the use of contraception as it goes against the **sanctity of life** belief that God creates all life, contraception interferes with God's plan. The purpose of sex is to ***'be fruitful and multiply'*** contraception stops procreation. Some believe contraception devalues sex and encourages **promiscuity**. However, there is nothing in the Bible that forbids the use of contraception. Many ***'Your body is a temple'*** – contraception helps to protect your body from unwanted STIs. Christians and Muslims will allow if both partners agree. Muslims will not allow contraceptives that can potentially harm the body.
Same sex relationships  	Many Christians oppose same sex relationships on Biblical grounds. They believe God intended for man and woman to be in a committed relationship because God created **Adam and Eve**. The Bible teaches ***'No man should lie with another as he would a woman'***. This is interpreted to mean same sex relationships are wrong. Also the purpose of sex is to reproduce '***be fruitful and multiply***' same sex couples cannot do this. However, Jesus taught ***'love',*** he didn't say who you had to love. Others would argue that '***God made man in His image'*** and that we are all created equally and the way in which God intended. Same sex relationships are **haram** and forbidden in Islam. Sex should only take place between a man and woman.

RE Knowledge Organiser. Human Rights

Key concepts / words

Prejudice – Pre judging – judging people to be inferior or superior without a cause

Discrimination – Acts of treating groups of people, or individuals differently, based on prejudice

Censorship - The practice of suppressing and limiting access to materials considered offensive or a threat to security. People maybe restricted by censorship laws.

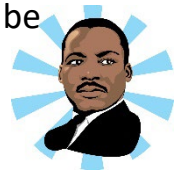
Personal Conviction - Something a person strongly feels of believes in

Relative poverty - A standard of poverty measured in relation to the standards of society in which a person lives.

Religious expression -

Prejudice and discrimination are unacceptable in Christianity. They go against religious teachings of equality. ***'God made man in His image'.*** Jesus didn't discrimination in the **Parable of the Good Samaritan** and taught '***Love your neighbour'.*** The Bible also teaches ***'There is neither Greek or Jew, slave or free, male or female, all one in Jesus'***. The **Golden Rule** states to treat others as you would want to be treated. In Islam all people are equal as they are **all Allah's creation**. The teaching ***'All equal as the teeth of a comb'*** promotes equality.

Personal Conviction is something a person strongly believes in and their actions may conflict with the law or authroity **Martin Luther King** had a personal conviction for racial equality. He led peaceful protests, used speeches, sit ins and non violence to fight against injustice. He believed all should be equal as we are all ***'Made in God's image'***. He also followed the example of Jesus ***'Love your neighbour'.***



Malala Yousafzai strongly believed girls in Pakistan deserved an education as this is her human right. She went against the authority if the Taliban in Pakistan who were not allowing girls an education. She was shot three times by the Taliban while on the school bus. Islam teaches 'All equal as the teeth of a comb' and we are all Allah's creation so should therefore be treated equally and are entitled to our human rights.

Wealth and Charity

Christians believe people should use their wealth to support others and they will be **rewarded in the afterlife**. The Bible teaches ***'It is easier for a camel to pass through the eye of a needle than for a rich man to get into heaven.'***

Christians also believe they should support those in need and charities as Jesus taught ***'love your neighbour'.*** **Parable of the Good Samaritan** teaches us to help those in need.

Christian Aid aim to end poverty and injustice.

Muslims believe **wealth is gift from Allah** and should be used correctly. You will be judged on how you have used your wealth. Muslims are expected to give **Zakah**. This is the third pillar of Islam and it is a Muslims duty to give 2.5% of wealth to charity to help those in need. They follow the example of the **Prophet Muhammad.** **Islamic relief** is an example of an Islamic charity.

Maths Knowledge Organiser

GRAPHS LINEAR AND QUADRATIC EQUATIONS

Key Concepts

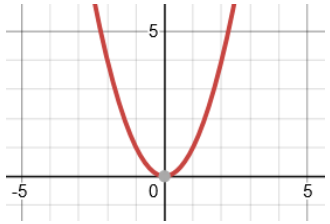
Straight line graphs always have the equation:

$$y = mx + c$$

m is the **gradient** i.e. the steepness of the graph.

c is the **y intercept** i.e. where the graph cuts the y axis.

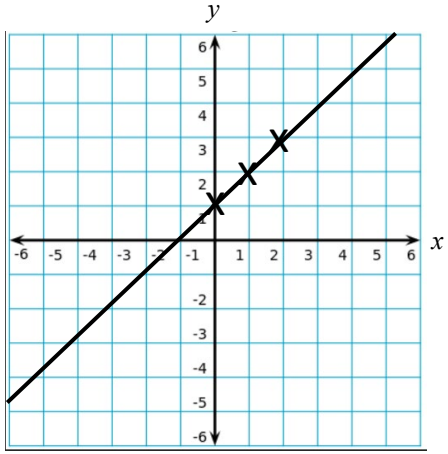
A **quadratic** graph will always be in the shape of a parabola.

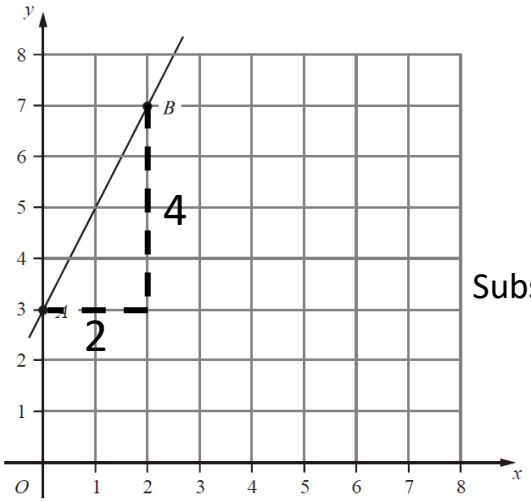


Examples

Plot the graph of $y = x + 1$

x	0	1	2
y	1	2	3





Calculate the equation of this line:

$$y = mx + c$$

$$m = \frac{4}{2}$$

$$= 2$$

$$y = 2x + c$$

Substitute in a coordinate: (2,7)

$$7 = (2 \times 2) + c$$

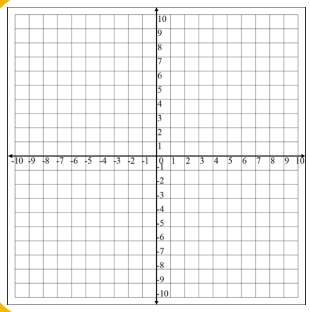
$$3 = c$$

$$y = 2x + 3$$

Y9 F/H

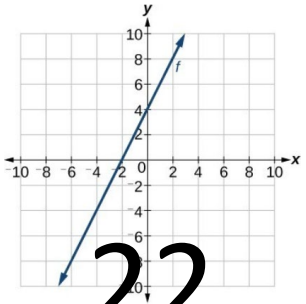
Key Words

Coordinate
Gradient
Quadratic
Y-intercept
Roots
Turning-point
Solution



1) Plot the line $y = 3x - 2$

2) Find the equation of the line for the attached graph.



ANSWERS: 2) $y = 2x + 4$

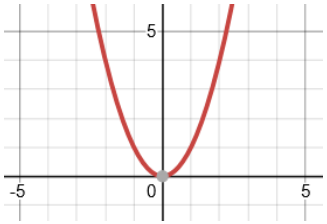
Maths Knowledge Organiser

QUADRATIC GRAPHS

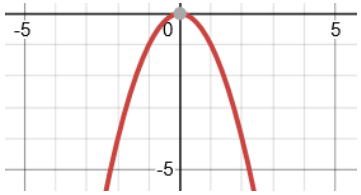
Key Concepts

A quadratic graph will always be in the shape of a parabola.

$y = x^2$

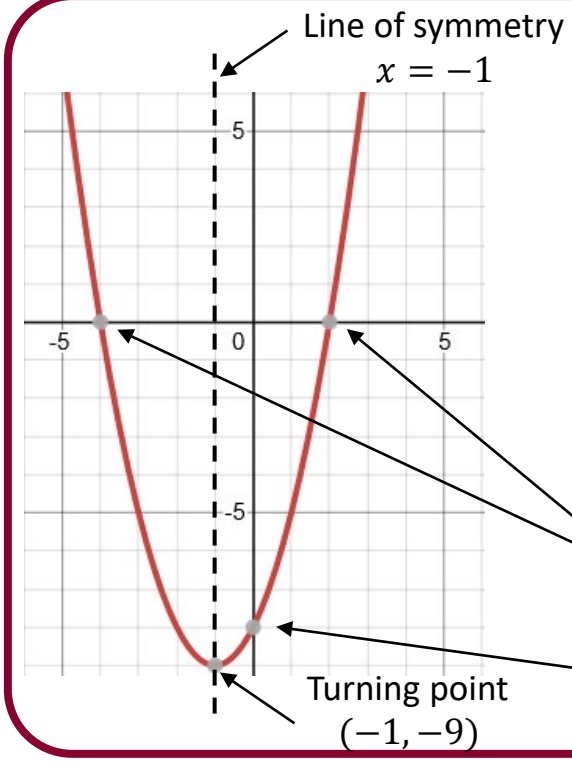


$y = -x^2$



The roots of a quadratic graph are where the graph crosses the x axis. The roots are the solutions to the equation.

Examples



$$y = x^2 + 2x - 8$$

A quadratic equation can be solved from its graph.
The roots of the graph tell us the possible solutions for the equation.
There can be 1 root, 2 roots or no roots for a quadratic equation. This is dependant on how many times the graph crosses the x axis.

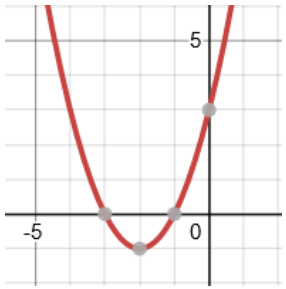
Roots $x = -4$
$x = 2$

y intercept = -8

Y9

Key Words

Quadratic
Roots
Intercept
Turning point
Line of symmetry



Identify from the graph of $y = x^2 + 4x + 3$:

1) The line of symmetry
2) The turning point
3) The y intercept
4) The two roots of the equation

ANSWERS 1) $x = -2$ 2) $(-2, -1)$ 3) 3 4) $x = -1$ and $x = -3$

Maths Knowledge Organiser

PERCENTAGE CHANGE AND REVERSE PERCENTAGE

Key Concepts

Calculating percentages of an amount without a calculator:

10% = divide the value by 10
1% = divide the value by 100

Calculating percentages of an amount with a calculator:

Amount × percentage as a decimal

Calculating percentage increase/decrease:

Amount × (1 ± percentage as a decimal)

Percentage change:

A dress is reduced in price by 35% from £80. What is it's **new price**?

$Value \times (1 - percentage\ as\ a\ decimal)$
= $80 \times (1 - 0.35)$
= £52

A house price appreciates by 8% in a year. It originally costs £120,000, what is the **new value** of the house?

$Value \times (1 + percentage\ as\ a\ decimal)$
= $120{,}000 \times (1 + 0.08)$
= £129,600

Reverse percentages: This is when we are trying to find out the original amount.

A pair of trainers cost £35 in a sale. If there was 20% off, what was the **original price** of the trainers?

$Value \div (1 - 0.20)$
= $35 \div 0.8$
= £43.75

A vintage car has increased in value by 5%, it is now worth £55,000. What was it worth **originally**?

$Value \div (1 + 0.05)$
= $55{,}000 \div 1.05$
= £52,380.95

Examples

Y9 F/H

Key Words
Percent
Increase/decrease
Reverse
Multiplier
Inverse

1a) Decrease £500 by 6%
b) Increase 70 by 8.5%
2) A camera costs £180 in a 10% **sale**. What was the **pre-sale** price
3) The cost of a holiday, including **VAT** at 20% is £540. What is the **pre-VAT** price?

24

ANSWERS A 1a) £470 b) £75.95 2) £200 3) £450

TYPES OF ANGLE AND ANGLES IN POLYGONS

Key Concepts

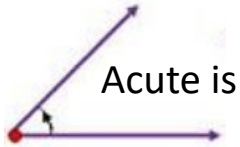
Regular polygons have equal lengths of sides and equal angles.

Angles in polygons
Sum of interior angles
$= (number\ of\ sides - 2) \times 180$

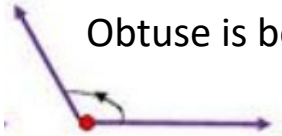
Exterior angles of **regular** polygons $= \frac{360}{number\ of\ sides}$

Types of angle
There are four types which need to be identified – acute, obtuse, reflex and right angled.

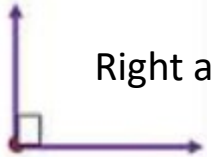
Examples



Acute is less than 90°



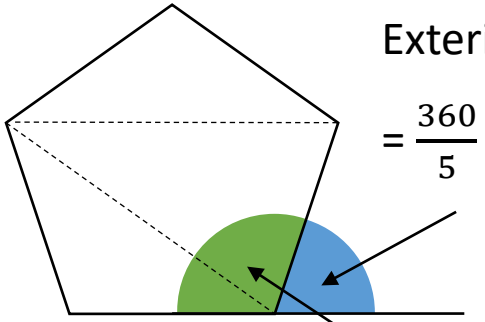
Obtuse is between 90° and 180°



Right angled is 90°

Reflex is between 180° and 360°

Regular Pentagon



Exterior angles

$= \frac{360}{5} = 72^o$

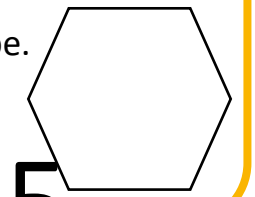
Sum of interior angles
$= (5 - 2) \times 180$
$= 540^o$

Interior angle $= \frac{540}{5} = 108^o$

Y9

Key Words
Polygon
Interior angle
Exterior angle
Acute
Obtuse
Right angle
Reflex

Questions
1) Calculate the sum of the interior angles for this regular shape.
2) Calculate the exterior angle for this regular shape.
3) Calculate the size of one interior angle in this regular shape.



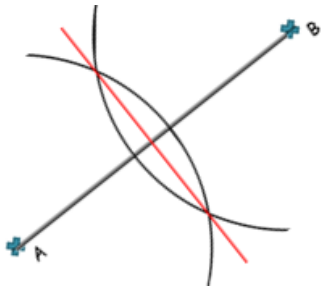
ANSWERS: 1) 720° 2) 60° 3) 120°

Maths Knowledge Organiser

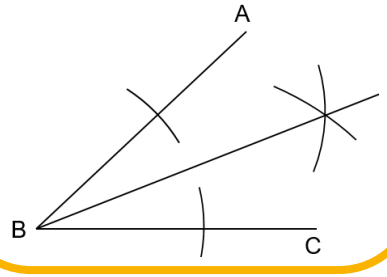
CONSTRUCTIONS

Key Concept

Line Bisector



Angle Bisector



Key Words

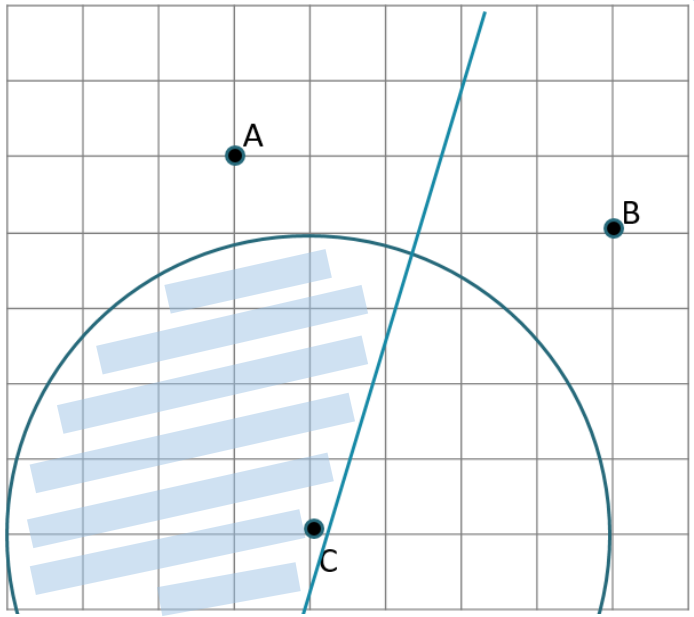
Construction: To draw a shape, line or angle accurately using a compass and ruler.
Loci: Set of points with the same rule.
Parallel: Two lines which never intersect.
Perpendicular: Two lines that intersect at 90°.
Bisect: Divide into two parts.
Equidistant: Equal distance.

Examples

Shade the region that is:
- closer to A than B
- less than 4 cm from C

Line bisector of A and B

Circle with radius 4cm



Y9

Tip

Watch for scales.

For a scale of:
1 cm = 4 km.

20 km = 5 cm
6 cm = 24 km

Questions

1) Draw these angles then bisect them using constructions:
a) 46° b) 18° c) 124°
2) Draw these lines and bisect them: a) 6cm b) 12cm

MFL Knowledge Organiser Yr 9 Spanish Spring 1 Diviértete

Tenses

PRESENT	-ar verbs	-er verbs	-ir verbs
I	-o	-o	-o
you	-as	-es	-es
he/she/it	-a	-e	-e
we	-amos	-emos	-imos
you (pl)	-áis	-éis	-ís
they	-an	-en	-en

FUTURE Saying what you are going to do

Voy	a	INFINITIVE
vas		*Ir*
va		*Tocar*
vamos		*jugar*
vais		*nadar*
van		*leer*
		Ver

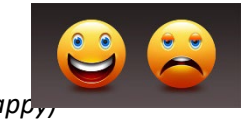
PAST preterit	AR	ER/ IR
I (yo)	é	í
You (tú)	aste	iste
He/she (él /ella)	ó	ió
We (nosotros)	amos	imos
You (pl) vosotros	asteis	isteis
They (ellos/ellas)	aron	ieron

Opinions & Pronouns

Lo que más me gusta es… =the thing I most like is
Creo que../pienso que= I think that

Me chifla

Me hace feliz
(it makes me happy)
Me alegra
Me diverte



MeMe pone de los nervios
Me saca de quicio
Me aburre

Connectives

SEQUENCING

En primero	firstly
En Segundo	secondly
Finalmente	finally
Luego	then
Después	after that
Más tarde	later
De repente	suddenly

Complexity

quiero + infinitive = I want to ..
Quise + inf = I wanted to

Tengo que + Infinitive = I have got to
Tuve que + inf = I HAD to

Puedo + inf = to be able to
Pude + inf = I could

Adjectives

emocionantes	exciting
aburridas	boring
divertidas	fun
infantiles	childish
interesantes	interesting
estúpidas	stupid
Graciosas	funny
Intensas	intense
Tristes	sad
Deprimentes	depressing
De miedo	scary
Atemorizantes	terrifying
Espantosas	frightening

Las comedias **son más graciosas que** las películas de acción = *are more funny than*

Demasiado=*too*
realmente= *really*
Tan= *so (es tan barato =it is so cheap)*

KO. Yr9 Diviértete

TOPIC VOCABULARY TRANSLATE

UNA CITA - a date

DONDE

al club de jóvenes	to the youth club
a la pista de hielo	to the ice rink
al cine	to the cinema
al parque de atracciones	to the amusement park
a la bolera	to the bowling-alley
En la plaza	In the square
En tu casa	At your house
En la estación	At the station

¿Cuándo?	When?
esta mañana	this morning
esta tarde	this afternoon
esta noche	this evening
mañana por la mañana	tomorrow morning
mañana por la tarde	tomorrow evening/ pm

Las películas ...	films.
románticas	romantic
cómicas	comedy (comedies)
de ciencia-ficción	sci-fi
de acción	action
de terror	horror
de dibujos animados	animated (cartoons)...
Del oeste	western

Los verbos

- Llamar por teléfono - to call
- Quedar - to meet
- Encontrar - to meet
- Pasarlo bien* - to have a good time
- Viajar - to travel
- Llegar - to arrive
- Empezar - to startr
- Tirar (tomates) - to throw (tomatoes)
- Hacer sol / calor / frío
- Llover - to rain
- Preferir - to prefer
- Ver - to watch
- Salir - to go out
- Querer - to want

¿Qué hora es? Es... / Son...

Los programas	**TV porogrammes**
Las noticias	the news
Los concursos	games shows
Los documentales	documentaries
Las series cómicas	comedy series
Las series policiacas	police series
Las telenovelas	soaps
Los dibujos animados	cartoons
Los programas de deporte	sports programmes
Los programas musicales	music programmes
Los programas de tele realidad	reality TV programmes

Important Spanish Question Words

- ¿Cuándo? - *When?*
- ¿Para qué? - *For what purpose?*
- ¿Cómo? - *How?*
- ¿Adónde? - *Where?*
- ¿Cuánto? - *How much / many?*
- ¿Quién? - *Who?*
- ¿Qué? - *What?*
- ¿Por qué? - *Why?*
- ¿De dónde? - *From where?*
- ¿Cuál? - *Which one?*

MFL Knowledge Organiser Spring 2 la tecnología y la música

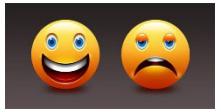
Tenses

Irregular preterites	Ver	Hacer	Ir/ser
I	Vi	Hice	Fui
you	Viste	Hiciste	Fuiste
he/she/it	Vio	Hizo	Fue
we	Vimos	Hicimos	Fuimos
you (pl)	Visteis	Hicisteis	Fuiseis
they	vieron	Hicieron	fueron

PAST preterit	AR	ER/ IR
I (yo)	é	í
You (tú)	aste	iste
He/she (él /ella)	ó	ió
We (nosotros)	amos	imos
You (pl) vosotros	asteis	isteis
They (ellos/ellas)	aron	ieron

Opinions & Pronouns

Me chifló



Me hizo feliz

(it makes me happy)

Me divertió

Me alegró

Me enfadó (angered)

Me puso de los nervios

Me aburrió

Me sacó de quicio

Connectives/frequencies

Ayer - yesterday
El mes pasado – last month
La semana pasada – last week
Anteayer – day before yesterday
El año pasado – last year
Hace dos días – 2 days ago
Have tres semanas – 3 weeks ago

Complexity

quiero + infinitive = I want to ..
Quise + inf = I wanted to

Tengo que + Infinitive = I have got to
Tuve que + inf = I HAD to

Puedo + inf = to be able to
Pude + inf = I could

Adjectives

Útil	useful
Fácil	easy
Rápido	fast
Práctico	practical
Peligroso	dangerous
Lento	slow
Gratis	Free (of charge)
Caro	expensive
Barato	cheap
Gracioso	funny
Inútil	useless

La red es **más útil que** un libro = *the internet is more useful than a book*

El ordenador es **menos práctico** que mi móvil = *the computer is less practical than my phone*

Lo bueno/mejor es jugar juegos en linea = *the good/best thing is playing games on line.*

Lo malo/peor es hacer las compras – *the bad/worst thing is doing shopping*

KO. Yr9 la tecnología y la música

TOPIC VOCABULARY TRANSLATED

usar la tecnología	
usar/ utilizar	To use
uso/ utilizo	I use
chatear con amigos	chat with friends
hacer los deberes	to do homework
investigar	to do research
navegar por internet	to surf the internet
comprar en línea	to shop online
enviar mensajes de texto	to send texts
enviar correos electrónicos	to send emails
leer los periódicos	to read newspapers
leer libros	to read books
expresar una opinión	to express an opinion
sacar fotos	to take photos
compartir fotos	to share photos
ver una película	to watch a film
descargar música	to download music
jugar juegos	To play games
puedes comunicarte con todos tus contactos	you can communicate with all your contacts
es gratis si tienes conexión a internet	It's free if you have an internet connection

Vocabulario importante	
ser adicto/a	to be addicted
el hecho	fact
el acoso	bullying
el correo basura	spam / junk mail
los usuarios	users
la conexión inalámbrica	wireless connection
la pantalla	screen
el buscador	search engine
la contraseña	password

Los aparatos	
el ordenador	a computer
el portátil	a laptop
el móvil	a mobile phone
la tableta	a tablet
lector de libros electrónicos	an eBook reader
los medios sociales	social media
las redes sociales	social media
los mensajes de texto	text messages
las aplicaciones	apps
el iPad/ iPod	iPad / iPod
la revista (digital)	(digital) magazine
el correo	E-mail

La música

La música clásica	classical music
La música Latina	latine music
La música electrónica	electro music
La música de los años sesenta	music from the sixties
El pop	pop music
El rock	rock
El jazz	jazz
El rap	rap music

Los verbos	
encender	to switch on
apagar	to switch off
hablar	to speak
chatear	to chat
comunicarse	to communicate
descargar	to download
borrar	to delete
crear	to create
enviar	to send
mandar	to send
guardar	to save
quitar/eliminar	to remove
comprar	to buy
vender	to sell
compartir	to share

Science Knowledge Organiser

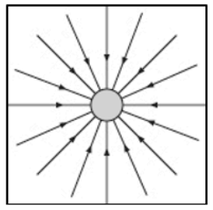
Physics GCSE Transition

1. Differences

Potential differences	Causes currents to flow in circuits
Temperature differences	Causes energy to be transferred between objects by heating
Why a cold drink taken from the fridge will warm up	The air in the room is warmer than the drink, so energy is transferred from the air to the drink until both are at the same temperature
Latent heat	The energy needed to break the bonds *between* particles in melting or evaporating, or the energy released when these bonds form in condensing or freezing
Specific heat capacity	The energy needed to raise the temperature of 1 kg of a substance by 1 °C
Convection current	A flow of liquid or gas caused by part of it being heated or cooled more than the rest
How a land breezes occur	At night the land cools down faster than the sea because it has a lower specific heat capacity, so the air above the land is cooler than the air above the sea; the air above the sea is less dense than the air above the land, and so it tends to rise and create lower air pressure over the sea; air above the land is at higher pressure, so it flows out over the sea; the breeze blows from land to sea

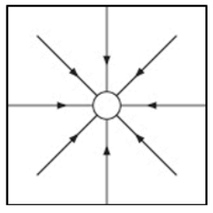
2. Fields

Force field	The volume around something where a non-contact force can affect things
Electric field	The space around an object with a charge of static electricity where it can affect other objects



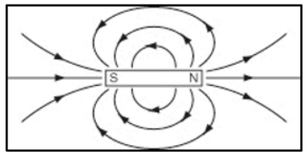
The arrows show the direction a positive charge would move

Gravitational field	The space around any object with mass where its gravity attracts other masses



The direction of a gravitational field is always towards the mass

Magnetic field	The space around a magnet where it can affect magnetic materials or other magnets



The arrows show the direction a north pole would move

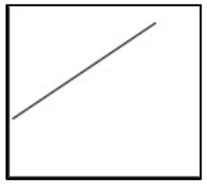
Calculating gravitational potential energy	Gravitational potential energy (in J) = mass (in kg) × height (in m) × gravitational field strength (in N/kg)

3. Cause And Effect

Correlation	When two things happen together, such as one variable increasing as another increases, or two variables changing with time in a similar way

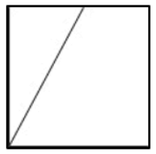
4. Links Between Variables

Equation for a straight line	$y = mx + c$ y is the dependent variable, m is the gradient, x is the independent variable, c is the point where the line crosses the vertical axis
Linear relationship	A relationship between variables that produces a straight line



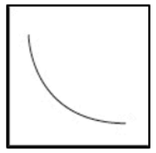
The line does not have to go through the (0,0) point

Direct proportion	A relationship between two variables where one variable doubles when the other doubles



The graph is a straight line through (0,0)

Inverse proportion	A relationship between two variables where one variable doubles when the other halves



Example: If the cross-sectional area of a wire is doubled, its resistance halves

Distance-time graph	The gradient of the line tells you the speed
Speed-time graph	The gradient of the line tells you the acceleration and the area under the graph tells you the distance the object has moved

5. Models

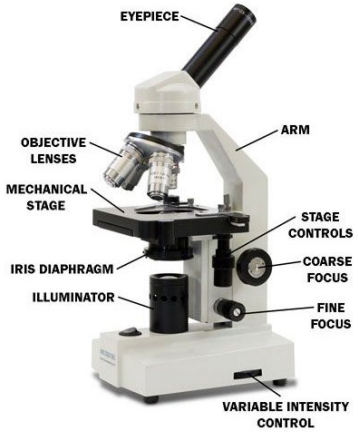
What models can be used for	To help us understand how things work; to test new technology
Abstract model	A model that only exists in your thoughts or as a computer program, formula or diagram
Physical model	A model that you can touch or a model that you could build e.g., wind tunnel

B1: Biology key concepts

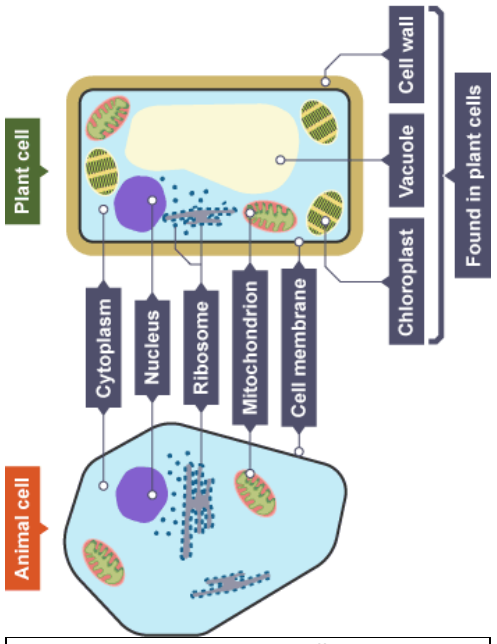
Lesson sequence

1. Microscopes
2. Plant and animal cells
3. Measuring cells
4. Core practical: using microscopes
5. Specialised cells
6. Bacterial cells
7. Digestive enzymes
8. How enzymes work
9. Factors affecting enzymes
10. Core practical: enzymes and pH
11. Cell transport
12. Core practical: osmosis in potatoes

1. Microscopes	
***Magnification**	The number of times bigger something appears under a microscope.
***Eyepiece lens**	The lens on a microscope that you look through.
***Objective lens**	The lens at the bottom of a microscope. There are normally three you can choose from.
***Total magnification**	Eyepiece lens x objective lens.
****Resolution**	The smallest distance between two points so that they can still be seen as two separate points.
****Stains**	Dyes added to microscope slides to show the details more clearly.
****Milli**	Thousandth, $1x10^{-3}$ (a millimetre is a thousandth of a metre).
****Micro**	Millionth, $1x10^{-6}$ (a micrometre is a millionth of a metre).
****Nano**	Billionth, $1x10^{-9}$ (a nanometre is a billionth of a metre).
****Pico**	Trillionth, $1x10^{-12}$ (a picometre is a trillionth of a metre).



2. Plant and animal cells	
***Cell**	The basic structural unit of all living things (the building blocks of life).
***Parts of an animal cell**	Cell membrane, cytoplasm, nucleus, ribosomes, mitochondria.
***Parts of a plant cell**	Cell membrane, cytoplasm, nucleus, ribosomes, mitochondria, cell wall, permanent vacuole, chloroplasts.
***Cell membrane**	Controls what enters and leaves the cell.
***Cytoplasm**	A jelly-like substance where chemical reactions take place.
***Nucleus**	Contains DNA and controls the cell.
***Ribosome**	Produces proteins.
***Mitochondria**	Releases energy by aerobic respiration.
***Cell wall**	Protects and supports the cell, made of cellulose.
***Permanent vacuole**	Stores sap and helps to support the cell.
***Chloroplast**	Where photosynthesis happens, contains chlorophyll.

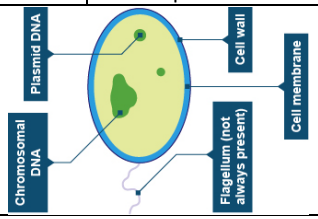


3. Measuring cells	
***Micrograph**	A picture produced by a microscope.
***Light microscope**	A microscope that uses light, can magnify up to 1500 times.
****Electron microscope**	A microscope that uses electrons to produce an image, can magnify up to 1,000,000 times.
****Actual size of a cell**	Actual size = measured size / magnification
****Convert mm to µm**	Micrometres (µm) = millimetres (mm) x 1000

4. Core practical – using microscopes (CP1)	
***CP1 – key question**	What do cells look like under a light microscope?
***CP1 – Prepare the slide**	Collect the cells you are studying and place them on the slide. Add a drop of stain and cover with a cover slip.
***CP1 – Select lens**	Choose between the 4x, 10x and 40x objective lenses.
***CP1 – Place slide in microscope**	Place slide on microscope stage, adjust the coarse focus until the lens is just touching the slide.
***CP1 – Rough focus**	Looking through the eyepiece, slowly adjust the coarse focus until you see a rough image.
***CP1 – Fine focus**	Looking through the eyepiece, slowly adjust the fine focus until you see a sharply focussed image.
***CP1 – Record the image**	Draw what you see, label any cell parts you can recognise and repeat with different objective lenses.
***CP1 - Results**	As you increase the magnification of the objective lens, the cells appear larger and more detailed.

5. Specialised cells	
****Small intestine cell**	**Job:** To absorb small food molecules produced during digestion. **Adaptations:** Tiny folds called microvilli that increase their surface area.
****Sperm cell**	**Job:** Fertilise an egg and deliver male DNA. **Adaptations:** A tail to swim, mitochondria to give energy for swimming, an acrosome to break through the egg's jelly coat, haploid nucleus with only half the total DNA.
****Egg cell**	**Job:** To be fertilised by a sperm and then develop into an embryo. **Adaptations:** Jelly coat to protect the cell, many mitochondria and nutrients to provide energy for growth, haploid nucleus with only half the total DNA.
****Ciliated epithelial cell**	**Job:** To clear mucus out of your lungs (and other internal surfaces). **Adaptations:** Small hairs on the surface – called cilia – which wave to sweep mucus along.

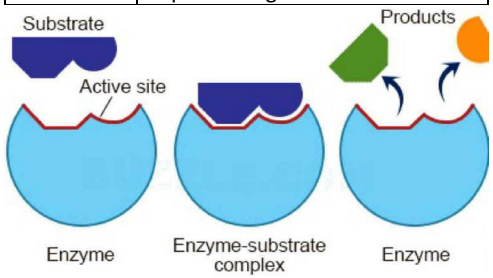
6. Bacterial cells	
***Parts of a bacterial cell**	**All bacteria:** Cell membrane, cell wall, cytoplasm, ribosomes, chromosomal DNA, plasmid DNA **Some bacteria:** flagellum.
****Chromosomal DNA**	Large piece of DNA containing most genes.
****Plasmid DNA**	Small loops of DNA containing a few genes.
****Flagellum**	A tail used for movement.
****Eukaryotic cells**	Cells with a nucleus.
****Prokaryotic cells**	Cells without a nucleus.
***Standard form**	A way of writing numbers in terms of powers of ten. E.g. $0.015 = 1.5 \times 10^{-2}$ $0.000458 = 4.56 \times 10^{-4}$ The index of ten (the 'minus' number) tell you which decimal point to start on.



7. Digestive enzymes	
***Digestion**	Breaking large food molecules down into ones small enough to absorbed by the small intestine.
***Catalyst**	A substance that speeds up a chemical reaction without being used up.
***Enzyme**	A protein that works as a catalyst to speed up the reactions in our cells.
***Digestive enzymes**	Enzymes that break large food molecules down into smaller ones.

****Amylase**	**Where found:** saliva, small intestine **What it does:** breaks down starch into simple sugars such as maltose
****Lipase**	**Where found:** small intestine **What it does:** breaks down fats into fatty acids and glycerol
****Protease**	**Where found:** stomach (pepsin), small intestine (trypsin) **What it does:** breaks down proteins into amino acids

8. How enzymes work	
***Substrate**	The chemical(s) that an enzyme works on.
***Active site**	An area of an enzyme with the same shape as the substrate.
****Lock and key mechanism**	The substrate moves into the active site and reacts to form the products. The products leave the active site so another substrate can then enter and so on.
****Specificity**	Each enzyme can only work on one substrate because the shape of the active site has to match.
***Denature**	When the shape of the active site changes shape so the enzyme stops working.



9. Factor affecting enzymes	
***Optimum temperature**	The temperature when an enzyme works fastest (about 37° for human enzymes).
****Changing the temperature**	**Increasing to optimum**: rate increases because particles move faster **Increasing past optimum:** rate decreases as enzyme denatures
***Optimum pH**	The pH when enzymes work fastest (around pH 6-8 for most human enzymes)
****Changing pH**	Rate decreases as you move away from the optimum because the enzyme denatures.
****Increasing substrate concentration**	At first the rate increases, but then it levels out as the enzyme is working as fast as possible.

10. Core practical – enzymes and pH (CP2)	
***CP2 – key question**	How does the rate that amylase works change as you change the pH?
***CP2 – Prepare your reactants**	Place starch solution, amylase solution and pH 7 buffer into separate test tubes and warm them in a water bath at 40°C
***CP2 – Prepare your dropping tile**	Place a few drops of iodine solution into each well of a spotting tile.
***CP2 – Start the reaction**	Mix reactants together, start the stop watch and keep the mixture warm in the water bath.
***CP2 – Test for starch**	Remove a small amount of mixture and place in a well on the spotting tile.
***CP2 – Record your results**	Repeat the test until the mixture does not go black (no starch). Record the time.
***CP2 – Vary the pH**	Repeat with different pH buffers from pH 3 to pH 10
***CP2 – Results**	The amylase works fastest around pH 7 and more slowly at pH high or lower than this.

11. Cell transport	
***Concentration**	The number of particles in a given volume (the strength of a solution).
****Concentration gradient**	The difference in concentration between two neighbouring areas.
***Diffusion**	The movement of particles from high to low concentration (down a concentration gradient).
***Diffusion examples**	**Lungs:** oxygen into blood, carbon dioxide out of blood **Leaf:** carbon dioxide into leaf, oxygen out of leaf.
****Partially permeable membrane**	A membrane that allows some molecules but not others to pass through it (like a cell membrane).
****Osmosis**	The movement of water across a partially permeable membrane from high water/low solute conc to low water/high solute conc.
****Osmosis examples**	Water into plant roots, water in/out of any cells.
***Active transport**	Using energy to move substances from low to high concentration (up a concentration gradient).
***Active transport examples**	Minerals being absorbed into plant roots.

12. Core practical – osmosis in potatoes (CP3)	
***CP3 – Prepare potatoes**	Cut six similar pieces of potato, blot them dry and weigh them.
***CP3 – Run the experiment**	Place each potato piece in a test tube with sucrose (sugar) solutions with concentrations from 0% to 50%
***CP3 – Record results**	Blot each potato piece dry and re-weigh it.
***CP3 – Calculate percentage mass change**	% change = (final value – starting value) / starting value x 100
***CP3 – Results**	Potato in weaker sucrose solutions gain mass because water enters potatoes by osmosis, those in stronger solutions lose mass as water leaves by osmosis.

B2: Cells and control

Lesson sequence

1. Mitosis
2. Animal growth
3. Plant growth
4. Stem cells
5. Nervous system
6. Neurotransmission
7. Controlling movement

1. Mitosis	
***Cell cycle**	The life of a cell comprising interphase and mitosis.
***Interphase**	Preparation for mitosis in which extra cell parts are made and DNA chromosomes are replicated (copied).
***Mitosis**	When one cell divides into two genetically identical daughter cells.
***(I)PMATC**	The stages of mitosis: interphase (not mitosis), prophase, metaphase, anaphase, telophase, cytokinesis.
****Prophase**	The membrane of the nucleus breaks down and spindle fibres start to form.
****Metaphase**	Spindle fibres fully form and chromosomes line up across the middle of the cell.
****Anaphase**	Chromosome copies separate and move to each end of the cell.
****Telophase**	A new membrane forms around each set of chromosomes to form two nuclei.
****Cytokinesis**	The two new cells fully separate.
***Cancer**	When mitosis happens out of control forming large lumps of cells called tumours.

2. Animal growth	
***Growth**	Increase in size due to increased numbers of cells.
***Percentile**	A measure of the growth of a child that compares them to other children of the same age.
***90th percentile**	A child is taller than 90% of children of the same age.
***50th percentile**	Average for height/mass for the age.
***Percentile graphs**	Graphs showing how height/mass change with age with different lines for each percentile.
***Cell differentiation**	When a cell divides by mitosis to produce two different types of cell (not two identical ones).
***Specialised cell**	A cell special features designed for a specific job.
****Importance of differentiation in animals**	To produce all the different types of cell the body needs such as red blood cells, fat cells, nerve cells and muscle cells.

3. Plant growth	
***Plant growth**	Cell division creates more cells, elongation makes these cells get bigger.
****Meristems**	Areas just behind the tips of roots and shoots where cell division and differentiation happens.
****Importance of differentiation in plants**	To produce all the different types of cell a plant needs such as root hair cells and xylem cells.
****Calculating percentage changes**	% change = (final value – starting value) / starting value x 100

4. Stem cells	
***Stem cell**	A cell that can differentiate when it divides, to produce two different cells.
****Embryonic stem cell**	A stem cell that can become any kind of cell. Found in developing embryos.
****Adult stem cell**	A stem cell that can only become a few types of cell. Found in animals after birth.
***Stem cells in medicine**	It is hoped they can be used to replace damaged cells in diseases like type 1 diabetes or leukaemia, or to grow new organs for transplant.
****Problems with stem cells**	They may potentially cause cancer, stem cells can only be used in the person they have come from.

5. Nervous system	
***Nervous system**	All the nerves in your body working together to gather information, make decisions and control responses.
***Central nervous system**	The brain and spinal cord – makes decisions (aka CNS).
****Peripheral nervous system**	All your other nerves – gathers information from your sense and carries messages from the CNS to your muscles.
***Neurone**	A nerve cell
***Impulse**	Electrical message carried by a neuron.
****Cell body**	The central part of a nerve cell containing its nucleus.
****Dendron and axon**	The long parts of a nerve cell carrying impulses towards the cell body (dendron) and away from it (axon)
****Myelin sheath**	A fatty layer around the axon and dendron that insulates it to prevent the impulse from escaping and speeds the impulse up.

6. Neurotransmission	
****Neurotransmission**	The travelling of an impulse along a neuron and into another.
****Dendrites**	Branches at the beginning of a dendron that connect to receptor cells or another neuron.
****Axon terminals**	Branches at the end of an axon that connect to a muscle or another neuron.
****Synapse**	Small gap between two neurons where the axon terminals of one meet the dendrites of another.
****Neurotransmitter**	Chemicals released by axon terminals that diffuse across the synapse to trigger a new impulse the dendrite of another neuron.
****Sensory neuron**	Nerve cell that carries impulses from sense organs to the CNS. Has a long dendron and a long axon.
****Relay neuron**	Nerve cell in the CNS that makes decisions. Dendrites join onto cell body, short axon.
****Motor neuron**	Nerve cell that carries impulses from the CNS to muscles. Dendrites join onto cell body, long axon.

7. Controlling movement	
***Stimulus**	A piece of information detected by the nervous system.
***Receptor**	Cells that detect a stimulus.
***Response**	The action that the nervous system makes happen.
***Effector**	The body part that produces the response, often a muscle.
****Voluntary movement**	A stimulus is detected by a receptor, causing an impulse to be carried by a sensory neuron to the brain. Relay neurones in the brain decide what to do and send another impulse down a motor neuron to the effector (muscle) to cause a response.
***Reflexes**	Automatic responses that happen very quickly without conscious thought to keep the body safe.
****Reflex arc**	Movement is caused in the same way as for voluntary movement, except the spinal cord makes the decision without needing the brain to think.

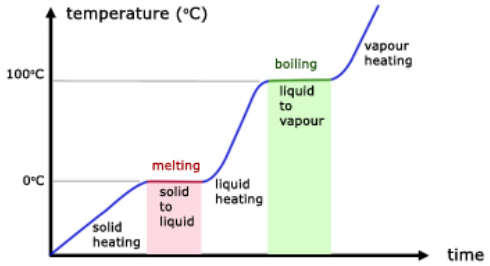
C1 & 2: States of matter and separating substances

Lesson sequence

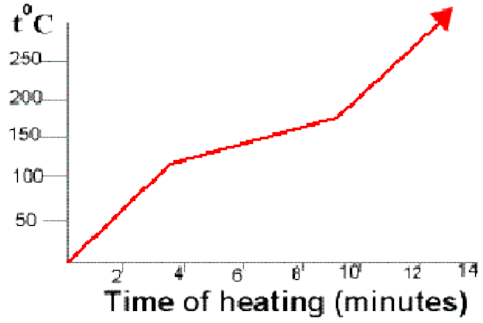
1. States of matter
2. Mixtures
3. Filtration and crystallisation
4. Paper chromatography
5. Distillation
6. Core practical – investigating inks (CP7)
7. Drinking water

1. States of matter	
***Particle**	The tiny pieces that all matter is made from.
***Atom**	The smallest independent particle. Everything is made of atoms.
***Molecule**	A particle made from two or more atoms bonded together.
***State of matter**	Whether a substance is solid, liquid or gas.
***Particle model**	A theory that uses the idea of particles to explain the differences between solids, liquids and gases.
***Solid**	**Particle arrangement:** Regular pattern, touching each other. **Particle movement:** Vibrating around a fixed point.
***Liquid**	**Particle arrangement:** Random, touching each other. **Particle movement:** Moving around
***Gas**	**Particle arrangement:** Random **Particle movement:** Moving quickly
***State changes**	Solid to liquid = melting Liquid to solid = freezing Liquid to gas = evaporating or boiling Gas to liquid = condensation Solid to gas = sublimation Gas to solid = deposition

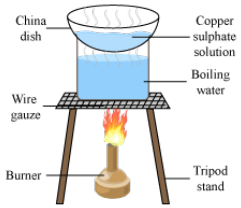
****Heating curve for a pure substance**	Temperature rises as you heat a solid, levels out as it melts, continues rising once fully liquid, levels out whilst boiling and rises again once fully gas.

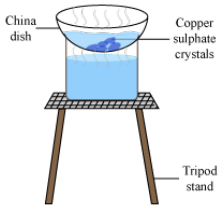


2. Mixtures	
***Element**	A substance made from only one type of atom.
***Compound**	A substance made from two of more different elements bonded together.
***Mixture**	A substance made of two of more substances (elements or compounds) mixed but not bonded together.
****Melting point of mixtures**	Mixtures do not melt at a fixed temperature but melt gradually over a range of temperatures.
****Heating curves of mixtures**	The flat sections of the heating curves of a pure substance are sloped for a mixture.

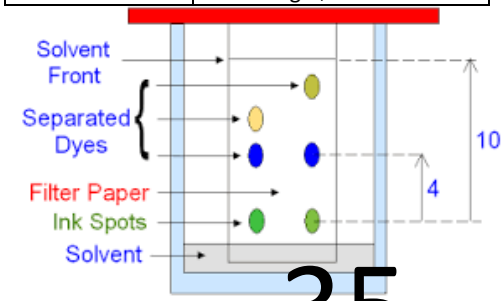


3. Filtration and crystallisation	
***Dissolve**	When a substance mixes with a liquid by breaking down into individual particles (atoms or molecules).
***Soluble**	When a substance can be dissolved by a liquid.
***Insoluble**	When a substance can't be dissolved by a liquid.
***Filtration**	A method of separating a mixture of a liquid and an insoluble solid by passing it through a filter paper.
****Residue**	The solid that gets left behind in the filter paper.
****Filtrate**	The liquid that passes through the filter paper.
****How filtration works**	The filter paper contains many tiny holes. The water molecules are small enough to pass through the holes, the solid particles are too big and get trapped.
***Solution**	A mixture of a solute dissolved in a solvent.
****Solvent**	A liquid that has dissolved a substance, for example water.
****Solute**	A solid that has been dissolved, for example salt.
***Crystallisation**	A method of collecting the dissolved solid from a solution by heating it so that the solvent evaporates away.
****Risks of crystallisation**	As the solvent boils away, the hot solution can spit, so you should wear safety goggles to protect your eyes.

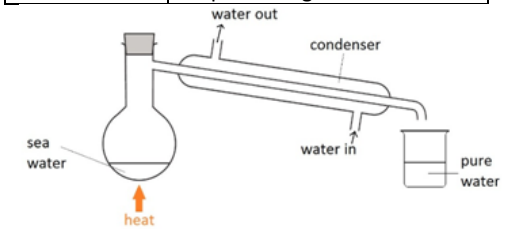


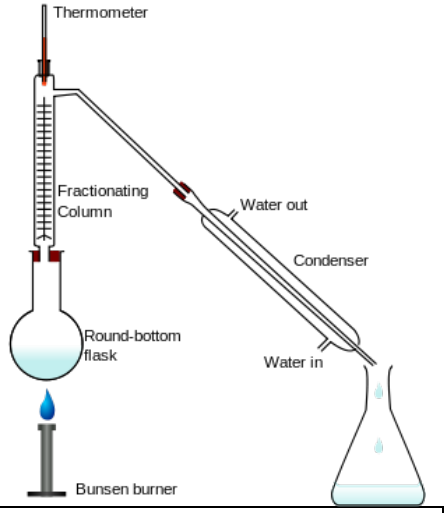


4. Paper chromatography	
***Paper chromatography**	A method of separating out mixtures of liquids to show what is in them, by letting them travel up a piece of chromatography paper.
***Chromatography method**	1. Draw pencil line on paper 2. Place sample spot on line 3. Place paper in solvent, with solvent below pencil line. 4. Allow solvent to soak up the paper 5. Stop when solvent near top, and mark how far it gets.
****Stationary phase**	The substance the solvent moves through – usually paper (Note: technically it is a thin layer of water from air that is bound to the paper molecules)
****Mobile phase**	The solvent.
****R_f (retardation factor)**	R_f = spot distance / solvent distance
****Uses of R_f**	R_f enables you to identify a substance because for a given solvent and stationary phases, it is unique to each substance.
****Uses of chromatography**	- To tell between pure and impure substances - To identify substances by comparison with known ones - To identify substances by calculating R_f.



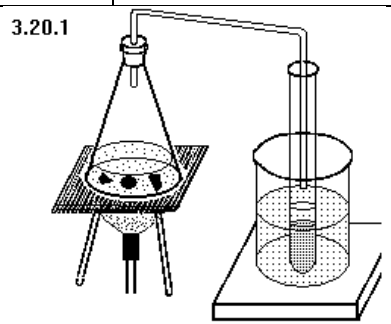
5. Distillation	
***Distillation**	A method used to collect pure liquid from a solution, such as getting pure water from seawater.
****Condenser**	A glass tube surrounded by a glass jacket containing cold tap water. Used to condense gases back to liquids.
****How distillation works**	The solution is heated until it is hot enough for the solvent to boil. The solvent is then passed through a cool condenser where it turns back to liquid. The solute does not get hot enough to evaporate and stays where it is.
****Anti-bumping granules**	Jagged grains of glass that are added during distillation to prevent violent boiling.
***Fractional distillation**	A type of distillation used to separate mixtures of two or more liquids.
****How fractional distillation works**	The liquid with the lowest boiling point boils first and can be collected, then the next boils and so on.
****Fractionating column**	A tall glass column used during fractional distillation that gives a better separation of the liquids by producing a temperature gradient.





6. Core practical – investigating inks (CP7)	
***CP7 – Aim**	To separate inks using distillation and chromatography.
***CP7 – Distillation set up**	Place some ink in a conical flask with a side arm and delivery tube attached, place the flask on a tripod above a Bunsen burner. Place a boiling tube in a beaker of ice and place the delivery tube into the boiling tube.
***CP7 – Run the distillation**	Light the Bunsen burner and allow the ink to boil, stop once a few drops of liquid have collected.
***CP7 – Distillation results**	Pure water collects in the test tube because it boils and the cold ice condenses the vapours back to liquid. The ink gets darker because there is less water to dilute it.
***CP7 – Chromatography setup**	1. Draw pencil line on paper 2. Place ink spot on line 3. Place paper in solvent, with solvent below pencil line. 4. Allow solvent to soak up the paper 5. Stop when solvent near top, and mark how far it gets.

***CP7 – Chromatography - calculate Rf**	Measure how far each of your spots has moved from the line and how far the solvent has moved. Rf = spot distance / sample distance.
***CP7 – Chromatography results**	The ink separates into multiple different spots. The one that moves furthest is most soluble in the water.



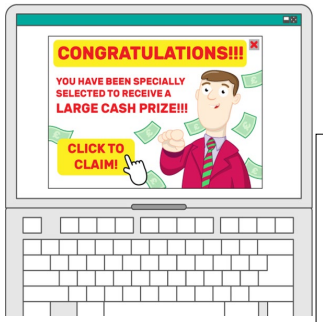
7. Drinking water	
***Potable water**	Water that is safe to drink.
***Desalination**	Producing pure water from seawater.
****Purifying seawater**	The seawater is distilled: heating the water to produce water vapour and condensing it back to liquid. Uses lots of energy.
****Uses of pure water**	Pure water has to be used when chemists analyse substances to fins out what they contain. Tap water contains many dissolved substances that could interfere with this.
****Water treatment in the UK**	Water is passed through a sedimentation tank, to allow sediment to settle out, it is passed through a filtration tower to remove floating particles, chlorine is added to kill bacteria.

Computer Science Knowledge Organiser

CYBERSECURITY

Key words	
adware	adverts for products a user may be interested in, based on internet history
authentication	verifying the identity of a user or process
biometrics	‘password’ created from the user fingerprint, iris, retina, facial, voice
blagging	inventing a scenario to obtaining personal information
CAPTCHA	Completely Automated Public Turing Test To Tell Computers and Humans Apart
DoS/DDoS	Denial of Service attack/Distributed Denial of Service
encryption	mathematically converts data into a form that is unreadable without a key
firewall	checks incoming and outgoing network traffic for threats
hacking	gaining **unauthorised** access to or control of a computer system'
malware	a variety of forms of hostile or intrusive software
penetration testing	testing a network/program for vulnerabilities
pharming	redirecting web traffic to fake websites designed to gain personal information
phishing	messages designed to steal personal details/money/identity
ransomware	virus which locks a computer and encrypts files until a ”ransom” is paid
script kiddies	hackers with no technical hacking knowledge using downloaded software
shouldering	directly observing someone enter personal details e.g. PIN number, password.
social engineering	manipulating people so they give up personal/confidential information
spyware	gathers information about a person or organisation without their knowledge
trojans	masquerades as having a legitimate purpose but actually has malicious intent
viruses	self-replicating software attached to another program/file
worms	Replicate and spread through the network

Cybersecurity looking at common attacks and methods to protect ourselves and our networks against these attacks.



It is the law

Data Protection Act 2018:
All organisations and people using and storing personal data must abide by the DPA principles . It states how data should be stored/accessed and what rights a data subject has for the protection of their data.

Computer Misuse Act 1990: It is an offence to:
1. have unauthorised access to computer material
2. have unauthorised access with intent to commit or facilitate the commission of further offences
3. commit unauthorised acts with intent to impair, or with recklessness as to impairing, the operation of a computer.

Hacking in the context of cyber security is gaining **unauthorised** access to or control of a computer system .

Unethical versus ethical hacking
Penetration testers (pen testers) are people who are paid to legally hack into computer systems with the sole purpose of helping a company identify weaknesses in their system.

Network and System **security measures** include:

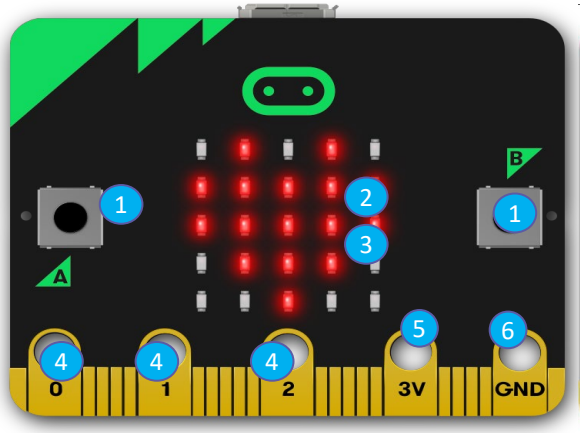
Penetration testing
Anti-malware
passwords
User permissions
firewall
biometrics
User authentication
encryption
Auto updates

Computer Science Knowledge Organiser

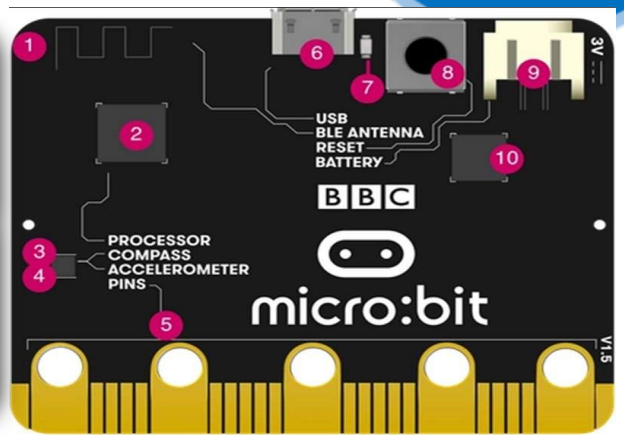
MICRO-BITS

The micro: bit is a pocket-sized computer that introduces you to how software and hardware work together. It has an LED light display, buttons, sensors and many input/output features that you can program and physically interact with.

Keywords	
Micro:bit	A small computer with a microprocessor that can execute a single program at a time.
Buttons	Capture user input and makes things happen
LED display (Light Emitting Diodes)	5x5 LED matrix output used to display information.
Light Sensor	Input, measures how much light is falling on the micro: bit.
GPIO (General-Purpose Input Output) pins	Input and output connects headphone, sense touch and add other electronics.
Temperature sensor	Input measures how warm the environment is.
Compass	Input, finds magnetic north or measures magnetic field strength
Accelerometer	Input detects gestures and measures movement in 3 dimensions.
Radio	Communication input and output allows communication with other devices
Algorithm	A set of instructions to be followed to complete a given task or solve a problem.
Program	A sequence of instructions used by a computer.
Sequence	The order which the computer will run code in, one line at a time.
Selection	A decision made by a computer, choosing what code should be run only when certain conditions are met.
Condition	Checking to see whether a statement or sum is true or false.
Iteration	When a section of code is repeated several times – also known as looping.
Variable	Something which can be changed in a computer. Made up of a name and some data to be saved.



1. **Buttons: input**
2. **LED display: output**
3. **Light sensor: input**
4. **Pins – GPIO: input/output**
5. **Pin - 3 volt power**
6. **Pin - Ground**



1. **Radio & Bluetooth antenna**
2. **Processor & temperature sensor**
3. **Compass**
4. **Accelerometer**
5. **Pins**
6. **Micro USB socket**
7. **Single LED**
8. **Reset button**
9. **Battery socket**
10. **USB interface chip**

Python is a **text** based **programming language**. That can be used to create programs, games, applications and much more!

A **program** is a set of precise instructions, expressed in a **programming language**.
Translating the programming language is necessary for a machine to be able to **execute** the instructions.

To execute a Python program, you need a **Python interpreter**. This is a program that translates and executes your Python program.

Python with data

Computer Science Knowledge Organiser

IT AND THE WORLD OF WORK

Keywords	
Local software	• Needs time to be installed on all computers • Licences may be bought for staff who do not use all of the available software in the package • Has to be maintained and updated by maintenance people • Users must be using the computer on which the software is installed
Cloud storage	• Files are stored on remote servers • When you want to access the file or media, they are downloaded or streamed to your device • Files or media can also be uploaded to the cloud for storage (useful for backups) • Files or media can be synchronised on more than one device so that each device has the same content • The amount of storage can be increased or decreased as needed (it's scaleable)
Ad hoc network	Created with a temporary device-to-device connection without the need for a connection to a Wi-Fi access point or router
VPN	A VPN will route your data traffic via the virtual server. This will hide/cloak your data from potential hackers
Mental well-being	Mental well-being describes your mental health, how well you cope with day-to-day life, how you feel, and how confident you are (good self-esteem).

Accessibility tools

Technology is transforming the way individuals with a disability access the world around them. This increases the opportunity for these individuals to successfully develop a career of their choice.

- Voice recognition that converts spoken word to digital text
- Screen readers that read screen text out loud
- Closed captioning or subtitles
- Motion or eye tracking
- Switch devices, which take the place of mice or keyboards

Reader pen

The impact of Technology

Positive

- Apps can encourage physical activity
- Enhances access to learning
- Wearable technology can track heart rate
- Diabetics can track blood sugar levels and receive warnings if it is high or low, helping them to manage their well-being
- Allows flexibility in choosing a working style

Negative

- Can reduce sleep quality
- Eye strain/poor vision
- Repetitive strain injuries
- Physical inactivity can lead to weaker muscles
- Overuse can lead to: Loneliness, Depression, Anxiety

Traditional vs modern workplace

Traditional

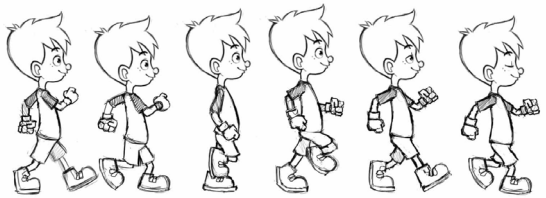
- Takes time to travel to and from the workplace
- Formal work wear
- Desks/workstations
- Labour-intensive tasks
- Slow communication
- Sociable
- 9-to-5 hours

Modern

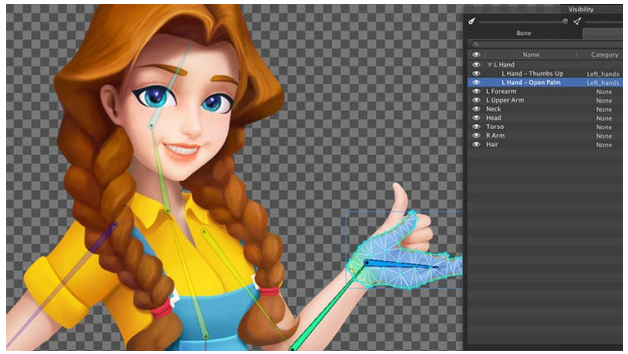
- Use of technology allows flexibility
- Teams can be local, national, or global
- Communication can be immediate
- Data/information is sent digitally and quickly
- Increased productivity
- Can be isolating

Computer Science Knowledge Organiser

BLENDER - MEDIA ANIMATIONS



Stop motion - manually animate every frame of the animation e.g. Shaun the Sheep ● **slower to make animations** ● **More difficult to edit**	**Keyframe animation** - pick the important locations, the keyframes and the computer works out the rest (called tweening) e.g. Pixar films ● Faster to make animations ● Easier to edit ● Smoother animations ● Repeatable



Key words		
add	colour	cut
edge	knife tool	extrude
face	keyframe	focus
edit	vertex	location
loop	tweening	object
organic	proportional	rotate
render	ray tracing	scale
timeline	subdivision	mode

Definitions	
Face:	A surface made up of three or more sides. **Faces** are often referred to as **polygons.**
Vertex:	A point where one or more edges meet
Edge:	A line connecting two vertices
Objects:	Scenes are made up of geometric, control, lamp and camera objects
Keyframes:	Used for tracking change, a key is a marker in time
Ray tracing:	Rendering that involves tracing the path of a ray of light through the scene
Rendering:	The process of computationally generating a 2D image from 3D geometry
Subdivision:	Creating smooth higher poly surfaces which can take a low polygon mesh as input.
Proportional editing:	Transforming selected elements
Extrude:	Extend an object

Smart Materials

A smart material has a property that can change depending on its environment. This change can be reversed if the environment changes again.

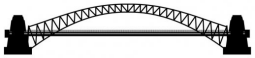
Type	Smart Property	Uses
Thermochromic pigments	Change colour with temperature	Plastic strip thermometers Mugs or spoons that change colour when hot Test strips on batteries
Photochromic pigments	Change colour with light	Lenses in sunglasses that get darker as the light gets brighter Security markers that can only be seen in UV light
Shape Memory Alloy (SMA)	If bent, will return to their original size when heated.	Spectacle frames Sensors in fire sprinkler systems Electric door locks

How to reduce our impact on the environment?

- Use **renewable** materials rather than non-renewable means these can be replenished.
- If non-renewable materials are used such as plastic (oil) **carbon emissions** are given off resulting in global warming.
- Choosing **biodegradable** materials means they will break down naturally when the product comes to the end of its life. Non-biodegradable materials that have not been recycled will end up in the landfill or the sea damaging animals and habitats.
- Apply the **6Rs** to ensure minimal impact on the planet.

Y9

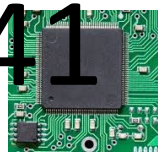
Modern Materials

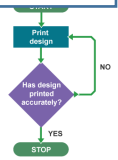
Type	Properties	Uses
Graphene	Hard and extremely strong Good conductor Flexible	Solar cells Ink that conducts electricity In the future it could be used to develop flexible technology
Composite **Glass Reinforce Polymer** *Fibreglass*	The polymer is flexible and the glass fibres are strong but brittle. Together they make a composite that is tough and strong.	Hulls of boats 
Composite **Carbon Reinforced Polymer**	Polymers are reinforced with carbon fibres making it extremely strong.	Crash helmets Frames for high performance racing bikes Racing cars 
Composite **Reinforced Concrete**	Cement has good compressive strength but poor tensile strength. This is reinforced with steel bars which have good tensile strength.	Construction of buildings and bridges 

Microcontrollers are programmable components that acts like a small computer within a single integrated circuit.

Peripheral Interface Controller **PIC** is a commonly used microcontroller

Flowchart program is a set of instructions laid out using flowchart symbols that tells a microcontroller what to do.





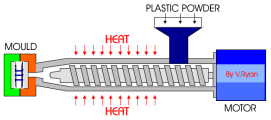
Manufacturing Methods

Natural and Manufactured Timbers	Metal	Polymer	Paper and Boards
Steam Bending Vacuum Press	Injection Moulding Extrusion	Injection Moulding Extrusion Blow Moulding Vacuum forming	Die Cutter Lithography Printing Screen Printing

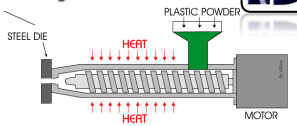
Scales of Production

	Advantages	Disadvantages
One off	High-quality craftsmanship, prototypes can be tested	Expensive, requires specialist labour, time consuming
Batch	Volumes are made for demand which reduces waste, templates and jigs can reused to produce identical products	Downtime between batches
Mass	High volumes can be produced, materials can be bulk purchased at cheaper rates, low-skilled workforce required	Expensive to set up because of specialised equipment, expensive machinery repairs
Continuous	24/7 production using an automated system, high volumes can be produced, materials can be bulk purchased at cheaper rates, low-skilled workforce required	Expensive to set up because of specialised equipment, expensive machinery repairs

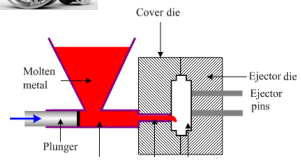
Injection



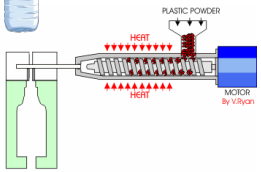
Extrusion



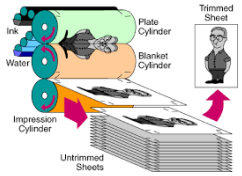
Die Casting



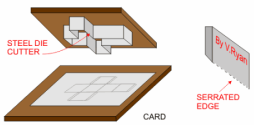
Blow Moulding



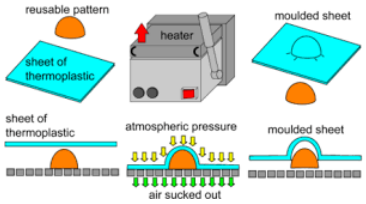
Lithography



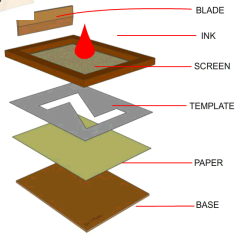
Die Cutter



Vacuum forming



Screen Printing

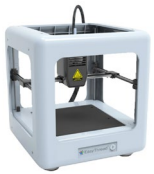


6Rs

Refuse	Is the product necessary?
Rethink	Are there alternative materials or design options that are more sustainable?
Reduce	Can the product be made from fewer materials? Can the amount of unsustainable materials be reduced?
Reuse	Can parts of the product be reused in a different product?
Recycle	Can the materials used be recycled? If the product made from recycled materials?
Repair	Can the product be repaired rather than being thrown away if it breaks?

Computer Aided Design
Computer Aided Manufacture

CAD	This is using computer software to draw and model a product. **Examples:** 2D Design, Photoshop, Macromedia Fireworks and Sketch Up **Advantages:** • Designs can be shared electronically • Accurate • Designs can be easily edited **Disadvantages:** • Software and training can be expensive • Security issues
CAM	This is using computer software to control machine tools to make products. **Examples:** Laser Cutter, 3D printer **Advantages:** • Faster • Complicated shapes are easily produced • Exact copied are easily made • Machines can run 24/7 **Disadvantages:** • High initial set up costs as CAM machines are expensive



Ergonomics and Anthropometrics

Anthropometrics is the practice of taking measurements of the human body and provides categorised data that can be used by designers. Anthropometrics help designers collect useful data, eg head circumferences when designing a safety helmet. In this example, as there is a large variation in size, the designer would need to build some adjustment into the safety helmet design.

Ergonomics can incorporate the use of **anthropometric data** when designing products to improve the user experience. If a designer doesn't use anthropometric data during the design process, it can lead to a poor user experience that causes discomfort, pain and potential injury. **Ergonomics** is a consideration that leads to a product being designed in a way to make it easy to use. Size, weight, shape, position of buttons and controls are all aspects that contribute to it being ergonomically designed.

Market Pull and Technology Push

Market Pull is when a new product is produced in response to demand from the market.
Technology Push is when a development in materials, components or manufacturing methods leads to the development of a new product.

Life Cycle Analysis

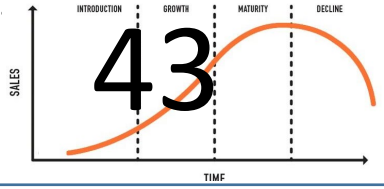
A Life Cycle Analysis is carried out to assess the environmental impact of a product during its entire life, from cradle-to-grave. It looks at use of materials, use of energy, impact of transporting the materials and the parts of the product at various points in its life.

1. **Supply Raw Material**
2. **Transport**
3. **Manufacture**
4. **Package**
5. **Use**
6. **Disposal**

Product Life Cycle

The Product Life Cycle describes the four stages a product goes through from its initial introduction to the market until it is replaced or withdrawn because it is not selling well enough

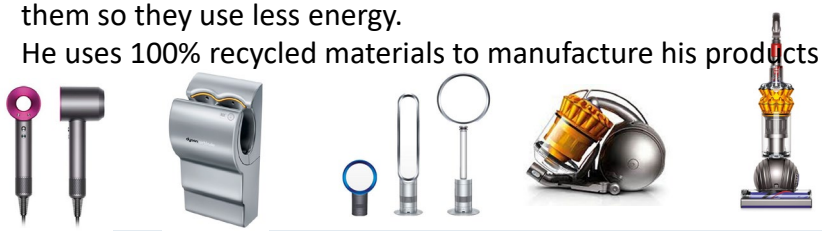
1. **Introduction**
2. **Growth**
3. **Maturity**
4. **Decline**



James Dyson

Key Facts

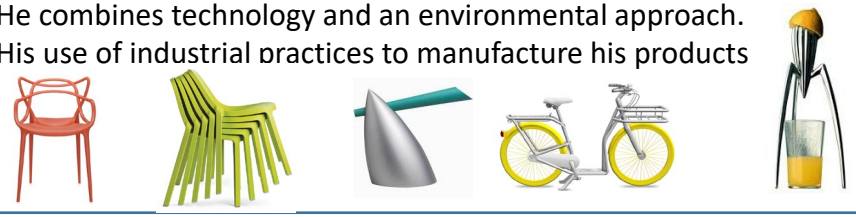
- He is a British inventor
- He is best known for dual cyclone bag bagless vacuum cleaner
- Dyson spent lots of money in research and development with robotics and artificial intelligence being the main focus
- He has developed several products using the latest technology and at the same time reducing impact on the environment by designing them so they use less energy.
- He uses 100% recycled materials to manufacture his products



Philippe Starck

Key Facts

- He is inspired by the organic in order to create technologies better adapted to humans – biomimicry
- He uses sustainable materials in his design
- His designs are made from recycled and re-used plastic
- He uses new technologies in his design
- He sees products as extension of the human body
- He creates products with the perfect balance between design and functionality
- He combines technology and an environmental approach.
- His use of industrial practices to manufacture his products



Design Process

Primary Research	Data gathered first hand directly from the client
Secondary Research	Data about the client that comes from a second hand source
Product Analysis	Looking at a product in detail to understand more about it using ACCESS FM
Design Brief	A summary of the design opportunity
Design Specification	A document that lists all the design criteria that the finished product must meet.
Design Development	Involves making a model of a design, which is then tested and evaluated. A new, improved prototype is made and the process is repeated until the finished design meets all the needs and wants of the client.
Testing	To check that the product meets the design specification and the needs of the user.
Evaluation	Where a designer reflects on the design of a product, looks at what went well during testing and identifies ways that a product could be improved.

Key Words and Definitions

Sustainability	The level to which resources can be used without them becoming unavailable in the future.
Carbon Footprint	Carbon foot print is the measurement/amount of greenhouse gases produced in the production of products.
Renewable Energy Source	A source that is quickly replaced by natural means and will not run out.
Non Renewable Energy Source	A source that cannot quickly be replaced and will eventually run out.

Food Technology Knowledge Organiser

FOOD CHOICES
What makes us choose?

- Special occasions
- Culture
- Likes and dislikes
- Time of day
- Morals
- Health conditions
- Age
- Cost
- Religion

- Some people will make food choices based on their religious beliefs
- Hinduism – most avoid beef & related products; some vegetarians; some avoid eggs
- Judaism – kosher; avoid pork & shellfish;
- Islam – halal; avoid pork & related products; no alcohol
- Buddhism – most are vegetarian or vegan; avoid alcohol

Types of vegetarians

Type of vegetarian	Meat	Fish	Dairy	Eggs
Vegan	✗	✗	✗	✗
Pescetarian	✗	✓	✓	✓
Lacto	✗	✗	✓	✗
Lacto-ovo	✗	✗	✓	✓

Vegetarian alternatives to meat

Quorn- cultured fungus

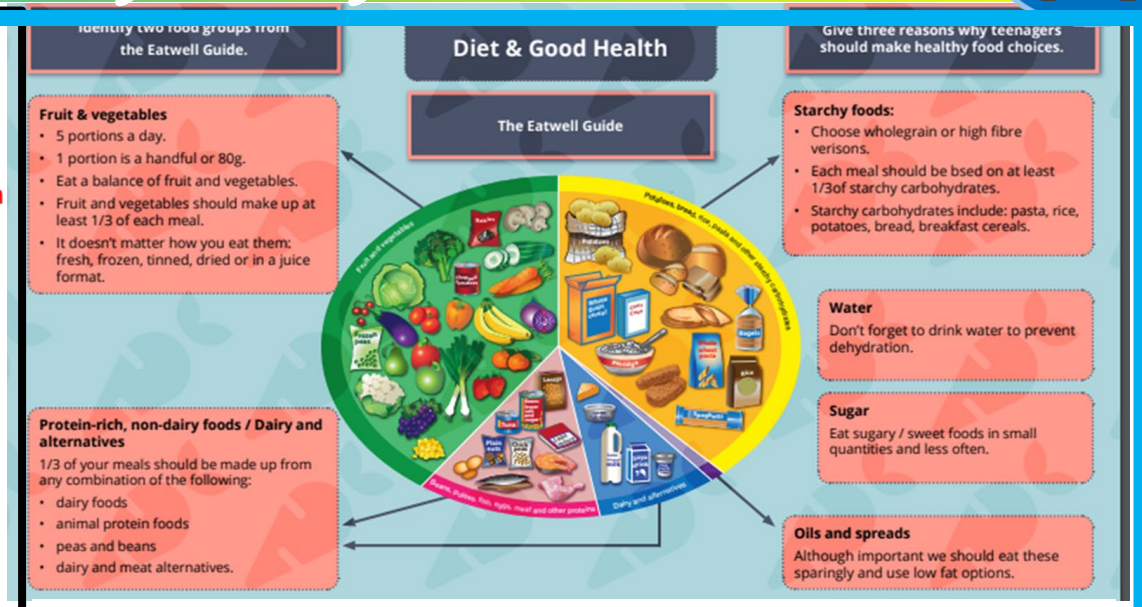
Soya- soya bean

TVP- Textured vegetable protein

Tofu-soya bean curd

Key words

1. Kosher
2. Halal
3. Vegetarian
4. Ovo-lacto vegetarian
5. Vegan
6. Lacto vegetarian
7. Ethical
8. Diabetes
9. Coeliac
10. Gluten
11. Protein
12. Malnutrition
13. Lactose intolerance
14. Allergy
15. Anaphylaxis
16. Epi pen



What is a Vegan diet	eat **no animal flesh** /meat/fish and poultry **and no animal products**
What is a lacto vegetarian diet	eat animal produce **(Dairy)** but not eggs or the flesh of animals/meat/fish/poultry
What is a lacto- ovo vegetarian diet	eat animal produce **(Dairy and eggs)** but not the flesh of animals/meat/fish/poultry
Why might someone choose to be a vegetarian?	Religious beliefs /Moral beliefs – cruel to kill animals/ Do not like the flavour, texture of meat / Land growing crops can feed many more people than land raising animals / Food scares – BSE, food poisoning, salmonella / Family influence/habits /Peer pressure
What foods can vegetarians get protein from?	Good vegetarian sources are Quorn, Tofu, Soya, Cereals, Pulses, Nuts & Lentils (**some** may also get this from diary and eggs)
What foods can vegetarians get non- haem Iron from?	Found in pulses, nuts, dried fruit, dark green leafy veg, dark chocolate, cocoa powder, black treacle, curry powder.
What foods can vegetarians get Vitamin B12	Found in yeast extract, marmite and fortified breakfast cereals
Vitamin B12 is needed to:	Needed for energy production, formation of red cells

Nutrient Needs of Teens

Nutrient	Reason	Example Foods
Protein	Cope with growth spurts. Boys muscular tissue develops	Omelettes, chicken
Iron	Girls lose iron during menstruation and could become anaemic if not replaced. Vit C helps absorb iron.	Spinach, beef
Vitamin C		Peppers, strawberries
Calcium	Skeleton grows rapidly. These nutrients helps skeleton reach peak size and bone density.	Milk, yogurt, kale, tofu
Vitamin D		Tuna, salmon, mackerel

Food Technology Knowledge Organiser

Diet related health conditions

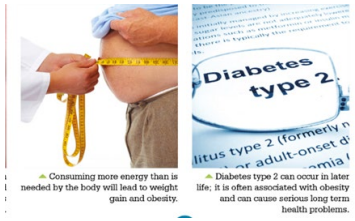
Cardiovascular disease (CVD) - This is the general term that describes disease of the heart or its blood vessels. The term includes coronary heart disease and stroke in which arteries carrying blood around the body become blocked with fatty deposits (cholesterol) and consequently blood flow is reduced. CVD is linked to poor diet and lifestyle traits such as obesity, high blood pressure, a diet high in cholesterol and lack of exercise.

To reduce the outcome of CVD it is important to follow dietary guidelines and eat a diet that is low in saturated fat and instead eat foods higher in unsaturated fat such as oily fish, nuts and seeds, olive oil and the recommended 5-a-day of fruit and vegetables.

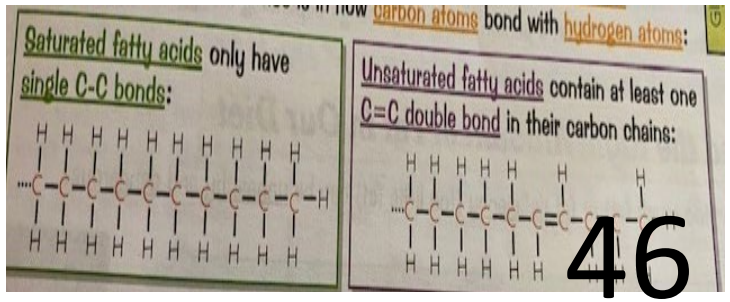
Obesity - This is the term to describe a person who is very overweight, with a lot of body fat. It is a common problem in Western society. The method to determine if a person is overweight is to measure their BMI.

Saturated fat: solid at room temperature, mainly animal foods sources include:
fatty cuts of beef, pork, and lamb
dark chicken meat and poultry skin
high fat dairy foods (whole milk, butter, cheese, sour cream, ice cream), tropical oils (coconut oil, palm oil, cocoa butter)lard
Unsaturated fats: Liquid at room temperature, vegetable sources, includes mono and polyunsaturated fats.

Diabetes: type 2 - The body may produce too little insulin, or the body has become insulin resistant and cannot utilise the glucose produced by carbohydrates. To help prevent this condition, people should follow the healthy eating guidelines, exercise and maintain a healthy weight. This kind of diabetes usually affects people who are overweight or older. If a person is overweight, they are twice as likely to get type 2 diabetes. Therefore, a high-sugar diet and high-fat diet should be avoided.



Iron deficiency anaemia - Iron is important in making red blood cells, which carry oxygen around the body. Iron deficiency anaemia results in the person affected feeling tired and lethargic because organs and tissues will not get as much oxygen as they need.
Good sources of iron include liver (avoid during pregnancy), eggs, red meat and dried fruit e.g. dried apricots and most dark green leafy vegetables.



Food Technology Knowledge Organiser

Food Science Topics

LOVE FOOD LOVE SCIENCE

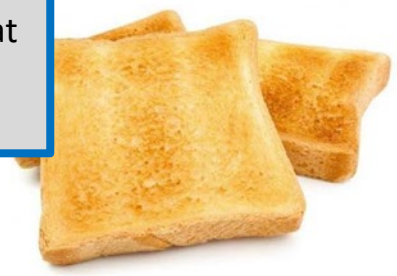
Making a Roux Sauce

Keywords

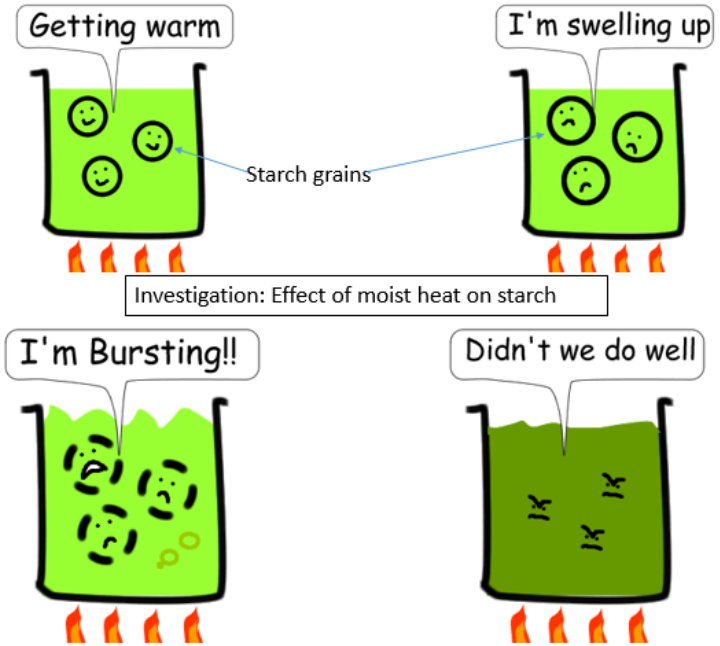
1. Gelatinisation
2. Viscosity
3. Consistency
4. Dextrinisation
5. Caramelisation

Carmelisation:Sugar molecules break down when they reach a high temperature causing the sugar to turn brown and change flavour.

Dextrinisation occurs when starch is exposed to dry heat. Starch in bread, biscuits and cakes with dry heat (toasting/baking) causes the starch molecules to break down to dextrin (brown colour)



a. The starch grains when **heated** between 62°C and 80° C with the liquid **absorbs the liquid.**
b. As it does so it **swells/expands.**
c. When it is no longer able to hold any more liquid the **starch grains burst** to release starch causing the **sauce to thicken.**

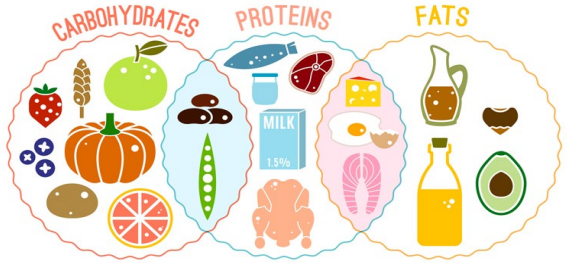


Investigation: Effect of moist heat on starch

Gelatinisation occurs when the starch grains absorb water and ruptures to thicken a sauce or in the cooking of rice and pasta.

Macro-nutrients (are those nutrients we need in large amounts . They all provide us with energy)

Carbohydrates
Starch
Sugars
Dietary fibre



Chemical formula for **glucose** : $C_6H_{12}O_6$

Sugars : Monosaccharide
Disaccharide
Polysaccharide

Food Technology Knowledge Organiser

Key Words

BMR: Basal Metabolic Rate is the amount of energy we need to keep our body alive.
Energy balance: the amount of energy we get from food each day is the same as the amount of energy we use each day.

BMI:is a measure that adults and children can use to see if they are a healthy weight for their height.

Energy dense: foods . containing high amounts of fat and carbohydrates (especially sugar) e.g. pizza, pastry, chocolate bars, pastries, cakes, cookies, meat products i.e. sausages, burgers salami).

Kilocalorie (kcal)/ kilojoule (Kj): units used to measure energy.

PAL (Physical Activity Level): the amount of energy we use for movement and physical activity every day.

Functions in the body. Everyone needs energy to survive. It allows the body to:

- Move muscles and be physically active
- Produce heat to keep warm
- Send messages to the brain to make nerves work
- Allow the body to grow and develop

Sources:

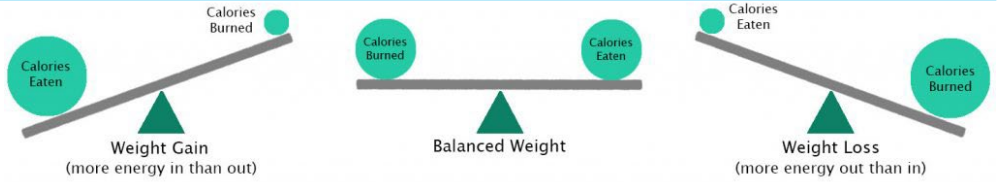
Carbohydrate: foods containing sugar and starch (1g of carbohydrates = 3.75 /4 kcals of energy)

Fat: foods containing visible and invisible fats and oils. (1g of fat = 9 kcals of energy)

Protein: (1g of protein = 4 kcals of energy)

Energy Balance The amount of energy we take in from food must be used up by our Basal Metabolic Rate and Physical Activity Level.

If we take in more energy from the food we use every day , the energy we do not use will be stored as fat and the body will gain weight.
If we take in less energy from food than we use every day, the energy stored in body fat will need to be used and the body will gradually lose weight.
This is the basis of weight reducing diets.



Physical Activity Level: Regular exercise is an important part of a healthy lifestyle.
Physical activity :

- Reduces risk of developing heart disease, obesity and some cancers.
- Improves health of muscles and skeleton
- Keeps the brain alert and working
- Makes people feel good about themselves.
- Health experts are concerned about the sedentary (inactive) lifestyles due to too much sitting for long periods of time e.g. working at a desk, watching television, using the internet or playing computer games.

The recommended physical activity needed daily is suggested to be:

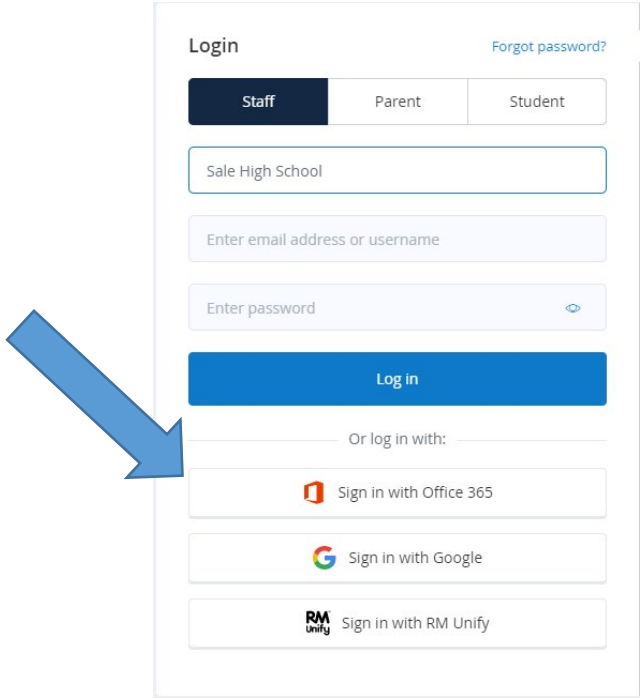
- 5—18 years: aim for an average of at least 60 minutes of moderate intensity physical activity a day across the week
- 19-64years: aim to do at least 150 minutes of moderate intensity activity a week or 75 minutes of vigorous intensity activity a week.

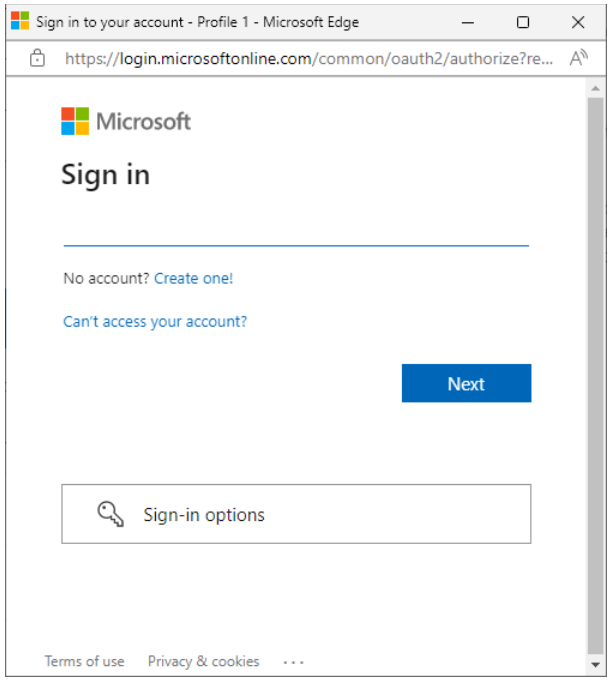
Amount of energy needed daily by each nutrient: Carbohydrate: 50%. Most of which should come from starch, intrinsic and milk sugars.
No more than 5% of the energy from carbohydrate should come from free sugars, intrinsic sugar found in fruit and vegetables.
Fat: 35% or less eat less saturated fats.
Protein: 15%

Satchel:one log in guide

How to Log into satchel:one

1. At the Log in Screen, Click ‘Sign in with Office 365’





2. Type in your school email address.

Your School Email Address is made up from the year you started Highschool,

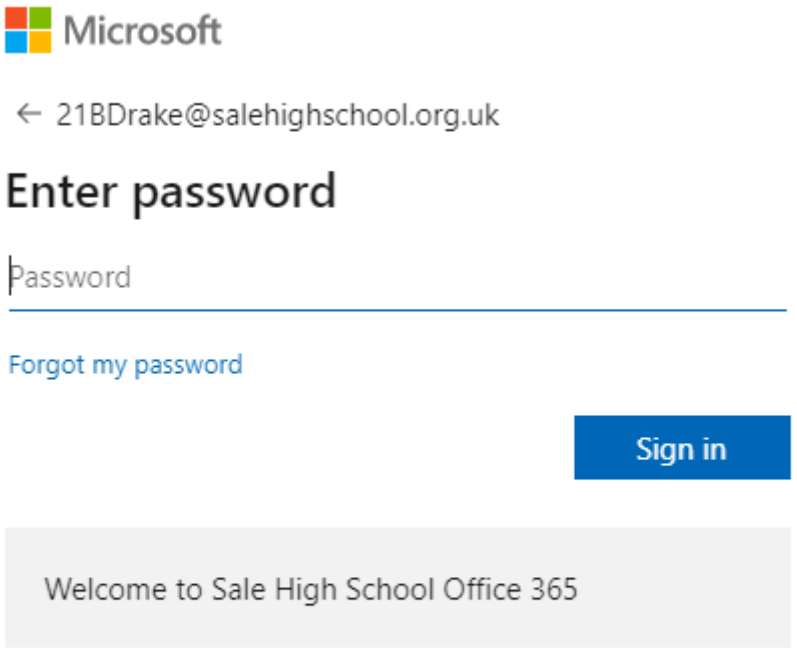
Year Started	School Year
23	7
22	8
21	9
20	10
19	11

Follow this with your first initial, second name, and the school domain address (@salehighschool.org.uk)

e.g: 21BDrake@salehighschool.org.uk

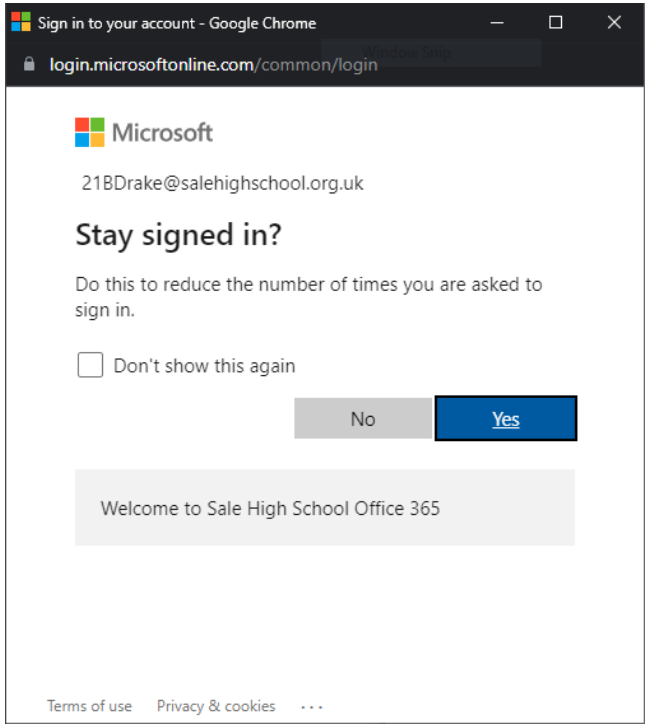
Satchel:one log in guide

3. Enter your password.
This is a six digit number.
(Your teachers can give you)

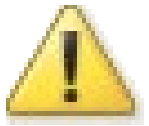


4. Finally, Office 365 asks about signing in.

Yes can be pressed if your log in is from your phone or own computer.



Logging into Satchel:one in this way is the same on all devices:
PC, Laptop, Tablet, iPad, and Phone.



PLEASE BE PATENT!
If you are on a mobile device (phone or tablet) Satchel often ‘snaps’ back to the original log in screen.
Wait for a few seconds and the system will change to your logged in account.