AUTUMN KNOWLEDGE ORGANISER

YEAR 8

CONTENTS PAGE

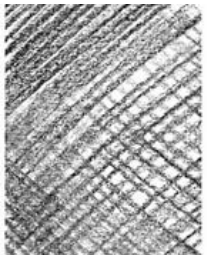
Art & Design

Sarah Graham

Sarah Graham is a contemporary British artist known for her vibrant, hyper-realistic paintings of everyday objects, particularly sweets, toys, and nostalgic items. Her work blends photorealism with a playful sense of colour and composition, often evoking feelings of nostalgia and joy. Using oil paint on canvas, Graham creates highly detailed, larger-than-life depictions of subjects like lollipops, gummy bears, and vintage toys, capturing their texture, shine, and reflections with remarkable precision. Her art is influenced by childhood memories and popular culture, transforming familiar objects into bold, eye-catching pieces.

Sketching

Sketching is the process of making quick, rough lines to capture ideas or shapes. It is often used as a foundation for more detailed artwork or as a way to practice and explore concepts. Sketches can be loose and expressive, focusing on form and movement rather than fine details. Sketching is an essential skill for artists, helping them develop their observational abilities and artistic techniques.



Blending

Blending is a technique used in drawing to create smooth transitions between tones and colours. It helps soften harsh lines and adds depth to a drawing, making it look more realistic.

Tonal shading

Tonal shading in drawing is the technique of using different shades of light and dark to create depth, form, and dimension. By varying the pressure of a pencil or layering marks, artists can create smooth transitions between tones, making objects appear more realistic. This technique helps define light sources, highlights, mid-tones, and shadows, giving a three-dimensional effect. Common methods include blending, hatching, cross-hatching, and stippling.

What techniques will I learn?

Highlights and shadows

Highlights are the lightest areas where light directly hits the surface of an object. They help define the shape and create a sense of shine or texture. In reflective surfaces like glass or metal, highlights are often very bright and sharp.

Shadows are the darker areas where light is blocked or less intense. They include cast shadows (formed when an object blocks light, creating a shadow on another surface) and form shadows (gradual darkening on the object itself due to its shape and the direction of light).

Coloured pencils

Start Light

Begin with light pressure so you can build up layers of colour gradually. This makes it easier to fix mistakes or add details later.

Layering

Add colours in thin layers to create depth and richness. Start with lighter colours and gradually add darker tones.

You will be assessed on

- Term 1 – Observational drawing (tonal shading)
- Term 2 – Coloured pencil drawing (Artist inspired)
- Term 3 – Chocolate bar wrapper painting (watercolour)

Links to curriculum

English and history- In our lessons this term we will be looking at different artists and writing about their work. We will also be looking at how their work has impacted the world.

Art & Design

Literacy / key words

Shading – The technique of adding varying degrees of darkness to create depth, form, and texture in a drawing.

Blending – The process of smoothing pencil marks by using tools like a blending stump, tissue, or finger to create soft transitions between tones.

Hatching – A drawing technique that uses closely spaced parallel lines to create shading, texture, or tonal variation.

Layering – The process of applying multiple layers of coloured pencil to build up colour intensity and depth.

Burnishing – A technique where heavy pressure is applied to blend colours.

Hyperrealism

Hyperrealism in drawing is a style that aims to create artwork that looks as realistic as a high-resolution photograph. Artists use fine details, precise shading, and layering techniques to capture textures, reflections, and subtle variations in tone. This style often goes beyond realism by enhancing details to create a heightened sense of depth. Hyperrealistic drawings can take many hours or even weeks to complete, requiring patience and advanced technical skills.

YEAR 8 Autumn Term

Texture

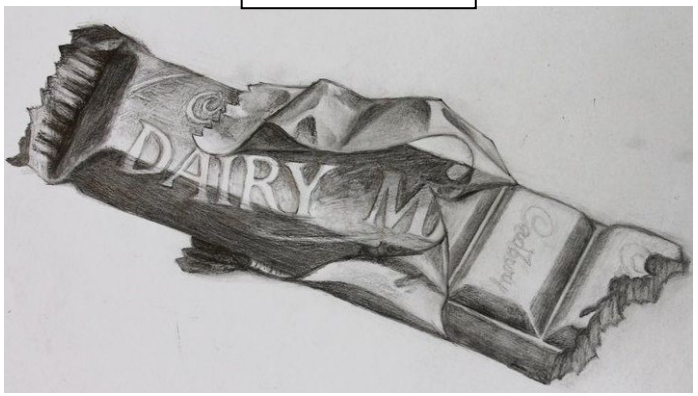
Texture in drawing refers to the way surfaces feel or appear to feel. It can be actual (how a surface physically feels) or implied (how it looks like it would feel). Techniques like cross-hatching, stippling, and shading help create the illusion of different textures

Steps for completing your baseline

1.Lightly sketch the basic shape of the chocolate bar, keeping the lines faint and loose at this stage.
2.Draw the chocolate bar's packaging or any design elements, such as text, or logos. Use light, controlled lines for precision.
3.Determine where your light source is coming from (e.g., top left, top right) to plan how light and shadow will fall on the chocolate bar.
4.Begin shading the wrapper, paying attention to how the light affects the surface.
5.If the chocolate bar has a textured surface, like small creases or bumps, lightly add these details.

Coloured pencil WAGOLL

Pencil WAGOLL



Can you guess what chocolate bar this is?

Extra - Read/watch/do

- Pencil drawing tips- https://www.youtube.com/watch?v=DaxL4gYwUrU
- Coloured pencil drawing tips- https://www.youtube.com/watch?v=TbncKmjDq7U
- Sarah Graham- https://www.youtube.com/watch?v=uW9-euSNiYY&t=28s

Keywords – The Island

Characterisation - The way an actor interprets and performs their character, through the use of vocal and physical skills

Status - A character's social or professional position. The amount of respect, admiration, or importance given to a character.

Body part isolation - An actor chooses a particular part of the body to lead with or exaggerate / draw attention to. For example, some people lead with their nose or might exaggerate their muscly arms.

Dramatic tension - You create a sense of suspense, anticipation of anxiety in the audience through some or all of:

- the story or plot
- characterisation
- production elements like lighting and sound

Cliff Hanger - When a conflict isn't fully resolved, leaving the audience wondering what happens next.

Physical Theatre - A form of theatre which emphasizes the use of physical movement, putting the human body at the centre of the storytelling process

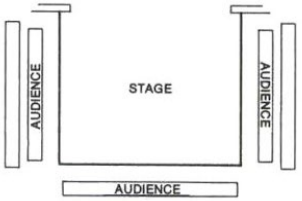
Stage Positioning

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

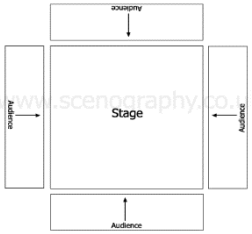
Audience

Stage Configurations

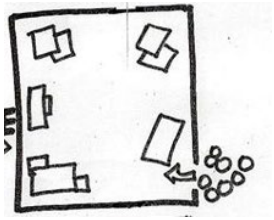
Thrust



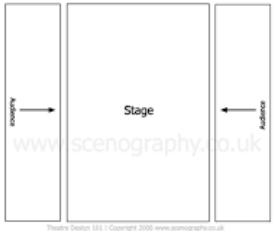
In-the-round



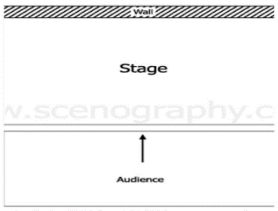
Promenade



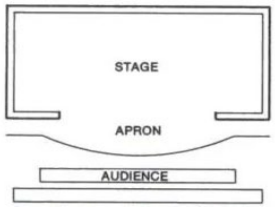
Traverse



End on

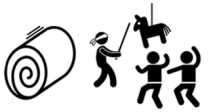


Proscenium Arch

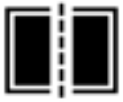


Keywords – Identification

Role Play - You pretend to be someone else by putting yourself in a similar position and imagining what the person might say, think and feel.



Split Stage - When the stage is split into different areas representing different places or times.



Cross-cutting - Switching between two or more scenes which take place at different times or in different places. Often used to compare and contrast characters in different settings.

Conscience Alley - Used to explore a character's multiple thoughts. To reflect in detail on the underlying issues and dilemmas of a character at that particular moment.

Year 8 Autumn Term

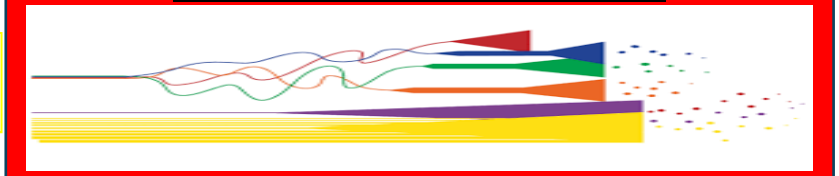
What is a Soundscape?

A soundscape can be made up of various elements including the sound of nature (birds chirping or running water), artificial sounds (traffic or machinery) and also more traditional instrumental sounds including melodies, rhythms and harmonies.

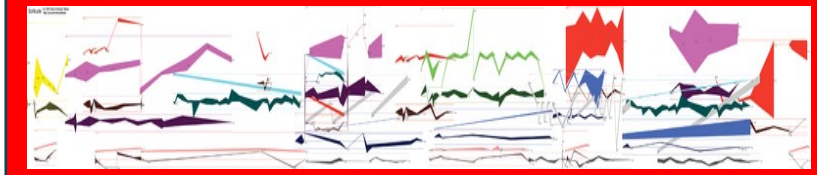
KEY WORDS – test yourself! (definitions on the next page)

Soundscape **Graphic Score** **Pitch** **Acoustic Environment**
Musical Experimentation **Foley Technique** **Duration** **Structure**
Texture **Tone** **Dynamics** **Post-production**

What is a Graphic Score?



Graphic notation (or **graphic score**) is the representation of music through the use of visual symbols. Composers often rely on graphic notation in experimental music, where standard musical notation can be ineffective. Graphic notation relies heavily on the imagination to interpret the visual content. Because of this the pieces usually vary from performer to performer.
Graphic notation can show effective use of PITCH, DURATION, STRUCTURE, TEXTURE, TONE and DYNAMICS.



Foley Artists:

In filmmaking, **Foley** is the reproduction of everyday sound effects and special effect sounds that are added to films, videos, and other media in post-production (after the film has been made). These reproduced sounds, named after sound-effects artist Jack Foley, can be anything from the swishing of clothing and footsteps to squeaky doors and light sabres. Sounds can also be used to cover up unwanted sounds such as aeroplanes, passing traffic or an accidental sneeze from the crew!

Interesting examples for you to look at:

Create a Live Soundscape to a Story (Mr McGee) https://vimeo.com/360684227

The Magic of Making Sound - https://www.youtube.com/watch?v=UO3N_PRIgX0

Where the Sounds From the World's Favourite Movies Are Born https://www.youtube.com/watch?v=0GPGfDCZ1EE

KEY WORDS AND MEANINGS

Soundscape	Music that is created to tell a story or create an impression of something specific. This can be through the use of instruments, voice, electronic or natural sounds.
Graphic Score	Using shapes and symbols to represent sounds. It is a modern form of notation.
Acoustic Environment	An **acoustic environment** is the naturally occurring sounds around you e.g. the sounds of street life through an open window during the daytime or sounds of nature (birdsong, flowing water).
Musical experimentation	Trying several different combinations of sound before using the best version.
Foley artist	Someone who creates sounds for film, game or radio – pioneered by Jack Foley.
Pitch	How high/low a sound is.
Duration	How long/ short a sound is.
Structure	How the music is organised from start to finish (e.g. introduction, verse-chorus song structure).
Texture	How many layers of sound are present (thick/ thin texture).
Tone	The sound quality – scratchy, smooth, mellow, thundering.
Dynamics	The volume – changes can be sudden or gradual.
Post-production	This is the time in the process when mistakes are corrected – AFTER the film has been completed.

Name	Character
Old Major	The oldest **pig** on the farm who inspires the animals to rebel. This character is based on **Karl Marx** and **Vladimir Lenin.**
Napoleon	A large violent **pig** who helps lead the rebellion and then seizes power. This character is based on **Joseph Stalin.**
Snowball	A clever **pig** who helps lead the rebellion and creates Animalism. A rival of Napoleon. This character is based on **Trotsky**.
Squealer	Napoleon's public speaker, this **pig** persuades other animals to support Napoleon, no matter how bad his rule is. He represents **the propaganda used during Stalin's rule of the Soviet Union.**
Boxer	A loyal and dedicated **carthorse**. He is the strongest worker among the animals. He represents **ordinary, hardworking Russian people (the proletariat)**.
Clover	A kind and caring **horse** who is close friends with Benjamin and Boxer. She also represents the **ordinary Russian people**.
Benjamin	A bitter, clever and sarcastic **donkey** who is good friends with Boxer. He represents the **very intelligent, professional people in Russia who did not push back against Communism or Stalin.**
Mollie	A spoiled white **pony** who only cares about pretty ribbons and sugar lumps. She represents the **comfortable middle-class people of Russia who were not willing to sacrifice their luxuries to fight back against Stalin and Communism.**
Mr Jones	The drunken, cruel **farmer** of Manor Farm. He is overthrown and kicked off the farm in the rebellion in Chapter 2. He is based on **Tsar Nicholas II**.
Mr Pilkington & Fredrick	Neighbouring **farmers** who often change between allies and enemies throughout the story. They represent the **USA and Germany.**

Autumn 1: Animal Farm

Revolution - a forcible overthrow of a government, in favour of a new system.

QTA Sentence Starters:

QUOTATION: Orwell presents... for example/this can be seen in '…'

A quotation to support this is '…'

TECHNIQUE: Through the use of ... the reader is able to…

Orwell uses the (*persuasive technique*) to…

ANALYSIS: This suggests/this shows…

(A+) *It could also suggest that…*

Particularly, the word _____ could highlight…

The reader may think/feel... because...

AO3 (context)/THE WRITER: Orwell used the character/idea/example to highlight…

Orwell was clearly trying to show that he felt…

Animal Farm is an allegory for… which…

WAGOLL- How does Orwell present Squealer in Chapter 9?

Orwell presents Squealer in Chapter 9 as manipulative. This can be seen when he asks the animals "surely, they knew their beloved Leader, Comrade Napoleon, better than that?". Through the use of rhetorical questions, Squealer is shown to manipulate the other animals and the reader is able to understand that he has been sent by Napoleon to convince them that he is a good leader and not a vicious dictator. This suggests that the other animals are being made to feel bad for ever questioning Napoleon because it makes them seem guilty and disloyal to their 'comrade', as if they are not working together for the good of the farm and to fight Jones. This then makes them more obedient; they don't want to be accused of disloyalty in the future. Particularly, the adjective 'beloved' encourages them to think of Napoleon positively, reminding them of how they used to feel towards him when he was helping lead the rebellion. The reader may feel angry towards Squealer because the other animals are actually right and Napoleon is a cruel, evil dictator who has killed other animals, but Squealer is manipulating them, exploiting the fact that they are not intelligent enough to question him. Orwell has used this idea to make us feel anxious and sad for the animals as they are vulnerable and being manipulated, just like the Russian people were manipulated by Stalin and the government in the Russian Revolution, which Animal Farm was written as an allegory for in order to convey Orwell's criticism of Communism.

Word Classes

Noun- A person, place or thing, *e.g. class, teacher, canteen.*
Proper Noun- The name of a specific person, place or thing. These need a capital letter at the start! *E.g. Mr Rogers, Sale High School, Manchester.*
Abstract Noun- The name of an idea, feeling or concept which cannot be physically touched, *e.g. love, education, danger.*
Concrete Noun- The name of something physical, like an object, *e.g. desk, book, pen.*
Pronoun- A word that replaces a noun, *e.g. they, it, her, us.*
Verb- An action or 'doing' word, *e.g. studied, learning, enjoy.*
Dynamic Verb- Verbs that describe something happening such as an action, process or change, *e.g. transformed, fighting, diminished.*
Stative Verb- Verbs that describe a state that is unlikely to change and usually refer to things like thoughts, senses or feelings, *e.g. suspected, doubting, loves.*
Adjective- A word that describes a noun, *e.g. triumphant, courageous, tenacious.*
Adverb- A word that tells us how/when something is done, *e.g. fondly, connivingly, today.*
Preposition- A word that shows time, place, location etc, *e.g. in, at, beneath.*
Conjunction- A word used to connect two clauses or ideas, *e.g. and, but, yet.*
Superlative- A word or group of words used to describe something being more than something else in some way, *e.g. biggest, hottest, most serene.*

Literacy (spellings)

1. Verona
2. Shakespeare
3. Elizabethan
4. Stereotype
5. Expectation
6. Feud
7. Montague
8. Capulet
9. Fate
10. Romantic

Adjectives - character (Q)

- Impulsive
- Romantic
- Idealistic
- Aggressive
- Patriarchal
- Loving/ kind
- Mercurial (extreme emotional swings)
- Emotional
- Despairing/ desperate
- Mature/ immature
- Abusive/ controlling

Autumn 2: *Romeo and Juliet*

Context

Verona: The setting of *Romeo and Juliet*. It is the second-largest city in Northern Italy

Shakespeare: playwright who wrote *Romeo and Juliet* probably in 1597

Elizabethan era: the period in history when Elizabeth I was Queen of England and Ireland is often called the "Elizabethan era". This was the period when *Romeo and Juliet* was written

Montague: Romeo's wealthy family

Capulet: Juliet's wealthy family

Duel: a fight (often to the death) to defend your own or your families honour; wealthy young men were trained how to fight and violence was expected

Petrarchan love = an idealised (not necessarily realistic!) view of love that believe men should 'worship' women and long for them.

Feud: a long-standing, violent grudge; the Montague and Capulet families have one which makes their relationship forbidden

Fate: belief your destiny is pre-planned, usually by God; Elizabethans believed astrology (star signs) could tell you your future!

Tragedy: play that ends in death/disaster often caused by the 'fatal flaw' of the characters; despite their flaws, we like the tragic heroes and so feel upset when they die

Patriarchy/ patriarchal: society controlled by men: Elizabethan women were expected to obey husbands/fathers

Marriage: Wealthy Elizabethans would be expected to have arranged marriages by their parents and not marry for love

Friar: a religious man, like a monk

TIF Words!

- **Hamartia =** a flaw in a character's personality that leads them to make bad decisions that result in their death: ***what do you think Romeo and Juliet's is?***
- **Anagnorisis =** moment the tragic hero realises they have doomed themselves
- **Peripeteia** = sudden downfall/ change in luck leading to disaster
- **Catharsis =** emotional release at end of the tragedy

Key characters:

Romeo Montague- Son of Lord & Lady Montague.

Juliet Capulet- Daughter of Lord & Lady Capulet.

Nurse- Juliet's nanny/maid and primary carer.

Friar Laurence- Priest & friend of the Montagues and Capulets. Marries the lovers in in secret.

Tybalt- Juliet's violent and aggressive cousin.

Mercutio – Romeo's impulsive and aggressive best friend

Paris- The wealthy man Lord Capulet wants Juliet to marry.

Prince Escalus – the Prince of Verona.

Autumn 2: *Romeo and Juliet*

Techniques:

- **Simile** – comparing with like/as
- **Metaphor** – comparing directly (is/are)
- **Sonnet** – 14-line love poem with set rhyme scheme
- **Juxtaposition** - clear contrast of opposites
- **Iambic pentameter** – poetic metre of alternating stressed/unstressed syllables (di-DUM, di-DUM)
- **Emotive language** – language with strong emotion
- **Personification** – describe non-human as human
- **Motif -** pattern of repeated imagery
- **Oxymoron** – contradictory phrase e.g. 'bittersweet'
- **Soliloquy –**speech where characters speak their thoughts aloud on stage alone
- **Hyperbole –** deliberate over-exaggeration for effect
- **Dramatic irony –** information the audience knows but the characters do not!

Sentence Starters (QTA)

Try to include one of each colour! ***(QTA)***

Q. Shakespeare has created the character of ____ in order to…/ Shakespeare presents a theme of…

Q. This is shown in the quote "…"

T. The *word/ techniques* suggests…

T. Also, the (word) emphasises…

T. Alternatively, it could also imply…

A: The audience will think/feel… because…

A: This links to the context of Elizabethan England because…

A: Shakespeare intended to…

Verbs of Inference: (Q)

- Present/ show/ convey
- Creates/ illustrates
- Establishes/ develops/ concludes

Verbs of analysis: (T – effect of language)

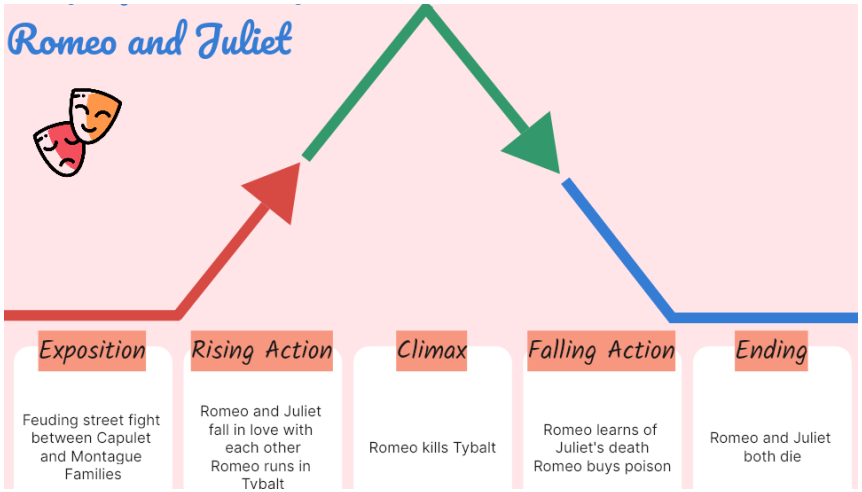
- Emphasise/ highlight
- Has connotations of/ makes you think of
- Imply/ suggest

Verbs of intent: (author's purpose)

- Makes the audience think/feel/ like/dislike
- Warns
- Criticises
- Sympathises with
- Shocks/ horrifies/ saddens
- Encourages the audience to/has a message of

Extra - Read/watch/do

- Luhrman's *Romeo and Juliet* (film)
- *Gnomeo and Juliet* (animated comedy adaptation!)
- *Rosaline* (film about Romeo's ex-girlfriend!)
- *Noughts and Crosses,* Malorie Blackman (book)
- *"These Violent Delights"* by Chloe Gong (book)
- *"Juliet Immortal"* by Jennifer L. Armentrout (book)



Language Techniques (Descriptive)

Simile– A phrase comparing one thing to another, using as or like, *e.g. He was as stealthy as a ninja.*
Metaphor– A phrase comparing one thing to another, without using as or like, instead saying it **is** something else, *e.g. He was a ninja, lurking unseen in the corridors of the villain's lair.*
Personification– A phrase giving human characteristics to a non-human object, *e.g. As the spy wriggled free, the ropes collapsed tiredly in a heap below him.*
Imagery– Words or phrases that create visual images, *e.g. The dark, imposing lair seemed to consume the world before it, bathing it in a shadow of villainy.*
Repetition– A word or phrase that is repeated for emphasis, *e.g. The spy was tense. The villain was tense. Everybody was tense.*
Zoomorphism- A phrase giving animal characteristics to something that is not an animal, *e.g. The teacher roared at the class to be quiet immediately!*
Sibilance– Words close together that begin with an 's' sound, *e.g. stealthily, the spy sneaked upstairs.*

Language Techniques (Persuasive)

Direct Address– Using pronouns to directly speak to the audience, *e.g. we, us, you.*
Alliteration– Words close together that begin with the same sound, *e.g. Our product will revolutionise and revitalise you life!*
Facts/Statistics– Using factual evidence to prove points, *e.g. 78.2% of users say my gadget is amazing!*
Rhetorical question– A question that does not require an answer, *e.g. Who doesn't want to simplify their life?*
Emotive language– Words that create feeling and emotion, *e.g. You'll be disappointed if you don't invest- do you really want to lose out on such an incredible opportunity?*
Rule of Three- Using three words to describe something or making three statements about something *e.g. The Spymaster 3000 is revolutionary, innovative and something never seen before.*
Cyclical Structure- Introducing an idea at the beginning of your writing which you return to at the end, creating a cycle, *e.g. asking the same rhetorical question at the beginning/end of a speech.*

Punctuation Reminder

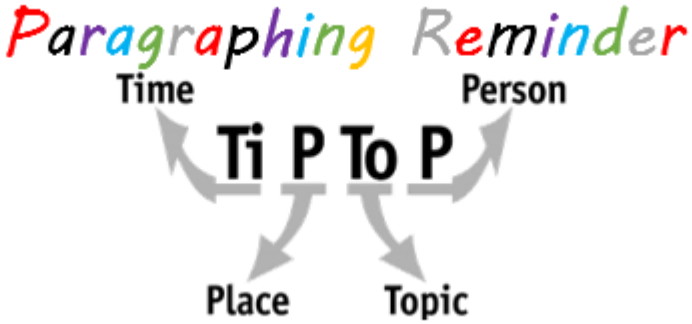
Commas ,- Separate clauses or indicate a pause.
Apostrophes '- Indicate possession or ownership or to show omission in contractions.
Quotation (speech) marks " "- Used to quote from texts or mark out speech.
Semicolon ;- Used to separate two main clauses that are closely related, often replacing a connective.
Colon : - Used to introduce an idea or start a list, *e.g. She packed her spy kit: gun, pepper spray, hidden camera.*
Brackets ( )- Used to add additional or non-essential information. The sentence must make sense on its own without the writing in brackets. **Dashes - -** can be used in the same way.
Ellipsis … - Represents a pause or that something has been intentionally left out. Can be used to build tension, *e.g. He tried to wriggle free from his bindings, but then his world suddenly went black…*

Key Vocabulary- Animal Farm

Revolution- a forcible overthrow of a government, in favour of a new system.

Fable- a short story, typically with animals as characters, conveying a moral.
Anthropomorphism- Making animals act like humans, e.g. talking and emoting.
Allegory- a story with a hidden meaning, typically a moral or political one.
Dictator- a ruler with total power over a country, usually one who has obtained control by force, violence or cruelty.

Paragraphing Reminder



GEOGRAPHY: Year 8 – Economic Activity and Globalisation

Key Terms

- Economy - the state of a country in terms of the production (making) and consumption (buying) of goods and services and the supply of money e.g. China's economy was stronger after more money was spent on building factories.
- Economic activity - refers to the production (making), distribution (transporting), and consumption (buying) of goods and services within an economy e.g. farming, car manufacture, retail.
- Economic structure – the proportion of different industries in an economy e.g. In the UK in 2006 2% of the economy was based on primary industries, 15% on secondary industries, 74% on tertiary industries and 9% on quaternary industries.
- globalisation - The way in which the world has become more interconnected. It refers to how people communicate as well as world trade, international investment and the sharing of ideas e.g. globalisation has increased rapidly now that the internet is common on people's phones.

Sectors of the Economy

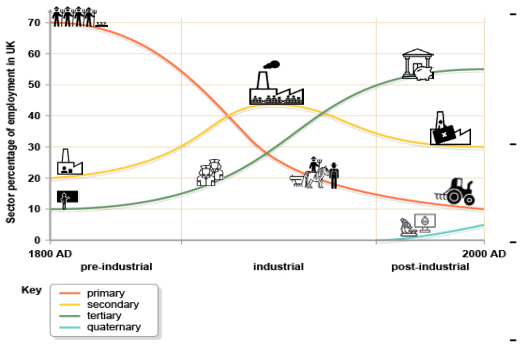
Primary Sector – the collection of raw materials e.g. mining and farming.

Secondary Sector – the processing of manufactured goods e.g. oil refining, car manufacturing.

Tertiary Sector – the services sector e.g. medical care, retail, tourism.

Quaternary Sector – industries providing knowledge or information services e.g. consultancy, medical research.

Geographical Skill: Analysing Graphs



- Describe the overall trends shown in the graph.
- Include specific facts e.g. dates or amounts.
- Are there any anomalies or exceptions?
- TIF: Explain why these trends have happened over time.

Deindustrialisation

Deindustrialisation is the decline of manufacturing industries in a country. Many of our manufactured goods are made abroad in NEEs. This is because the labour costs are lower, which lowers costs. The use of machines means fewer people are needed to work in factories.

Case Study: Salford Quays

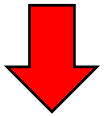
Manchester Docks was one of the world's biggest industrial ports. They were in operation from 1894, fuelling the secondary industries and cotton trade in the north west. As secondary industries declined, so did the docks. They closed in 1982.

The growth of tertiary and quaternary industries led to their revival, and old buildings were demolished or regenerated into what is now Salford Quays and Media City, home to theatres, TV studios, shopping centres and museums.

GEOGRAPHY: Year 8 - Weather

Key Terms / Literacy:

- **anticyclone** – an area of high atmospheric pressure e.g. the anticyclone brought clear skies and a gentle breeze.
- **depression** - a weather system created by low pressure. Whether they happen in winter or summer, they always bring clouds and rain!
- **isobar** - a symbol on a weather map showing the air pressure in a place e.g. the isobar showed high surface pressure of 1040 millibars.
- **precipitation** - water falling from clouds as rain, snow, hail or sleet e.g. heavy precipitation is expected as air pressure falls.
- **cumulonimbus** - a large, towering type of rain cloud e.g. the tropical storm brought huge cumulonimbus clouds.
- **Warm front** – the leading edge of an advancing warm air mass.
- **Cold front** - the leading edge of an advancing cold air mass.
- **Hazard** – a dangerous event, often one that is likely to impact people negatively.
- **Primary effect** – the impacts that a hazard has, directly caused by the hazard itself and often during or shortly after the hazard occurs e.g. the strong winds of a tropical storm causing damage to homes.
- **Secondary effect** – the indirect, or knock-on impacts that a hazard has. These may be realised after the hazard has passed e.g. the damage to homes costing a lot of money to repair.

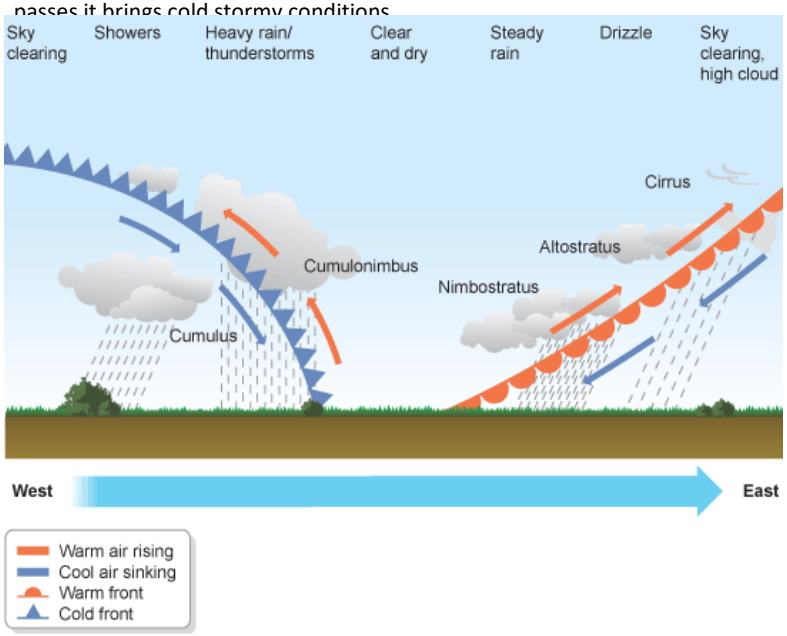


High Air Pressure: air is sinking, as it sinks it heats up. There are no clouds in the sky as condensation is limited. This leads to cloudless skies and sunny days. These weather systems are called **anticyclones**.

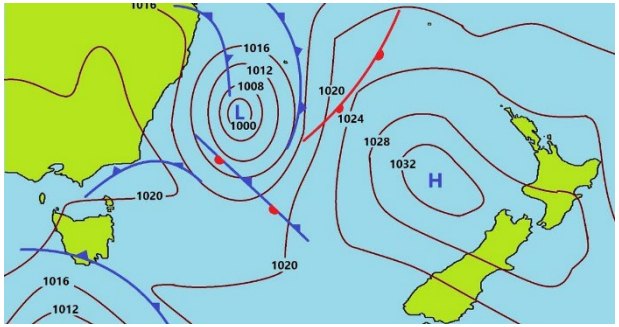
Low Air Pressure: air is rising, as it rises it cools down. There are clouds in the sky as condensation occurs as the air cools and water vapour turns to liquid. This leads to unsettled and rainy weather systems called **depressions**. Tropical storms are large depressions.

How do depressions affect our weather?

A depression is when there is low pressure and air is rising. A depression is made up of two fronts one warm and one cold (the edge of an air mass is called a weather front), which both bring rain and windy conditions. When the warm front passes it brings warm, wet conditions. When the cold front passes it brings cold stormy conditions.



Geographical Skill: Isoline Maps



Surface pressure charts are a type of map which show the level of air pressure there is in a place. They are a type of isoline map, where the lines join areas with equal air pressure. You should know how to get weather data from these maps as well as how to complete your own by paying close attention to the isolines either side of the one you are completing.

Why does it rain in a depression?

Warm air and cold air have different densities. Warm is lighter than cold air. So, when a warm front brings a warm air mass into a place where there is already cold air, the warm light air rises above the cold air mass. This rising air then cools and condenses to form clouds, and it rains.

Similarly, when the cold front arrives, it pushes the warm air up. Again, this causes the rising warm air to cool, condense and form rain clouds.

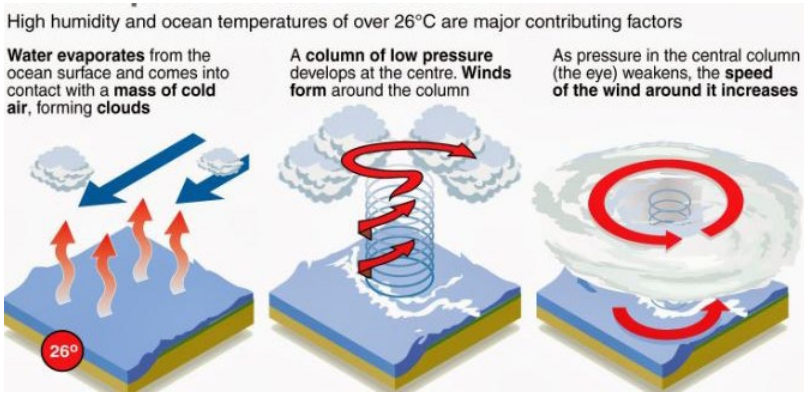
In both cases we have rising air, which is why a depression is a low-pressure weather system.

GEOGRAPHY: Year 8 - Weather

Tropical Storms

Tropical storms are huge depressions, which are hazardous due to strong winds (over 70mph), torrential rain and storm surges (huge waves). They are commonly known as hurricanes in the Americas, typhoons in east Asia and cyclones in southern Asia.

Tropical storms develop in the warm oceans, where surface temperatures are over 26°C. This causes huge amounts of evaporation, which leads to large towering cumulonimbus clouds developing. These begin to spin due to the Coriolis force (the force from the Earth spinning) and a calm eye develops in the centre of the storm. The tropical storm travels across the ocean and, if it reaches land, has devastating impacts on coastal communities.



Case Study: Typhoon Rai, Philippines December 2021

Typhoon Rai was classed as a super typhoon, due to its wind speeds of 195 km/h, making it a category 5 tropical storm. It was the second costliest typhoon to hit the Philippines. In some parts of the country, over 150 cm of rainfall was recorded in just three days.
Primary effects of the storm included 407 people killed and nearly 1,150 people had been injured by the storm. 36 million homes were damaged or destroyed and widespread floods damaged natural habitats especially in coastal areas.
Secondary effects included more than half a million people left homeless over the Christmas period. Thousands of people were housed in temporary shelters, many without running water or sanitation leading to diarrhoea and other diseases spreading. The overall estimated cost of damage was around $550 million (£435 million).

Do we have weather hazards in the UK?

Extremes of hot and cold temperatures are responsible for many thousands of deaths in the UK. There have been more than 50,000 heat-related deaths and more than 200,000 related to cold in England and Wales since 1988.
Some 4,507 deaths were estimated to be linked to heat in England in 2022, when temperatures topped 40C.
According to the Office for National Statistics, once temperatures hit 25°C, the number of temperature-related deaths go up by about 50%, compared to the optimal temperature for people. Below -5°C, the number of temperature-related deaths shoot up by about 75%.

Extra - Read/watch/do:

- Read 'The Secret World of Weather' by Tristan Gooley. This book focuses on observing natural signs to understand and predict weather patterns.
- Watch a weather forecast every day for a week to see how weather systems develop over time – the BBC or the Met Office forecasts are more detailed.
- Do make a weather journal to see how the weather changes. You may illustrate it or think about he impact it has on your activities and mood each day.

Assessment skill:

- Point - give the main argument you want to make e.g. 'tropical storms have social impacts.'
- Evidence / example - give a fact or figure that supports the point you have made e.g. 'Typhoon Rai killed 407 people.'
- Explain - go into depth about why this is significant by extending explanations using 'because', 'therefore', 'as a result' e.g. 'deaths could be devastating for families because it may mean young people are left without parents who may have been the main breadwinner, therefore, the income for the family would be affected. As a result, this would put a burden on young people to go out to work rather than attending school.'

Links to curriculum:

We will study climate in Year 9, which will build on our understanding of air pressure and how this affects different parts of the world over a long period of time.
The concept of impact is sued throughout KS3 and KS4.

GEOGRAPHY: Year 8 – Economic Activity and Globalisation

Key Terms

- TNC (transnational corporation) - a multinational company that is controlled in the home country but has operations (e.g. factories, offices, shops) in other countries of the world e.g. Nike is one of the largest TNCs in the world and is recognised globally.
- trade - the buying and selling of goods and services e.g. the UK trades with countries around the world, including the USA, India and EU countries.

Transnational Corporations

TNCs are large companies that operate around the world. They may have head offices, factories and shops in countries all over the world. They are widely recognised and generate high profits.

Positive impacts	Negative impacts
• Create a lot of jobs when they open factories in NEEs. • Increase a country's GNI, which can improve a country's overall development.	• Many of the jobs created are very low paid and workers suffer in poor working conditions. • The companies take little responsibility for the environmental damage they create.

Industrial Accidents in Bangladesh

Bangladesh has a poor record of industrial accidents. In the past people have died due to factory fires with workers trapped inside, and factories collapsing while people worked. Thousands of people have died as a result of these incidents.

The main reasons they are so common in Bangladesh is due to:

- Corruption, where health and safety officials are 'paid-off' so as not to report any malpractice
- The rapid pace of industrialisation in Bangladesh, so factories are built quickly and are not secure enough.
- Lax enforcement as officials are not checking all buildings thoroughly enough due to lack of resources.

TNCs are quick to deny any wrong-doing, because they do not directly own the factories, but the products being made do go on to be sold by these big international companies.

Extra: Read / Watch / Do:

- Do: Visit Salford Quays and consider how it has changed over time. How has the history of the site affected the economic activities that are there today?
- Read: Look for news articles about industrial change in the UK, recent changes include the possible closure of British Steel.
- Watch BBC Bitesize clips relating to the Industrial Revolution.

Assessment Skill - Writing to explain:

K: Show **knowledge** of the geographical feature in question e.g. One advantage of TNCs is that they create jobs.

PLC: Try to include some **place located content** i.e. a fact about a specific place to illustrate the point e.g. Shell Oil employ 65,000 people in Nigeria.

U: show your **understanding** by explaining why this feature is significant. You may use terms such as 'because', 'therefore', and 'as a result' e.g. This is good because it means a lot of people have a reliable income and higher salaries, therefore, they have more money to spend on the things that they want, rather than what they need. As a result, the service industry grows as more people spend money on these.

Curriculum Links:

The content from this unit ties in with the unit on Development, which you will study in Year 9, when you consider how economic structures lead to poverty and issues relating to quality of life in some parts of the world.

Topic 1 – Elizabethan England

Reformation	A major religious movement in the 1500s that led to the creation of Protestant churches and challenged the authority of the Catholic Church.
Counter-Reformation	The Catholic Church's attempt to win back followers and stop the spread of Protestantism, especially under Mary I.
Religious Settlement	Elizabeth I's 1559 compromise to bring stability by creating a version of the Church that tried to include both Catholics and Protestants.
Middle Way	Elizabeth's religious policy that aimed to avoid extremes and keep most of her subjects satisfied, balancing Catholic traditions with Protestant ideas.
Recusant	A person, usually Catholic, who refused to attend Church of England services.
Puritan	A strict Protestant who wanted further changes to the Church of England and to remove anything that looked too Catholic.
Excommunication	When someone is officially kicked out of the Catholic Church; this happened to Elizabeth I in 1570.
Treason	The crime of betraying the monarch or country, often punished by death in the Tudor period.
Spanish Armada	The large fleet sent by Catholic Spain in 1588 to invade Protestant England, which ended in failure.
Privateer	A sailor like Sir Francis Drake who was given permission by Elizabeth to attack Spanish ships and steal their treasure.
Colony	A settlement or territory taken over and controlled by another country, such as England's first attempts in the Americas under Elizabeth.
Significance	The importance or impact of a person or event, especially in how it shaped the future.

Bloody Mary (Mary I) **Reigned 1553–1558.**

- Mary tried to **restore Catholicism** in England after he father, Henry VIII started his own church. She **burned over 280 Protestants** for refusing to convert to Catholicism, earning the nickname "Bloody Mary".
- She married **Philip II of Spain**, creating fears of foreign control as English nobles in her court were worried that Philip would try to take control.

Mary, Queen of Scots

Mary, Queen of Scots was Elizabeth I's Catholic cousin and had a strong claim to the English throne. Many Catholics wanted her to replace Elizabeth. After fleeing Scotland, Mary was kept under house arrest in England. She was linked to several plots to kill Elizabeth, including the Babington Plot in 1586. Mary was found guilty of treason and executed in 1587. Her death made many Catholics angry and helped lead to the Spanish Armada.

Elizabeth and Empire

Elizabeth I played an important role in starting England's journey towards becoming an empire. She encouraged exploration and trade with other parts of the world, hoping to find new lands, resources, and wealth. She gave permission to **privateers** like **Sir Francis Drake** to attack Spanish ships and steal their treasure, which helped weaken Spain and increase England's power. Elizabeth also supported early attempts to create **colonies**, including the failed **Roanoke Colony** in North America. Although these first efforts were not always successful, they were important first steps. Elizabeth's reign helped lay the **foundations of the British Empire**, which would grow much larger in later centuries.

The Religious Settlement (1559)

- Elizabeth created a **'Middle Way'** to avoid religious conflict.
- The **Church of England** was Protestant in belief but kept some Catholic traditions.
- Aimed to **unite the country** and reduce religious tension.
- **Recusants** (Catholics who refused to attend services) faced fines.

Timeline of the Spanish Armada (1588):

1587 – Elizabeth I executes Mary, Queen of Scots. This angers Catholic Spain and helps push Philip II to plan an invasion of England.

May 1588 – The Spanish Armada (a fleet of around 130 ships) sets sail from Spain, led by the Duke of Medina Sidonia.

July 1588 – The Armada reaches the English Channel. English ships, led by Sir Francis Drake and Lord Howard, begin attacking.

27 July 1588 – The Armada anchors off Calais to meet the Spanish army, but the army is not ready.

28 July 1588 – The English send **fireships** into the Spanish fleet, causing panic and breaking their formation.

29 July 1588 – The Battle of Gravelines. The English defeat the scattered Armada using better tactics and faster ships.

August 1588 – The Armada tries to sail home by going around Scotland and Ireland. Many ships are wrecked by storms.

September 1588 – Less than half the Armada returns to Spain. The invasion is a failure.

Topic 2 – The British Empire

Empire	A group of countries or territories ruled by a single power, often for the benefit of the ruling country.
Colony	A country or area controlled by another, often settled or exploited by the ruling country.
Imperialism	A policy of extending a country's power through colonisation, military force, or other means.
East India Company	A private British company that played a major role in establishing British control over India.
First Nations	Indigenous peoples in what is now Canada.
Aborigines	The indigenous peoples of Australia.
Terra nullius	Latin term meaning "nobody's land," used by the British to justify taking land in Australia.
Transportation	The practice of sending criminals to penal colonies, such as Australia, as punishment.
Scramble for Africa	A period of rapid European colonisation of Africa in the late 19th century.
Maxim gun	The first automatic machine gun, used by imperial powers to assert control over indigenous peoples.
Raj	Term used to describe British rule in India after 1858.
Legacy	The lasting impact or consequences of historical events or systems, such as the British Empire.

From a handful of overseas trading posts in the 1500s, Britain expanded into the largest empire in history, ruling—at its height—nearly a quarter of the world's land and people. Its growth was not a single, planned process but a series of opportunistic conquests, commercial ventures, and settlements that changed Britain *and* the peoples it ruled.

When?	What happened?	Why did it matter?
1497	John Cabot explores Newfoundland for Henry VII.	First English claim in North America.
1580s–1650s	Elizabeth I backs privateers & early colonies; Jamestown (1607).	Foundations of North American empire & Atlantic slave trade.
17th c.	East India Company (EIC) gains trading bases in India.	Trade power grows; company gets its own army.
1763	Britain wins the Seven Years' War.	Takes Canada and lands in India; emerges as dominant global sea-power.

Legacy of the Empire	
Positive Views	**Negative Views**
English language as global *lingua franca (common language between speakers whose native languages are different.)*	Exploitation of resources, slavery, and forced labour
Railways, telegraphs, legal & parliamentary systems	Borders drawn without regard for ethnic groups → modern conflicts
Spread of sports (cricket, football) & ideas (Parliamentary democracy)	Cultural suppression, loss of languages & traditions
Commonwealth network of 56 nations	Continuing economic inequality between former colonies & Britain

Extra - Read/watch/do

The British Empire:
https://www.youtube.com/watch?v=t0_WPxfF8K0

Elizabethan England:
https://www.bbc.co.uk/bitesize/articles/zsysn9q

You will be assessed on

Elizabeth's Religious Settlement, Mary Queen of Scots, Elizabeth's role in Empire.

The creation of the Empire, British colonies in Canada and Australia, legacy

Links to curriculum

RE

English

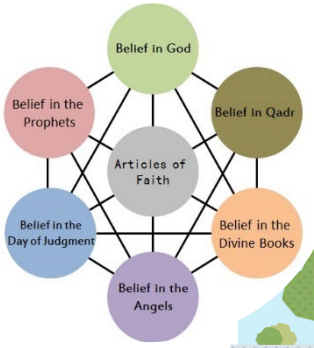
Geography

1	**Islam**	The religion of the Muslims, a monotheistic faith regarded as revealed through Muhammad as the Prophet of Allah.
2	**Allah**	"The God" in Arabic.
3	**Tawhid**	The belief in the oneness of God.
4	**Revelation**	A message from God to human beings.
5	**Prophet Muhammad**	An Arab religious, social, and political leader and the founder of Islam.
6	**Qur'an**	The central religious text of Islam, believed by Muslims to be the final revelation from God.
	Mecca	Holy city for Muslims established by Ibrahim and Ishmael.
8	**Hijrah**	The migration of Muhammad from Mecca to Medina.
9	**Ummah**	The worldwide Muslim community.
10	**Hadith**	The sayings of the Prophet Muhammad.
11	**Sunnah**	The traditions and practices of the Prophet Muhammad.
12	**Sunni**	The branch of Islam with the majority of followers, Sunni meaning followers of the Sunnah.
13	**Shia**	The branch of Islam with the minority of followers, Shi'a meaning 'House of Ali'.
14	**Caliphate**	An area ruled by a Muslim leader.
15	**Jihad**	The spiritual struggle within oneself against sin.

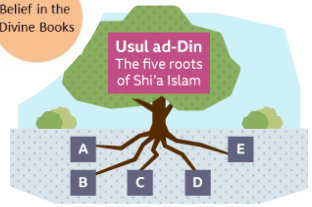
YEAR 8 What is Islam? – Going deeper.

Caliphs & Imams:

In Islam, Caliphs and Imams are important leaders but differ between Sunni and Shia beliefs. Sunni Muslims follow the Caliphs, who were political and religious leaders after Prophet Muhammad, starting with Abu Bakr, and including Umar, Uthman, and Ali—known as the "Rightly Guided Caliphs." Shia Muslims believe leadership should stay within the Prophet's family, starting with Ali as the first Imam, a divinely chosen spiritual guide. Shia Islam teaches that there were 12 Imams, with the last one in hiding, who will return to bring justice.



Six Articles of Faith (Sunni)



Five Roots of Usul ad Din (Shi'a)

- A **Tawhid** - Belief in the oneness of God
- B **Adalat** - Divine justice
- C **Nubuwwah** - The prophets
- D **Imamate** - The authority of the imams
- E **Al Ma'ad** - The Day of Resurrection

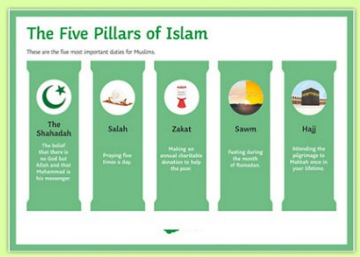
Islam comes from the word "Aslama" which means "Peace"

Jihad:

In Islam, Greater Jihad refers to the personal, inner struggle to live a good and faithful life—resisting temptation, doing good deeds, and staying true to Islamic teachings. It is considered the most important form of jihad. Lesser Jihad, on the other hand, refers to the external struggle, which can include defending Islam or the Muslim community. However, it has very strict conditions: it must be declared by a proper religious authority, must be in self-defence, must not harm innocent people, and must be a last resort. Because these conditions are so hard to meet, Lesser Jihad is rarely considered valid today.

Tawhid:

Tawhid is the belief in the oneness of God – this a a belief that is unified in Islam. It means that there is only one God (Allah) who is the sole creator, ruler, and sustainer of everything. Denying Tawhid or associating others with God (called shirk) is considered the greatest sin in Islam.



Extra - Read/watch/do

Islam - https://www.bbc.co.uk/bitesize/topics/z4v7gwx

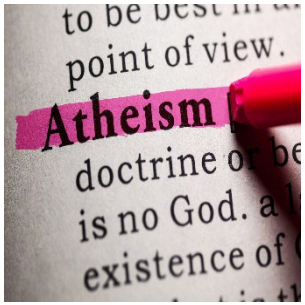
1	**Atheism**	Disbelief or lack of belief in the existence of God or gods.
2	**Philosophy**	The study of the fundamental nature of knowledge, reality, and existence.
3	**Scepticism**	Doubting the truth of something.
4	**Plato**	An ancient Greek philosopher.
5	**Plato's Cave**	A story which explores the true nature of reality.
6	**Empirical Evidence**	Evidence for something based on observation or experience.
	Biblical Criticism	The use of critical analysis to understand and explain the Bible.
8	**The Enlightenment**	A period of time in the 17th and 18th centuries which emphasised reason and individualism rather than tradition.
9	**Science**	The systematic study of the structure and behaviour of the physical and natural world through observation and experiment.
10	**Rationalism**	The practice or principle of basing opinions and actions on reason and knowledge rather than on religious belief or emotional response.
11	**Theory of Evolution by Natural Selection**	Organisms produce more offspring than are able to survive in their environment. Those that are better physically equipped to survive, grow to maturity, and reproduce.
12	**Morality**	Principles concerning the distinction between right and wrong or good and bad behaviour.
13	**Militant Atheism**	A movement of atheists who campaign against religion due to its irrational beliefs.

YEAR 8 What is Atheism?

Atheism:

The word atheist comes from the Greek atheos, meaning "without gods." In ancient Greece, people who didn't believe in the state gods—like early Christians—were called atheists, even though they still believed in a god. Today, atheism means believing there is no god at all.

Greek thinkers like Xenophanes started to explain the world using nature and reason instead of myths, and how they saw gods as human ideas. These early ideas helped shape what we now call atheism.



Challenging the Bible:

Although not directly about atheism, students will learn how Martin Luther's challenge to the Church and his translation of the Bible helped lead to biblical criticism. By making the Bible available to everyone, people began to spot contradictions and question parts of scripture. Some use these flaws to support atheist views—for example, questioning the angry image of God in the Old Testament or the unscientific story of creation in Genesis. Students will then consider whether these challenges weaken religious belief or help people think more deeply about faith.

Key Thinkers:

Nietzsche and the Übermensch
Friedrich Nietzsche was a philosopher who said "God is dead," meaning that traditional religious beliefs were losing their power in modern society. He introduced the idea of the *Übermensch*—a person who creates their own values and purpose without needing religion or God.

Plato's Cave
Plato's Cave is a story about people who only see shadows on a wall and believe that's all there is to reality. It shows how people can be trapped by false beliefs, and some atheists use this idea to suggest that religion might be like the shadows—hiding the real truth.

Richard Dawkins
Richard Dawkins is a scientist and writer who argues that science gives better answers about life than religion does. He believes that belief in God is not needed to explain the world and that religion can sometimes stop people from asking important questions.

Extra - Read/watch/do
Atheism - https://www.bbc.co.uk/teach/class-clips-video/articles/zdkcwty
Humanism - https://understandinghumanism.org.uk/what-is-humanism/

FRACTIONS, DECIMALS, PERCENTAGES & RATIO

Keywords

Percentage: Is a proportion that shows a number as parts per hundred.

Ratio: Relationship between two numbers.

Simplify: Divide both parts of a ratio by the same number.

Equivalent: Equal in value.

Convert: Change from one form to another.

Year 8

Key Concepts

FDP equivalence

F	D	P
$\frac{1}{100}$	0.01	1%
$\frac{1}{10}$	0.1	10%
$\frac{1}{5}$	0.2	20%
$\frac{1}{4}$	0.25	25%
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%

Tip

There is a % function on your calculator.

To find 25% of 14 on a calculator:

2 , 5 , SHIFT , (, x , 1 , 4 , =

Simplify 60 : 40 : 100

÷ 10

6 : 4 : 10

÷ 2

3 : 2 : 5

This could have been done in one step by dividing by 20.

Share £45 in the ratio 2 : 7

45 ÷ 9 = 5

£10 : £35

2 : 7

5	5
5	5
=10	5
	5
	5
	5
	5

=35

Calculator

Find **32%** of 54.60 = **0.32** × 54.60 = 17.472

Questions

1) **Simplify a) 45 : 63 b) 66 : 44 c) 320 : 440**

2) **Write in the form 1 : n a) 5 : 10 b) 4: 6**

3) **Share 64 in the ratio 3 : 5** **4) Write the ratio 1 : 4 as a fraction.**

ANSWERS: 1) a) 5 : 7 b) 3 : 2 c) 8 : 11 2) a) 1 : 2 b) 1 : 1.5

3) 24 : 40 4) $\frac{1}{5}$

3D SHAPES

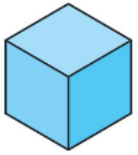
Keywords

Volume: The amount of space that an object occupies.
Net: The net of a 3D shape is what it looks like if it is opened out flat. A net can be folded up to make a 3D shape.
Cuboid: 3D shape with 6 square/rectangular faces.
Vertices: Angular points of shapes.
Face: A surface of a 3D shape.
Edge: A line which connects two faces on a 3D shape.

Year 8

Key Concepts

Cube



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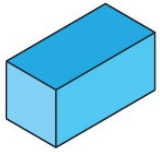
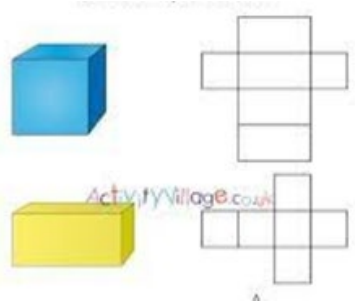
Edges – 12
Vertices – 8

Cuboid



Faces – 6
Edges – 12
Vertices – 8



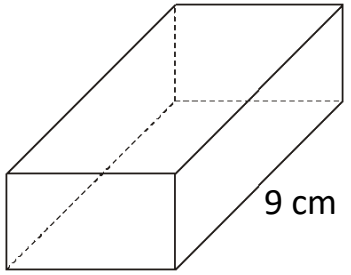
Tip

Remember the units are cubed for volume.

Formula

$$\textbf{Cuboid Volume} = l \times w \times h$$

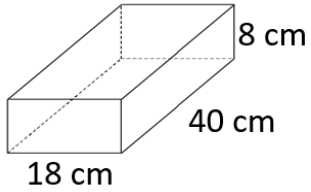
Examples



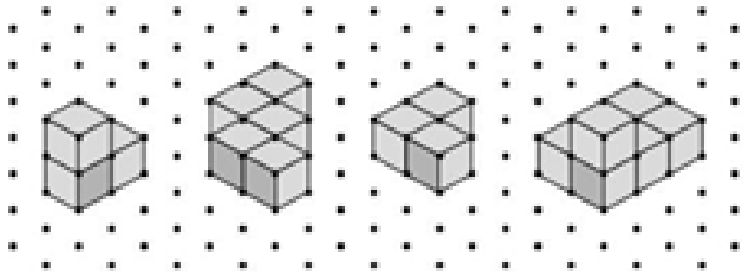
$$Volume = 4 \times 9 \times 2$$
$$= 72cm^3$$

Questions

Find the volume of the cuboid:



Try drawing these on isometric paper:



ANSWERS: Volume = 5760 cm^3

FORMULAE AND NTH TERM

Keywords

Substitution: Replacing letters with numbers

Term: The numbers in a sequence

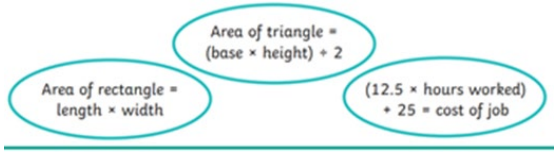
Linear Sequence: A sequence which goes up or down by the same amount

nth term: rule for finding a term in a sequence

Coefficient: The value of a letter, e.g. in 4a the coefficient of a is 4

Key Concepts

A formula is a special type of equation that shows the relationship between different substituted variables. Formulas are often used in geometry to find area and volume.



To find the n^{th} term of a linear sequence we can use Din0:

1st 2nd 3rd 4th 5th

5, 7, 9, 11, 13, 15, …

2 2 2 2

Difference is	2
n	2n
0	2n+5

EXAMPLES

P = 4m – 5

Work out the value of P when m = 7

P = 4 x 7 – 5

P = 28 – 5 = 23

Find the nth term of the sequence 3, 8, 13, 18, 23

3, 8, 13, 18, 23,

Difference is 5, nth term is 5 times tables minus 2.

Nth term = 5n - 2

Questions

1. **T = 5m – 7 find the value of T if (a) m = 3 (b) m = -3**
2. **Find the nth term of (a) 4, 7, 10, 13, 16**

(b) 6, 14, 22, 30, 38

Year 8

Tip

If a sequence is decreasing the nth term will have a negative coefficient of n

ANSWERS: 1(a) 8 (b) -22 2(a) 3n + 1 (b) 8n - 2

PIE CHARTS

Key Words

Discrete Data: Information that can only take certain values

Frequency: The number of times something happens

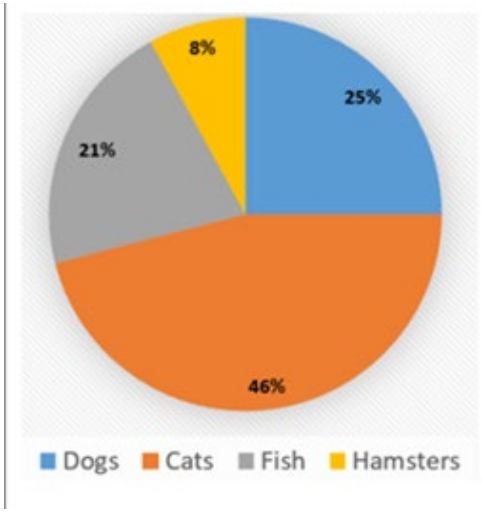
Proportion: The relative size of something compared to a whole

Protractor: Used to accurately draw and measure angles

Key Concepts

Pie Chart:

- **Divided into sectors which shows the relevant size of the data.**
- **Needs a key or labels to clearly show what each sector represents.**
- **Sectors calculated using parts of 360^0.**



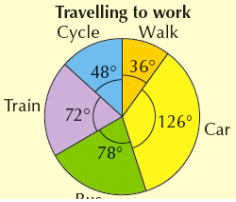
This is a circle divided into sectors. Each sector represents a set of data. Pie charts are excellent for displaying the most / least popular type of something.

Draw a pie chart to represent the data showing how a group of people travel to work.

Set the data out in a frequency table and write the calculations in it.

Now draw the pie chart.

When drawing a pie chart, draw the smallest angle first and try to make the largest angle the last one you draw, then any cumulative error in drawing will not be so noticeable.



Sector (type of travel)	Frequency	Calculation	Angle
Walk	24	$\frac{24}{240} \times 360° = 36°$	36°
Car	84	$\frac{84}{240} \times 360° = 126°$	126°
Bus	52	$\frac{52}{240} \times 360° = 78°$	78°
Train	48	$\frac{48}{240} \times 360° = 72°$	72°
Cycle	32	$\frac{32}{240} \times 360° = 48°$	48°
Total	240		360°

Questions:

The table gives information about the dogs in a village. Draw an accurate pie chart to show this information.

Breed	Frequency
Spaniel	11
Poodle	7
Greyhound	4
Jack Russell	14

Year 8

Tip

Check that your calculated angles add up to 360°

AREA OF COMPOUND SHAPES & TRAPEZIUMS

Key Words

Perimeter: The distance around the outside of the shape.

Area: The amount of square units that fit inside the shape.

Dimensions: The lengths which give the size of the shape.

Shapes:

Rectangle, Triangle, Parallelogram, Trapezium, Kite.

Year 8

Key Concepts

Area:

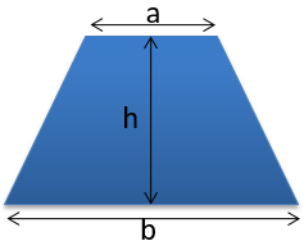
Rectangle:

A = l × w

Trapezium (either):

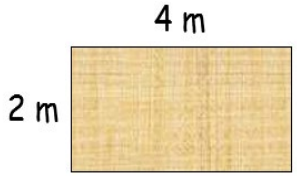
$$\text{Area} = \frac{a+b}{2} \times h$$

$$\text{Area} = \frac{1}{2}(a+b)h$$

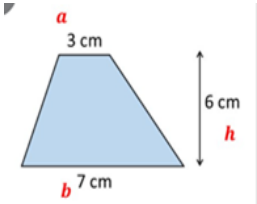


Tip

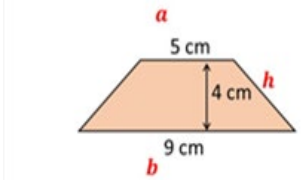
You can work out the area of a trapezium by splitting into a rectangle and triangle(s) but it is quicker to use the formula



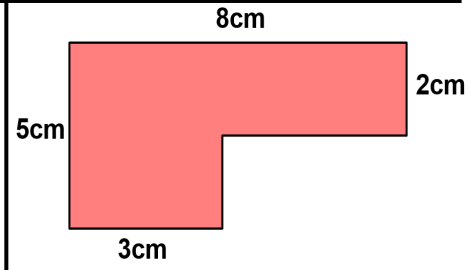
$$Area = 2 \times 4 = 8m^2$$



$$\frac{3+7}{2} \times 6 = 30 \text{ cm}^2$$



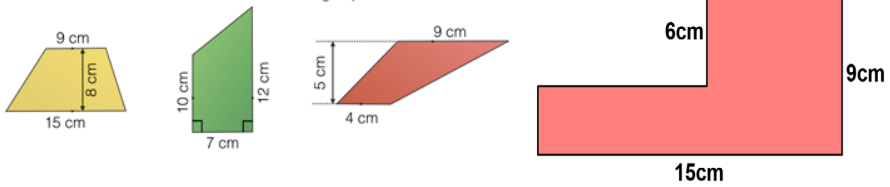
$$\frac{5+9}{2} \times 4 = 28 \text{ cm}^2$$



$$Area = (5 \times 3) + (2 \times 5) = 25cm^2$$

Questions – Find the areas.

Find the area of each of the following trapeziums:



ANSWERS 1) 96 cm² 77 cm² 32.5 cm² 2) 87 cm²

ADDING AND SUBTRACTING FRACTIONS

Key Concepts

To add and subtract fractions the denominators must be the same.

Use common denominators and equivalent fractions to convert them

Converting from a mixed number into an improper fraction:

$$2\ \frac{3}{5} = \frac{(2 \times 5) + 3}{5} = \frac{13}{5}$$

Key Words

Improper fraction: when the numerator is larger than the denominator e.g. $\frac{20}{12}$

Mixed Number: a whole number and a fraction e.g. $2\frac{1}{4}$

Numerator: top numbers

Denominator: bottom number

Convert: change

Examples

$\frac{3}{5} + \frac{2}{7}$

Make the denominators the same

$\frac{3}{5} + \frac{2}{7}$ ×7 ×5

$\frac{21}{35} + \frac{10}{35} = \frac{31}{35}$

$\frac{3}{5} - \frac{2}{7}$

$\frac{3}{5} - \frac{2}{7}$ ×7 ×5

$\frac{21}{35} - \frac{10}{35} = \frac{11}{35}$

$1\frac{2}{3} + 2\frac{1}{4}$

Convert into an improper fraction

$= \frac{5}{3} + \frac{9}{4}$

$= \frac{20}{12} + \frac{27}{12}$

Find a common denominator

$= \frac{47}{12}$

Convert back into a mixed number

$= 3\frac{11}{12}$

$2\frac{2}{3} - 1\frac{1}{4}$

$= \frac{8}{3} - \frac{5}{4}$

$= \frac{32}{12} - \frac{15}{12}$

$= \frac{17}{12}$

$= 1\frac{5}{12}$

Year 8

Calculate:

1) $\frac{3}{5} + \frac{4}{15}$ 2) $\frac{2}{7} + \frac{5}{8}$ 3) $\frac{7}{9} - \frac{2}{5}$ 4) $1\frac{2}{3} + 2\frac{3}{4}$ 5) $3\frac{3}{4} - 1\frac{1}{3}$

ANSWERS 1) $\frac{13}{15}$ 2) $\frac{51}{56}$ 3) $\frac{17}{45}$ 4) $4\frac{5}{12}$ 5) $2\frac{5}{12}$

SOLVING EQUATIONS

Key Concept

Inverse Operations

Operation	Inverse
+	—
—	+
×	÷
÷	×
x^2	$\sqrt{x}$

Key Words

Unknown: A letter which represents a number we do not know the value of.

Terms: The numbers and letters in the expression or equation.

Inverse: The operation which will do the opposite.

Tip

Answers can be in:

- Integers
- Decimals
- Fractions
- Negatives

Examples

$x + 9 = 16$
$-9 \quad -9$
$x = 7$

$x - 12 = 20$
$+12 \quad +12$
$x = 32$

$\frac{x}{3} = 5$
$\times 3 \quad \times 3$
$x = 15$

$2x + 5 = 14$
$-5 \quad -5$
$2x = 9$
$\div 2 \quad \div 2$
$x = 4.5$

$\frac{x}{4} - 2 = 4$
$+2 \quad +2$
$\frac{x}{4} = 6$
$\times 4 \quad \times 4$
$x = 24$

$2(3x + 5) = -14$
expand
$6x + 10 = -14$
$-10 \quad -10$
$6x = -24$
$\div 6 \quad \div 6$
$x = -4$

$2x + 7 = 5x + 1$
$-2x$
(smallest x term)
$+7 = 3x + 1$
$-1 \quad -1$
$6 = 3x$
$\div 3 \quad \div 3$
$2 = x$

Questions

1) $x + 8 = 19$ 2) $y - 25 = 15$ 3) $2y = 82$ 4) $\frac{t}{4} = 7$

5) $\frac{p}{2} - 6 = 2$ 6) $3(2x - 3) = 15$ 7) $4x - 8 = 2x + 1$

ANSWERS: 1) x = 11, 2) y = 40, 3) y = 41, 4) t = 28, 5) p = 16, 6) x = 4, 7) x = 4.5

Year 8

AVOIR [to have]		ÊTRE [to be]	
j' [I]	ai	je	suis
tu [you]	as	tu	es
il/elle[he/she]	a	il/elle	est
nous [we]	avons	nous	sommes
vous you (pl)	avez	vous	êtes
Ils/elles[they]	ont	ils/elles	sont

Opinions & Pronoun phrases

J'aime beaucoup

Je préfère

Ça m'intéresse
Ça m'amuse
Ça me fascine

*Ça me plait
*Ça me rend content(e)

J'ai horreur de

Je n'aime pas du tout

Ça me stresse
Ça m'énerve
Ça m'ennuie
Ça m'embête

*Il aime
*elle pense que
*Nous adorons
*vous trouvez
*ils détestent

Je pense que (c'est...)
Je trouve que..
A mon avis...

Adjectives

actif [ive]	active
amusant [e]	fun
énervant [e]	annoying
intéressant[e]	interesting
relaxant [e]	relaxing
passionnant [e]	exciting
violent	violent
barbant [e]	Boring/tedious
ennuyeux [euse]	boring
nul [le]	rubbish
facile	easy
difficile	difficult
dangereux [euse]	The teacher is nice
sportif [ive]	
génial [e]	great
marrant [e]	Fun / funny

REGULAR PRESENT TENSE

	-ER	-IR	-RE
Je	e	is	s
Tu	es	is	s
Il/Elle/On	e	it	
Nous	ons	issons	ons
Vous	ez	issez	ez
Ils/Elles	ent	issent	ent

Connectives

Aussi /en plus	also / furthermore
Mais / cependant	but / however
que / qui	which
où	where
Parce que /car	because

USEFUL infinitives (verbs)

aimer = to like
adorer = to love
Détester = to hate
penser = to think
Trouver = to find

surfer- to surf (the net)
tchatter = to chat
télécharger = to download
Jouer= to play
parler = to talk
Envoyer = to send

Complexity

Je dois + infintive- I must
Il faut + infinitive – 'one must'..
Je peux + infinitive - I can
Je veux + infinitive -I want
Je voudrais + infinitive – I would love

Quantifiers

très (very); vraiment (truly)
assez (quite); un peu (a bit)
trop (too); tellement (so)

TOPIC VOCABULARY TRANSLATED

Les ordinateurs et les portables • Computers and mobile phones

Qu'est-ce que tu fais ...	*What do you do/are you doing ...*
avec ton ordinateur?	*on your computer?*
avec ton portable?	*on your mobile phone?*
Je joue.	*I play/I'm playing games.*
Je surfe sur Internet.	*I surf/I'm surfing the net.*
Je tchatte sur MSN.	*I chat/I'm chatting on MSN.*
Je regarde des clips vidéo.	*I watch/I'm watching video clips.*
Je télécharge de la musique.	*I download/I'm downloading music.*
J'envoie des SMS.	*I text/I'm texting.*
Je parle avec mes ami(e)s/ mes copains/ mes copines.	*I talk/I'm talking to my friends/mates.*
J'envoie des e-mails.	*I send/I'm sending e-mails.*

La fréquence • Frequency

quelquefois	*sometimes*
souvent	*often*
tous les jours	*every day*
tous les soirs	*every evening*
tout le temps	*all the time*
de temps en temps	*from time to time*
une fois par semaine	*once a week*
deux fois par semaine	*twice a week*

Quand? • When?

en été / hiver	
in summer / winter	
En printemps / automne	
in spring / summer	
quand il fait beau / chaud	
when it's good / hot weather	
quand il pleut / il neige	***when it rains / snows***
quand il fait froid	***when it's cold***
Il y a du soleil	**it is sunny**
Il y a du vent	**it is windy**
Il y a des nuages	**it is cloudy**
Il y a de l'orage	**it is stormy**
Il est variable	**it is changeable**

jouer

Je joue ...	*I play ...*
au foot	
au basket	
au billard	***billiards/snooker***
au tennis de table/ au ping-pong	***table tennis***
à la pétanque/ aux boules	***boules***

faire

Je fais	*I do*
Je fais du parkour.	*I do parkour.*
Je fais du patin à glace.	*I go ice-skating.*
Je fais du vélo.	*I go cycling.*
Je fais de la natation.	*I go swimming.*
Je fais de l'équitation.	*I go horse-riding.*
Je fais des promenades.	*I go for walks.*

The NEAR future tense "going" + infinitives		
je [I]	vais	jouER TO play
tu [you]	vas	retrouvER TO meet
il/elle/on [he/she/spoken we]	va	écoutER **TO** listen to
nous [we]	allons	traînER **TO** hang out
vous you (pl)	allez	téléphonER **TO** phone
Ils/elles[they]	vont	**faire** **TO** do / **TO** go

PRESENT TENSE *with 'aimer'*

J'aim***e***	***I*** like
Tu aim***es***	***you (sing)*** like
Il /elle aim***e***	***he/ she*** likes
On aim***e/ nous*** aim***ons***	***we*** like
Vous aim***ez***	***you*** (plural) like
Ils/elles aim***ent***	***they*** like

Some MORE USEFUL infinitive verbs

sortir avec = to go out with
me balader/ me promener = o go for a walk
aller voir= to go and see
regarder = to watch
rendre visite à … = to visit (someone)
jouer À (des jeux vidéos/ des jeux de société) = to play video games/board

Opinions & Pronoun phrases: Future Tense

Je vais adorER ça!

Je vais détestER ça!

1. **Ça VA m'intéressER.**
2. **Ça VA m'amusER.**
3. **Ça VA me fascinER.**
4. **Ça VA me plaiRE.**
5. **Ça VA me rend content(e).**

Je ne vais pas DU TOUT aimER ça!

6. **Ça VA me stressER**
7. **Ça VA m'énervER**
8. **Ça VA m'ennuyER**
9. **Ça VA m'embêtER**

Je pense que ÇA SERA …
Je trouve que ÇA SERA …
A mon avis ÇA or CELA sera…

Connectives

aussi /en plus	also / furthermore
mais / cependant	but / however
que / qui	which
où	where
parce que /car	because

Complex structure

DE LA danse? J' EN fais/ J'aime EN faire

DU vélo? Je N'EN fais PAS/ Je n'aime pas EN faire.

Time TAGS

Le matin	In the morning
L'après-midi	In the afternoon
Le soir	In the evening
Le week-end	At the weekend
Pendant la semaine	During the week
Tous les week-ends	Every week-end

FUTURE TENSE Time TAGS

Demain	Tomorrow
Le week-end prochain	Next weekend
La semaine prochaine	Next week
Demain matin/soir	Tomorrow am/eve

More Quantifiers + ADJECTIVES

extrêmement (extremely);
réellement (really/genuinely)
peu (litte);
si/tellement (so);

Y8_Autumn 2_ Qu'est-ce que tu aimes faire?

TOPIC VOCABULARY TRANSLATED

Qu'est-ce que tu aimes faire?	• What do you like doing?
le soir/le weekend	*in the evenings/ at the weekends*
le samedi matin/ après-midi/soir	*on Saturday mornings/ afternoons/evenings*
J'aime ...	*I like ...*
... retrouver mes amis en ville.	*... meeting my friends in town.*
... regarder la télévision (la télé).	*... watching TV.*
... jouer sur ma PlayStation.	*... playing on my PlayStation.*
... écouter de la musique.	*... listening to music.*
... faire les magasins.	*... going shopping.*
... faire du sport.	*... doing sport.*
... jouer au football.	*... playing football.*
... traîner avec mes copains.	*... hanging out with my mates.*
... téléphoner à mes copines.	*... phoning my mates.*

FAIRE DU ...

1. **bricolage** (DIY)
2. **codage** (coding)
3. **jardinage** (gardening)
4. **shopping**
5. **ski** (skiing)
6. **ski nautique** (waterskiing)
7. **sport** (sport)
8. **tricot** (knitting)
9. **vélo** (cycling/biking)
10. VTT (mountain biking)

DU + NOUNS = MASCULINE nouns (le...)

FAIRE DE LA ...

1. **bicyclette** (cycling)
2. **boxe** (boxing)
3. **danse** (dancing)
4. **cuisine** (cooking)
5. **lecture** (reading)
6. **marche** (walking)
7. **musique** (music)
8. **natation** (swimming)
9. **pâtisserie** (baking)
10. **randonnée** (hiking)

DE LA + NOUNS = MASCULINE nouns (le...)

FAIRE DE L'

1. **équitation** (horseriding)
2. **escalade** (climbing)
3. **escrime** (fencing)

DE L' + NOUNS = STARTING with a vowel

FAIRE + plural nouns

1. **mes devoirs** (my homework)
2. **des courses** (shopping)
3. **des promenades** (walks)
4. **des balades** (walks)
5. **les magasings/les boutiques** (shopping)

À la télé / les films	**On TV / films**
Mon émission préférée, c'est …	*My favourite programme is …*
je ne regarde jamais	*I never watch*
je ne rate jamais	*I never miss*
je regarde …	*I watch …*
mon acteur préféré, c'est …	*my favourite actor is …*
mon film préféré, c'est …	*my favourite film is …*

Normalement on peut regarder beaucoup de choses.
J'aime regarder la télé car c'est informatif.
Je préfère regarder les infos, parce que c'est utile.

Je suis fan des films d'action car ils sont passionnants.
Mon film préféré, c'est Spiderman car c'est divertissant.

Normalement, le soir après avoir mangé, je joue en ligne. Mais le week-end je fais des quiz et ça me plaît car c'est rigolo .

Hier soir, avant de me coucher, j'ai écouté de la musique et aussi j'ai surfé sur internet. Je pense que c'était nul et ça m'a énervé à mon avis.

Hier soir **Last night**
discuter
écouter la radio.
envoyer des SMS.
jouer à des jeux en ligne.
poster des photos.
regarder la télé/des clips vidéo.
surfer sur Internet.
tchatter sur MSN
télécharger des chansons.

……
……
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REGULAR PRESENT TENSE

	-ER	-IR	-RE
I / Je	e	is	s
You / Tu	es	is	s
He/she / Il/Elle/On	e	it	
We / Nous	ons	issons	ons
You all / Vous	ez	issez	ez
They / Ils/Elles	ent	issent	ent

How to form the future tense with ALLER…

- You will need to remember one easy formula:

1 subject	+	2 present tense of aller	+	3 infinitive
I / Je		vais		manger
You / Tu		vas		jouer
He/she / il / elle / on		va		faire
We / Nous		allons		regarder
You all / Vous		allez		finir
They / ils/elles		vont		aller

Opinions & Pronouns

Ça m'a amusé – it amusED me

Ça m'a énervé –it GOT on my nerves

Je suis fan de … ***I'm a fan of …***

je ne suis pas fan de … ***I'm not a fan of …***

j'ai une passion pour les … ***I have a passion for …***

j'ai horreur des … ***I really dislike …***

Frequencies

d'abord	*first of all*
Deuxièmement	*secondly*
ensuite/puis	*next/then*
Plus/moins de temps	*most/less of the time*
après	*afterwards*
finalement	*finally*
aujourd'hui	*today*
hier	*yesterday*
avant-hier	*the day before yesterday*
(mardi) dernier	*last (Tuesday)*

Adjectives

C'était comment? **What was it like?**

C'était … *It was …*
J'ai trouvé ça … *I found it …*

amusant	*funny*
assez bien	*quite good*
barbant	*boring*
chouette	*excellent*
effrayant	*frightening*
émouvant	*moving*
ennuyeux	*boring*
génial	*great*
intéressant	*interesting*
nul	*rubbish*
passionnant	*exciting*
pratique	*practical*
stupide	*stupid*
formidable	*great*
idiot	*stupid*

Le film était plus amusant que lza télé
L'émission de sport était moins amusantE que le film
Les films étaient intéressants

Perfect Tense **Regular Verbs**

	Subject	Avoir	Past participle
I	J'	ai	Take off ending from infinitive:
You	Tu	as	
He/she	Il/elle	a	-er verbs = é
We	Nous	avons	-ir verbs = i
You all	Vous	avez	-re verbs = u
they	Ils/elles	ont	

Irregular verbs with avoir

Eu – had
Bu – drank
Vu – saw

Complexity

On peut + inf - you can…
On peut lire - you can lire
On peut voir - you can see
Après avoir mangé – after having eaten
Après avoir visité – after having visited
Avant de visiter – before visiting

8I Fluids

1. The Particle Model

States of Matter	The three forms that a substance can be in; solid, liquid or gas.
Solid Properties	Do not flow, fixed shape, fixed volume, cannot be compressed
Liquid Properties	Can flow, no fixed shape, fixed volume, cannot be compressed
Gas Properties	Can flow, no fixed shape, no fixed volume, can be compressed
Particle Theory	Used to explain the different properties and observations of solids, liquids and gases.
Solid Particle Properties	Fixed arrangement of particles held closely together that cannot move over each other but vibrate. 
Liquid Particle Properties	Held closely together but not in a fixed arrangement and can move over each other. 
Gas Particle Properties	Far apart from each other and free to move about in all directions. 
Diffusion	The movement of particles spreading out and mixing with each other without anything moving them.
Brownian Motion	An erratic movement of small specks of matter caused by being hit by the moving particles that make up liquids or gases.
Expanding	Materials expand when heated because the particles vibrate more, taking up more space.
Contract	Materials contract when cooled because the particles vibrate less and take up less space.
Density	The mass of a certain volume of a material. $density = \frac{mass}{volume}$

2. Changing State

Changes of State	Changing from one state of matter to another. Physical changes because no new chemicals are made.
Melting	Turning from a solid to a liquid- occurs at melting point
Freezing	Turning from a liquid to a solid- occurs at freezing point
Condensing	Turning from a gas into a liquid.
Sublimation	Turning from a solid to a gas.
Evaporation	Turning from a liquid into a gas. Can occur at the surface of a liquid at any temperature.
Boiling	When evaporation occurs within a liquid- occurs at the boiling point
Pure	A substance made up of a single type of atom or compound.
Pure Substances Changing State	Occurs at a set temperature. The temperature stays constant when changing state as bonds are broken or made.
Mixtures Changing State	Occurs over a range of temperatures as it contains substances with different melting/boiling points.
Water	Contracts as it is cooled up until 4°c and then it expands slightly. Ice takes up more space than water and is less dense

3. Pressure in Fluids

Fluids	Liquids and Gases
Pressure	The force of particles hitting things- comes from all directions in gases and liquids.
Pressure Units	**Pascals (Pa)** One pascal is the a force of one newton on every square metre.
Atmospheric Pressure	The pressure of the air- 100,000 Pa
Tyres	Contain air under high pressure because they are pumped with extra air causing more particles to hit the inside walls.
Temperature	Pressure in fluids increases as you increase temperature because particles move faster and hit the walls of the container harder.
Volume	If you compress a gas into a smaller volume the pressure increases because the particles hit the walls more.
Pressure From Above	As you go down the ocean there is more water above you so pressure increases. As you go up a mountain there is less air above you so pressure decreases.

4. Floating and Sinking

Upthrust	The force of water pushing upwards.
Weight	The amount of force with which gravity pulls on a mass.
Water	The density of water is 1 g/cm^3
Floating	If something has a density less than water it will float in water.
Sinking	If something has a density greater than water it will sink in water.
Air	The density of air at sea level is around 0.001 g/cm^3
Hot Air Balloons	Fly because the overall density of the balloon is less than the air around it.

5. Drag

Drag	A resistance force acting on an object to slow it down.
Water Resistance	Type of drag that occurs in water.
Air Resistance	Type of drag that occurs in air.
Friction	Partly causes the drag on a moving object.
Streamlined	Smooth shape to reduce air / water resistance.
Speed	The faster an object is moving, the greater the drag.
Balanced Forces	Equal forces acting in opposite directions.
Engine	Forward force of an engine needs to balance the drag.

8F The Periodic Table

1. Dalton's Atomic Model

Matter	All things are made of matter.
John Dalton	(1766-1844) An English chemist.
Dalton's Atomic Theory	• all matter is made up of atoms. • atoms in an element are identical. Each element has its own type of atom. • atoms cannot be destroyed or created. • In compounds each atom is always joined to a fixed number of other atoms. • atoms rearrange during chemical reactions to form new substances.
Atoms	Small particles that all matter is made up of.
Element	A substance made up of one kind of atom.
Compound	Contains atoms of two or more different elements chemically joined together.
Physical Properties	The properties that describe a substance on its own. *(colour, strength, density, etc.)*
Physical Changes	A change in which no new substances are formed.
Symbols	Letters used to represent the elements. *e.g. C represents Carbon*

2. Chemical Properties

Chemical Properties	How a substance reacts with other substances.
Hypothesis	An idea about how something works that can be tested using experiments.
Prediction	What you think will happen in experiment and why.
Conserving Mass	The mass of the products of a reaction will be the same as the mass of the reactants.
Chemical Formulae	The combination of symbols and numbers that shows how many atoms of different element are in a particular molecule. *e.g. water is H_2O*
Ratio	Comparison of the proportion of two quantities *e.g. in water there are 2 hydrogens for every oxygen, the ratio is 2:1*

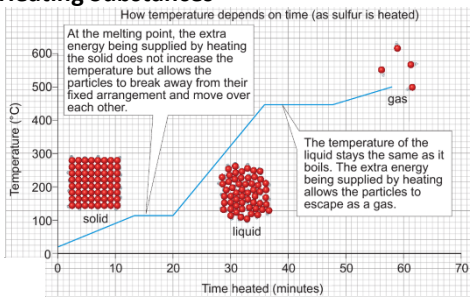
3. Mendeleev's Table

Johann Döbereiner	(1780-1849) German chemist who highlighted some groups of 3 elements had similar physical / chemical properties.
John Newlands	(1837-1898) English chemist who ordered elements by the mass of atoms and noticed every 8th element has similar properties.
Dmitri Mendeleev	(1834-1907) Russian chemist who published the first periodic table by ordering elements by increasing masses of their atoms forming groups of similar properties.
Gaps	Mendeleev left gaps in his table for undiscovered elements and predicted their properties.
Group	A vertical column in the Periodic Table- contains elements with similar properties.
Alkali Metals	Group 1 Very reactive metals, they even react with water.
Halogens	Group 7 React with most metals to form solid compounds.
Noble Gases	Group 0 Unreactive gases

4. Physical Trends

Melting Point	When a substance changes from a solid into a liquid
Boiling Point	When a substance changes from a liquid into a gas.
Freezing Point	When a substance changes from a liquid into a solid- the same as the melting point.

Heating Substances



Periods	The horizontal rows in the Periodic table.
Transition Metals	Block of elements in the middle of the Periodic table- separates the eight main groups.
Metal Properties	High melting points, strong, flexible, malleable, shiny, good conductors.
Non-Metal Properties	Low melting points, brittle, dull, poor conductors.

5. Chemical Trends

Alkali Metals & Water	Alkali metals produce metal hydroxides and hydrogen when reacting with water. *(sodium + water → sodium hydroxide + hydrogen)*
Alkali Metals & Oxygen	Alkali metals produce metal oxides when reacting with oxygen. *(lithium + oxygen → lithium oxide)*
Reactivity	How quickly / vigorously something reacts.
Alkali Metal Reactivity	As you move down the group the reactivity increases.
Oxides	Formed when elements react with oxygen.
Oxide Trends	When we dissolve oxides in water there is a trend in their pH. Further to the left of the Periodic table oxides formed are more alkaline. Further to the right they are more acidic.

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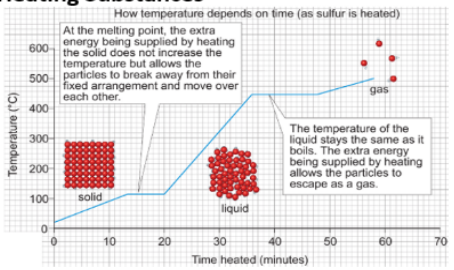

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8J Light

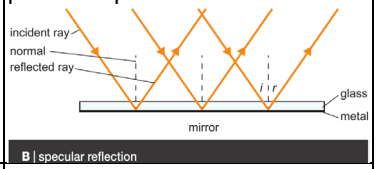
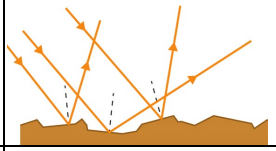
1. Light on the move

Vacuum	A completely empty space, containing no particles.
Matter	All things are made of matter. There are three states of matter: solid, liquid, gas.
Longitudinal wave	A wave where the particles vibrate in the same direction as the wave is travelling. 
Transverse wave	A wave where the vibrations are at right angles to the direction the wave is travelling. 
Ray	A narrow beam of light, or an arrow on a diagram representing the path of light and the direction in which it is travelling.
Transparent	A material that light can travel through without scattering. (Note: transparent substances may be coloured or colourless.)
Transmit	To pass through a substance.
Reflect	To bounce off a surface instead of passing through it or being absorbed.
Absorb	'To soak up' or 'to take in'.

Translucent	Material that lets light through but scatters it. You cannot see things clearly through translucent materials.
Opaque	Material that does not let light through. It is not possible to see through an opaque substance.
Scattered	Scattering occurs when light or other energy waves pass through an imperfect medium (such as air filled with particles of some sort) and are deflected from a straight path.
Reflected ray	A ray of light bouncing off a mirror.
Source	Where a sound wave or other wave begins.
Image	A picture that forms in a mirror or on a screen, or is made by a lens. You see an image when looking down a microscope.
Pinhole camera	A piece of apparatus that forms an image of an object on a screen when light rays travel through a tiny hole in the front
Shadow	A place where light cannot get to, because an opaque object is blocking the light.

2. Reflection

Plane mirror	A smooth, flat mirror.
Ray box	A piece of equipment that produces a narrow beam of light.

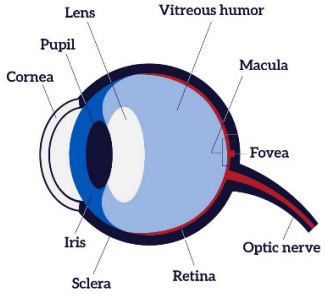
Ray tracing	A method of investigating what happens to light by marking the path of a light ray.
Ray diagram	A diagram that represents the path of light using arrows.
Normal	An imaginary line at right angles to the surface of a mirror or other object where a ray of light hits it.
Incident ray	A ray of light going towards the mirror or other object.
Reflected ray	A ray of light bouncing off a mirror.
Angle of incidence	The angle between an incoming light ray and the normal.
Angle of reflection	The angle between the normal and the ray of light leaving a mirror.
Specular reflection	When light is reflected evenly, so that all reflected light goes off in the same direction. Mirrors produce specular reflection.  B | specular reflection
Diffuse reflection	Reflection from a rough surface, where the reflected light is scattered in all directions. 
Law of reflection	The angle of incidence is equal to the angle of reflection.

3. Refraction

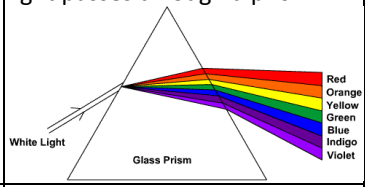
Refraction	The change in direction when light goes from one transparent material to another.
Interface	The boundary between two materials.
Lens	A curved piece of glass or other transparent material that can change the direction of rays of light.
Converging lens	A lens that makes rays of light come together.
Angle of refraction	The angle between the normal and a ray of light that has been refracted.
Focal point	The place where parallel rays of light are brought together by a converging lens.
Focal length	The distance between the centre of the lens and the focal point.

4. Cameras and eyes

Digital camera	A camera that uses electronics to record an image.
Sensor	An instrument that detects something. In a digital camera, the sensors detect light and change it to electrical signals.
Memory card	Part of a digital camera that stores the images.
Aperture	A hole in a camera that controls how much light goes to the sensor.
Shutter	A device that shields and protects the sensor in a digital camera. It opens when the picture is taken.

Human eye	
Retina	The part at the back of the eye that changes energy transferred by light into nerve impulses.
Pupil	The hole in the front of the eye that light can pass through.
Rod cell	A cell in the retina that detects low levels of light. It cannot detect different colours.
Cone cell	A cell in the retina that detects different colours of light.
Cornea	The transparent front part of the eye, which covers the iris and pupil.
Iris	The coloured part of the eye.
Optic nerve	The nerve that takes impulses from the retina to the brain.
Primary colour	One of three colours that are detected by the cone cells in our eyes. The primary colours are red, green and blue.
Secondary colour	A colour made when two primary colours mix. The secondary colours are magenta, cyan and yellow.

5. Colour	
White light	Normal daylight, or the light from light bulbs, is white light.

Frequency	The number of vibrations (or the number of waves) per second. Different frequencies of light have different colours.
Spectrum	The seven colours that make up white light.
Dispersion	The separating of the colours in light, for example when white light passes through a prism. 
Prism	A block of clear, colourless glass or plastic. Usually triangular.
Filter (physics)	Something that only lets certain colours through and absorbs the rest.

8K Energy Transfers

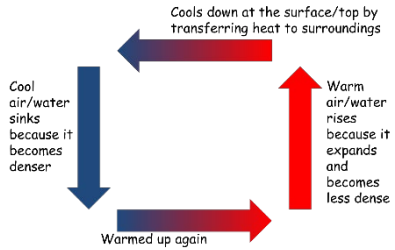
1. Temperature Changes

Temperature	How hot or cold an object is. *Measured in degrees Celsius (°C)*
Internal / Thermal Energy	The energy stored in the movement of particles. *Measured in Joules (J)*
Factors Affecting Amount of Internal Energy Stored	• temperature • material • mass
Energy Transfer	Always from a hotter object to a cooler one.
Evaporation	When a liquid turns into a gas. A way of transferring energy.
Cooling by Evaporation	The fastest moving particles escape a liquid to form a gas. The particles left are storing less energy so the temperature of the remaining liquid is lower.

2. Transferring Energy

Transferring Energy	Energy can be transferred by heating via evaporation, conduction, convection and radiation.
Radiation	A way of transferring Energy by heating through waves (it does not need a medium).
Emitting Radiation	All things give out (emit) infrared radiation, the hotter it is the more it emits.
Thermal Images	Instruments that measure infrared radiation and convert into maps of temperatures.
Conduction	When a solid is heated the particles vibrate more and these vibrations are passed through the solid transferring energy.
Thermal Conductors	Energy is transferred easily through them- metals.
Thermal Insulators	Energy is not transferred through them easily- wood / plastic.
Convection	In fluids (liquids and gases) when part of it is heated it become less dense and rises. Cooler fluid moves in to take its place and a convection current forms.

Convection Diagram



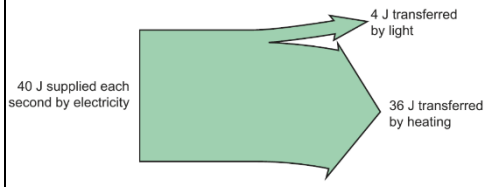
3. Controlling Transfers

Cold Climates	Houses are kept warm by burning fuel for heating and insulating houses to keep warmth inside.
Good Insulators	Brick, wood, carpet, feathers, wool.
Air	A very poor conductor because the particles are far apart
Hot Climates	Houses are kept cool by painting them white (light and shiny surfaces reflect infrared radiation).
Solar Panels	Painted black because dark colours absorb and emit infrared radiation well.
Vacuum Flask	Designed to reduce energy transfers and keep contents hot: • Plastic stopper to stop convection (and it is an insulator). • Glass walls with silver coating reflect radiation back in. • Vacuum between walls so no conduction or convection can occur.

4. Power and Efficiency

Power	The amount of energy transferred by an appliance per second.
Watts (W)	The units for measuring power. 1000W = 1kW (kilowatt)
Power Ratings	Tell us how much energy an appliance transfers.
Efficiency	The amount of useful energy transferred by a device compared with the amount of energy supplied to it.
Sankey Diagram	A diagram that represents energy transfers.

Sankey Diagram Example



Efficiency Formula

$$\text{efficiency} = \frac{\text{useful energy transferred}}{\text{total energy supplied}} \times 100\%$$

5. Paying for Energy

Kilowatt-hour (kWh)	The amount of energy transferred in 1 hour by an appliance. Used by energy companies to measure energy use.

Energy Use Formula

$$\underset{\text{(kWh)}}{\text{energy use}} = \underset{\text{(kW)}}{\text{power rating}} \times \underset{\text{(hours)}}{\text{time}}$$

Saving Money on Electricity / Gas Bills	Not using as much energy will save money. Insulating houses and using more efficient appliances will help with this.
Payback Time	How long it will take you to save the money that an efficiency measure costs.
Payback Time Formula	$\text{payback time} = \frac{\text{cost of change}}{\text{saving per year}}$

8L Earth and Space

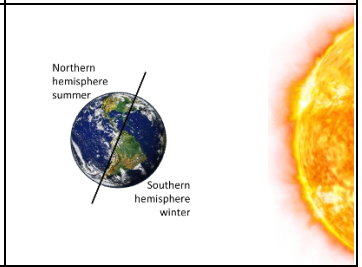
1. Gathering the Evidence

Astronomer	A scientist that studies space.
Early Astronomers	Could only use their eyes to make observations.
Ptolemy	Egyptian astronomer (*90-168*) Proposed a model with the Earth in the centre and the Moon, Sun and planets orbiting the Earth.
Nicolaus Copernicus	Polish astronomer (*1473-1543*) Suggested the Earth and other planets move in circles around (orbit) the Sun.
Reaction to Copernicus' Model	It was not accepted straight away. However observation made by Galileo using one of the first telescopes provided more evidence to support it.
Johannes Kepler	German astronomer (*1571-1630*) Proposed the model used today. The Sun is at the centre with the planets moving around in elliptical orbits. Moons orbit planets.

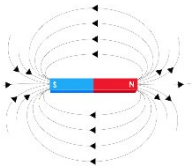
The Model of the Solar System

Phases of the Moon	The Moon appears different shapes at different times due to its position relative to the Earth and Sun. 
Spacecraft	Allowed scientists to investigate space more by collecting samples and taking readings on other planets.

2. Seasons

Summer	Longer days than nights, Sun high in the sky.
Winter	Longer nights than days, Sun not very high in the sky.
Cause of Seasons	Due to the tilt of the Earth's axis by 23.5°.
Causing Summer	When the northern hemisphere is tilted towards the Sun it is summer in the UK.
Causing Winter	When the northern hemisphere is tilted away from the Sun it is winter in the UK.
Causing Seasons Diagram	
Summer Sun	Because the Sun is higher in the sky in summer the heat is more concentrated, making it feel warmer

3. Magnetic Earth

Compass	A magnet that points north.
North-Seeking pole	The end of a bar magnet that points north- shortened to north pole.
South-Seeking pole	The end of a bar magnet that points south- shortened to south pole.
Attract	When two magnets are pulled together. Opposite poles will attract each other.
Repel	When two magnets are pushed apart. The same poles will repel each other.
Magnetic Field	The area around a magnet where it has an effect. Can be found using iron filings or a small compass.
Magnetic Field Diagram	
Magnetic Field Strength	Strongest closest to each pole, the field gets weaker as you get further from the magnet.
Magnetic Field Direction	The direction of a magnetic field is always from the north pole towards the south pole.

4. Gravity in Space

Gravity	Force exerted by all objects with mass trying to pull other objects towards it.
Bigger Mass	The bigger the mass of an object, the stronger the force it exerts.
Weight	The force of gravity pulling on you. *Measured in Newtons (N)*
Gravitational Field	The space around the Earth where gravity attracts things.
Gravitational Field Strength (*g*)	At the surface of the Earth it is about 10 newtons per kilogram (N/kg).
Weight Formula	Weight = mass x g
Gravity and Orbits	The force of gravity keeps the Earth in its orbit of the Sun.
Satellite	Anything that orbits a planet.
Natural Satellite	Moons are examples of natural satellites.
Artificial Satellite	Can be put into orbit around Earth for photographing / transmitting TV programs etc

5. Beyond the Solar System

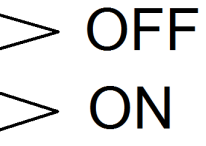
Constellation	Pattern of stars
Stars	Huge balls of gas that give out large amounts of energy. The Sun is a star.
Stars At Night	Appear less bright than the Sun because they are further away.
Galaxies	Large groups of stars.
Milky Way	The galaxy our Sun is in.
Universe	Made up by all of the millions of galaxies.
Light Year	Measurement of distance- the distance travelled by light in 1 year. Approximately ten million million kilometres.
Proxima Centauri	Nearest star to the Sun, about 4.22 light years away.

Binary – Data

Key Words	
Binary number	A number system that contains two symbols, 0 and 1. Also known as base 2
Base 2	A number system where there are only 2 digits to select from. 0 – 1 as this is all binary can understand.
data	Units of information. In computing there can be different data types, including integers, characters and Boolean. Data is often acted on by instructions.
Denary (also known as decimal)	The number system you use. It contains 10 unique digits 0 to 9. Also known as decimal or base 10
Base 10	The number systems that we/humans use. Numbers 0-9 as it can make any number combination from that.

Binary Rules	Carry
0 + 0 = 0	0
0 + 1 = 1	0
1 + 0 = 1	0
1 + 1 = 0	1

Conversion table	128	64	32	16	8	4	2	1
Example binary number	0	0	0	1	0	1	1	1

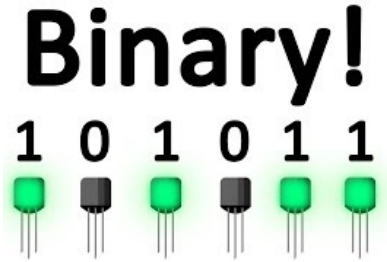


Representing information with sequences of symbols, is necessary for storing, exchanging and processing information. Information in computers must be represented in a form convenient for processing.

Humans have invented lots of different ways to code information using different sounds, symbols or even lights!

Computers represent all data, including numbers, letters, symbols, images, videos and sounds using binary

0s and 1s are called binary digits, or bits. All characters are represented using sequences of bits.



Computers only use the two symbols 0 and 1 because all computers are built out of electrical switched which can only be on (1) or off (0).

ASCII – American Standard Code for Information Interchange

ASCII is a character set that uses numeric codes to represent characters. These include upper and lowercase English letters, numbers, and punctuation symbols. Example: a capital "T" is represented by 84, or 01010100 in binary.

HTML

Key Words	
World Wide Web	Collection of webpages connected together by hyperlinks, using the Internet (Usually shortened to WWW)
Internet	A global network of computers all connected together
Webpage	A hypertext document connected to the world wide web
Website	A collection of webpages with information on a particular subject
Web browser	The software which displays a webpage or website on a computer
Uniform Resource Locator (URL)	An address that identifies a particular file or webpage on the internet
HTML	Hyper Text Mark-up Language – describes and defines the content of a webpage
Web script	A type of computer programming language used to add dynamic features to a webpages
Multimedia	Content that uses a combination of different types of media – for example, text, audio, images
Hyperlink	A link from a hypertext document to another location, activated by clicking on a highlighted word or image
Hotspot	An area on a computer screen which can be clicked to activate a function, especially an image or piece of text acting as a hyperlink
Navigation	The elements of a website that allows the user to move around the website. This is usually in the form of a menu or hyperlinked text or buttons
JPG	The main file type used for mages on the world wide web – uses lossy compression
PNG	Another type of image file used on the world wide web – supports transparency and uses lossless compression

Definitions: What does it do?	
<html>	Root of a HTML document
<body>	Contents of the page
<head>	Information about a page
<title>	Table title/defines title
<h1>,<h2>,<h3>	Headings
<p>	Paragraph
<img>	Image
<a>	Anchor (used in hyperlinks with href)
,	Order/unordered list
	List item
<table>	Creates and defines table
<tr>	Table row
<td>	Table data
	Bold
 	Linebreak
	Divider
<!-- -->	Comment

Python

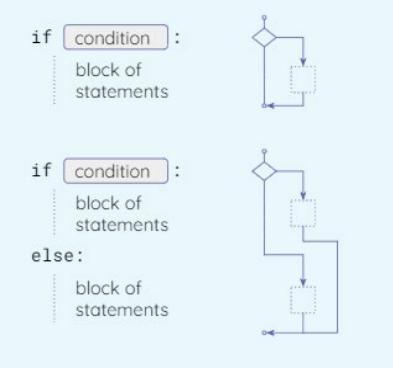
Python is a **text** based **programming language**. That can be used to create programs, games, applications and much more!

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.

A **selection** statement allows a computer to **evaluate** whether an **expression** is 'true' or 'false' and then perform an action depending on the outcome.



Arithmetic operators
+ addition
- difference
* multiplication
/ division
// integer division

Key Terms

selection **algorithm**

iteration **sequence**

logical operators

input **variable**

Arithmetic

output

You can use multiple branches using if, elif and else

Python helps by telling the programmer where the error is.
So if you see red error text—read it first.

Definitions	
Variable	Stores a value/data – Can be changed during the program
Float (FLOAT)	Decimal point
Integer (INT)	Whole number
Boolean (BOOL)	True or False
String (STR)	Letters, numbers, symbols inside speech marks
Data types	The different data that can be stored in a variable
Sequence	A set of instructions or rules that an algorithm uses have to be in the right order.
Syntax Error	A syntax error is a mistake in your Python program that prevents it from running (executing). Syntax errors are like spelling/grammar errors or logic error

Syntax Errors
All programming languages have rules for **syntax**, i.e. how statements can be assembled. Programs with **syntax errors** cannot be translated and executed.

Mobile App Development

Key Words	
abstraction	Identify the important aspects to start with
algorithm	Precise sequence of instructions
Application (app)	Software designed to run on a mobile device
Computational thinking	Solving problems with or without a computer
debugging	Looking at where a program might have errors or can be improved
blocks	Scratch bricks that we can use to code algorithms
decomposition	Breaking down a problem into smaller parts
execute	A computer precisely runs through the instructions
GUI	Graphical User Interface
iteration	Doing the same thing more than once
selection	Making choices
sequence	Running instructions in order
variable	Data being stored by the computer

Sequence, **selection** and **iteration** are all processes. In order for computers to perform tasks there is more that is needed. For example a computer will take an **input** (this might be automatic or via human input) which the computer will then **process** and the **output** will be visible on the computer monitor.

A mobile application, most commonly called an app, is a type of application software designed to run on a mobile device, such as a smartphone or tablet computer.

App Lab is a **block or text based programming language**. This allows creation and sharing of apps.

The point of an app is to connect and interact with users.
App creators tend to have an idea, a problem or a task that they want to develop user an app. These can be huge or relatively small ideas.
Decomposing the problem helps us make the task less daunting and more achievable. This involves breaking down the task into smaller more manageable parts to start with.

Most computers have an environment with tiles, icons and/or menus. These allow users to interact.
This type of interface is called the **graphical user interface (GUI)** because the user interacts with images through a mouse, keyboard or touchscreen.
The GUI needs careful design consideration so that the user experience is a positive one so they want to continue to use it.

Making sure the app is successful and actually does what it was intended to do is important.
Setting **success criteria** should be determined at the start of the project and can be revisited frequently.
The success criteria should be clear and easy to follow.

Evaluating and **debugging** allow for judging the quality of the app and enables errors to be corrected and improvements to be made.

COMPUTING SYSTEMS

Modern computer systems receive an input, process that data and then produce an output. The data can be sored in memory. They are designed to automate any process by a program. To execute programs that operate on data.

Computing systems need a **processor**, **memory**, and **storage**. Modern systems also rely heavily on **communication** between them.

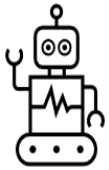
Modern computer systems receive an input, process that data and then produce an output. The data can be sored in memory. They are designed to automate any process by a program. To execute programs that operate on data.

Communication Computing systems exchange information and form networks
Programs and **data** are transferred between computing systems, when required.

Artificial Intelligence (AI)

Machine Learning

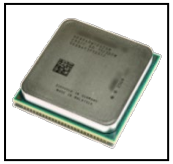
"AI has by now succeeded in doing essentially everything that requires 'thinking' but has failed to do most of what people and animals do 'without thinking' – that, somehow, is much harder!"
Donald Knuth, author of *The Art of Computer Programming, in **1981***



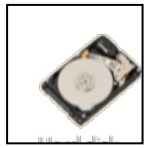
Hardware

CPU – Central Processing Unit
It is known as the 'brains of the computer' that processes program instructions

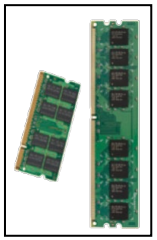
An instruction may:
- Perform arithmetic or logic operations on data
- Perform input/output of data



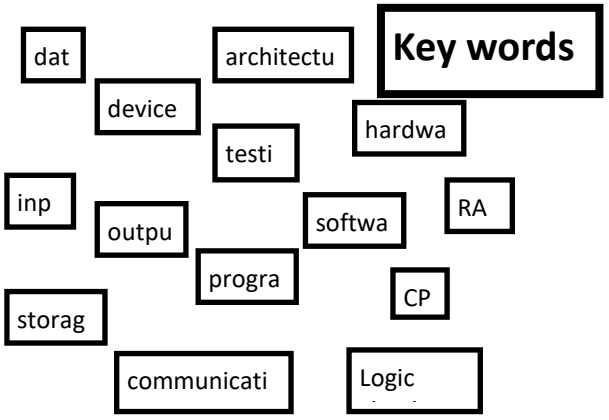
The **storage** (secondary memory) is the set of components that **stores** programs and data.
Storage is **persistent**: it retains its contents when the power is off.



Volatile (RAM) - Only stores information to run programs when computer is on
Non- volatile (ROM) - retains data even when the computer is switched off

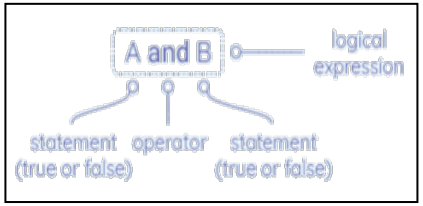


Key words

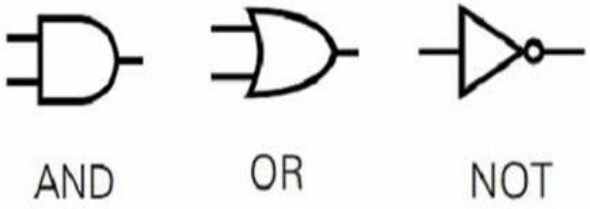


Logical

Logical operations operate on statements that are **true** or **false**. There are three basic logical operations. AND OR NOT



Logical expressions — **logic circuits** can be represented using diagrams
Logical operations — **logic gates** can be represented using symbols



Operating Systems
All hardware needs an operating system. It is responsible for managing the hardware and providing an environment for programs to run in.

It manages: Files, Hardware, software, memory

Examples: IOS, Windows, Android, MacOS, Linux

Literacy / key words

Microorganisms:

An organism that can be seen only through a microscope. They include bacteria, mould, and fungi.

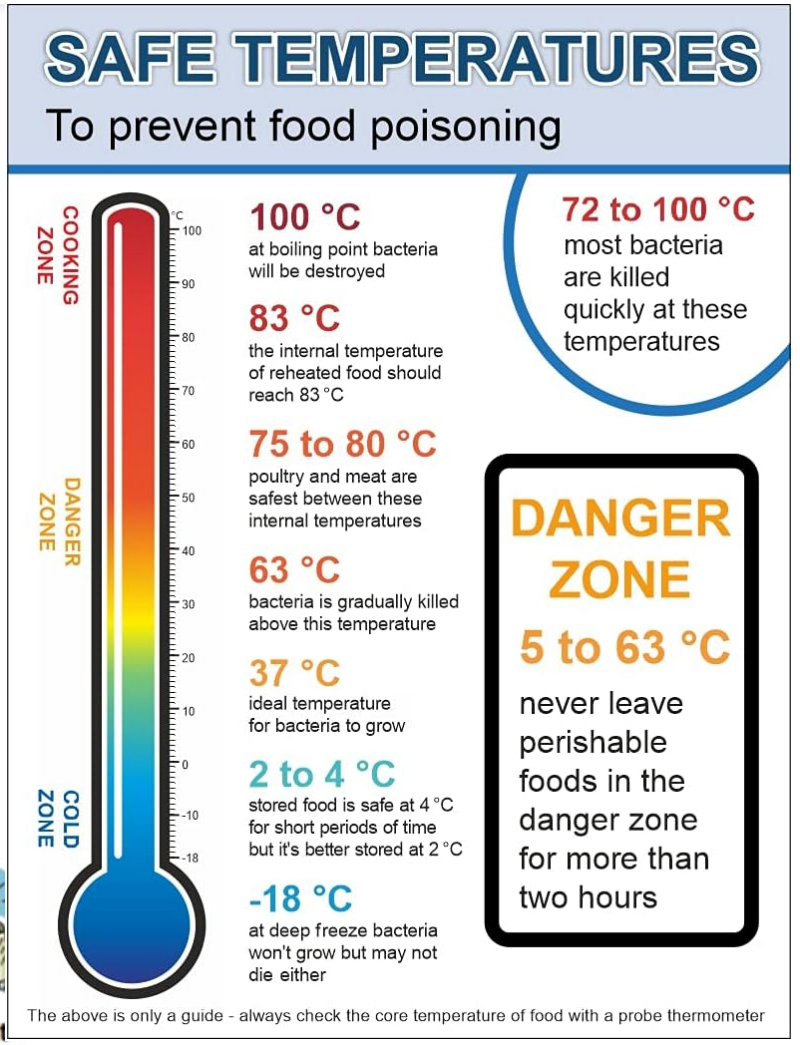
Fermentation: Yeast + FATTOM = Carbon dioxide & Alcohol.

Pathogens: Bad bacteria which can cause illness.

Danger Zone: The range at which bacteria will grow 5°C to 63°C.

Eat Well Guide:

The Eatwell Guide shows how much of what we eat overall should come from each food group to achieve a healthy, balanced diet. You do not need to achieve this balance with every meal, but try to get the balance right over a day or even a week.



Extra - Read/watch/do

https://www.youtube.com/watch?v=9HOk8A-j4Es

https://www.bbc.co.uk/teach/class-clips-video/articles/zby76v4

You will be assessed on:

- Food Science Investigation; Yeast.
- Heat Transfer with popcorn.
- Eat well guide and Amy's diet.
- Nutrients in food

Links to curriculum:

Model exemplary practical skills and food safety and hygiene processes, including personal hygiene

Effect of cooking on protein

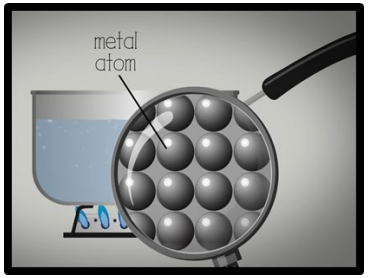
Protein denaturation:

the process of altering a protein's molecular characteristics or properties

Proteins: Coagulation

The process of turning a liquid into a solid

Example: Egg



Why food is cooked:

1. To make it safe to eat
2. To improve the shelf life
3. To develop flavour
4. To improve texture
5. To give variety

Functional and chemical properties of ingredients in cake and bread making

Cupcakes	
Self raising flour	Make the cake rise, Structure, dextrinises –add colour
Caster sugar	Sweetness, aeration
Margarine	Makes the cake moist, aeration
Egg	Binds mixture

Bread	
Strong flour	Structure, Gluten stretches helps bread rise and sets shape
Yeast	Produce CO_2 when all conditions provided so makes bread rise.
Water	Binds ingredients, provides moisture for yeast.

Methods of heat transfer

Convection - when the environment (air, water or oil) is heated up.

e.g. - baking a cake
- boiling an egg

Conduction - when heat is transferred directly.

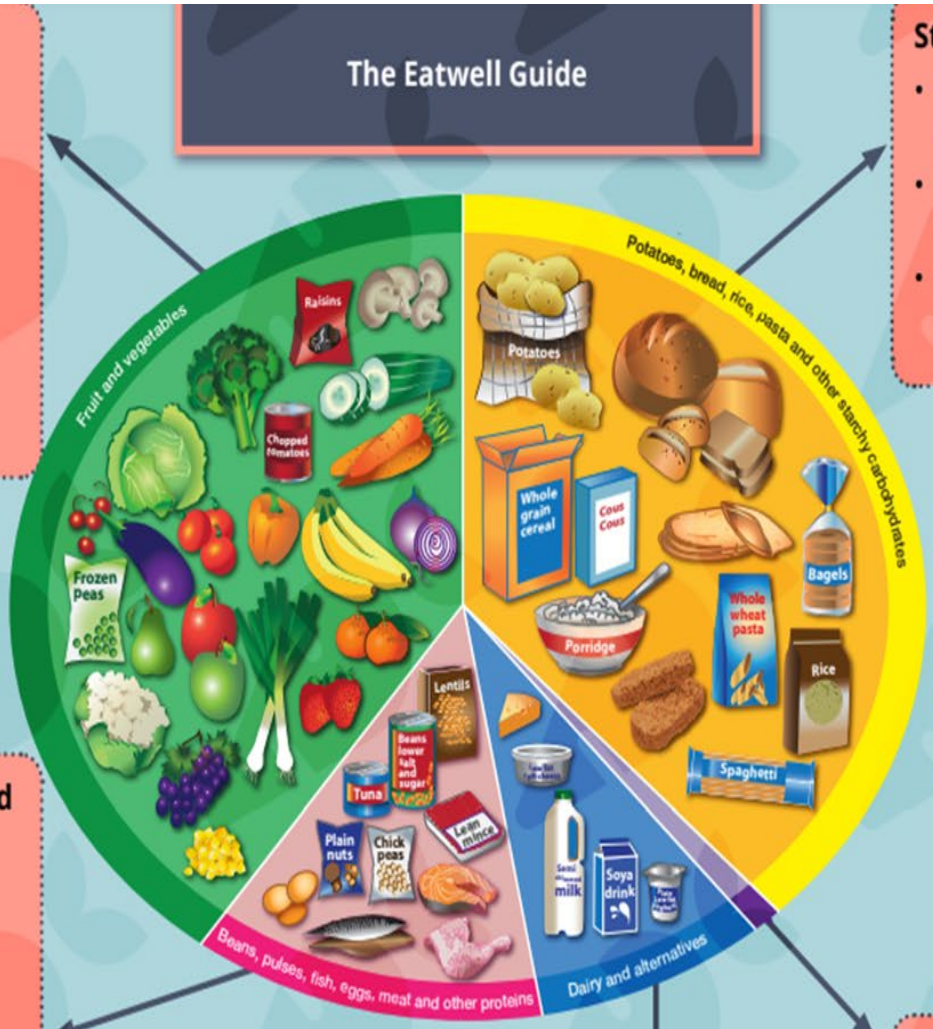
e.g. - frying an egg

Radiation - when heat radiates

e.g. - toast

Fruit & vegetables

- 5 portions a day.
- 1 portion is a handful or 80g.
- Eat a balance of fruit and vegetables.
- Fruit and vegetables should make up at least 1/3 of each meal.
- It doesn't matter how you eat them: fresh, frozen, tinned, dried or in a juice format.



Starchy foods:

- Choose wholegrain or high fibre verisons.
- Each meal should be bsed on at least 1/3of starchy carbohydrates.
- Starchy carbohydrates include: pasta, rice, potatoes, bread, breakfast cereals.

Water

Don't forget to drink water to prevent dehydration.

Sugar

Eat sugary / sweet foods in small quantities and less often.

Protein-rich, non-dairy foods / Dairy and alternatives

1/3 of your meals should be made up from any combination of the following:

- dairy foods
- animal protein foods
- peas and beans
- dairy and meat alternatives.

Oils and spreads

Although important we should eat these sparingly and use low fat options.

Nutrient		Functions	
Protein		Growth – known as the body's building blocks. For growth, particularly during pregnancy & adolescence. Repair body cells and tissues, including recovery after illness or injury. To produce enzymes needed for digestion. To produce hormones that control body functions.	Animal products – meat, fish, dairy; plants – lentils, nuts, seeds
Carbo-hydrates		Source of energy. Divided into: simple 1. Sugars and complex 2. Starches and dietary fibre. Starches provide slow releasing energy & add bulk	complex – wholemeal bread, pasta, rice, potatoes with the skin
Fats		Source of energy, insulation and Helping your body absorb fat-soluble vitamins (A, D, E, & K). Four types: 1. Monounsaturated 2. Polyunsaturated (omega 3 and 6) 3. Saturated 4. Trans fats. Fats are stored under the skin and are essential for health. Too much fat can cause health problems	Monounsaturated – olive oil, avocados; polyunsaturated – oily fish, nuts, sunflower oil, soya beans; saturated – full-fat dairy, fatty meats; and trans fats – many snack foods
Vitamins A, D &C		**A**: For healthy eyes , skin and immune system **D**: The main function is to help the body absorb calcium for strong teeth & bones **C**: Helps heal wounds and prevents scurvy and helps absorb iron.	**A** – dairy, oily fish, yellow fruit; **D** – oily fish, eggs, fortified cereals **C** – citrus fruit, broccoli, sprouts, berries, kiwi
Minerals-Calcium		Essential for many processes, e.g. bone growth/strength, nervous system, red blood cells, immune system. Only needed in small amounts.	**Calcium**: milk, canned fish, broccoli; **Iron**: watercress, brown rice, meat; **Zinc**: shellfish, cheese, wheatgerm; **Potassium**: fruit, pulses, white meat

Extra - Read/watch/do

https://www.youtube.com/watch?v=xtFx55a-j0Y&list=PLSXnX8lDffhTq41shvMiA7n9xCVlt7_nN&t=5s

Links to curriculum: Discuss the importance of energy balance and how to maintain a healthy weight throughout life; Demonstrate how to analyse a diet and make improvements; Perform nutritional analysis and use the results to plan recipes, meals and diets; Promote the benefits of a healthy diet and active lifestyle.

Types of Microorganisms

Yeast, Mould, Bacteria (Bad bacteria are known as Pathogens)

Some Pathogens that causes Food Poisoning:

Campylobacter - Raw or undercooked meat, particularly raw poultry, unpasteurised milk, untreated water.

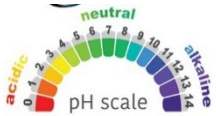
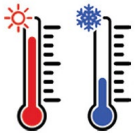
E. Coli - Raw or undercook ed meat and poultry or related products (eg gravy), raw seafood products, unpasteurised milk or products made from it (eg cheese) contaminated water.

Listeria - Unpasteurised milk or products made from it

Soft cheeses (eg camembert, brie) ready-to-eat foods (eg pre-packed sandwiches, pâté, deli meats) unwashed vegetables contaminated with soil.

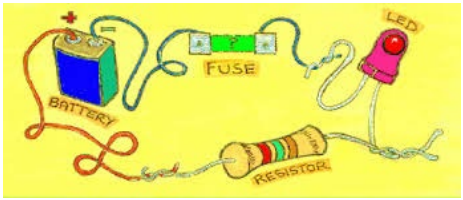
Staphylococcus Aureus - humans carry this in their nose & throat; it can be transmitted by coughing or sneezing. Ready-to-eat foods that are hand-made (e.g. sandwiches), cooked meats, unpasteurised milk and related products.

Salmonella - raw or undercooked poultry and meat, eggs and unpasteurised milk.

		Conditions for growth of Micro-organisms explained **(F A T T O M)**
F		**Food** - Food provides energy and nutrients for bacteria to grow. High risk foods particularly protein foods such as chicken and dairy products are rich in nutrients and moisture and so promote bacterial growth.
A		**Acid** - Most bacteria reproduce best at a neutral pH level of 7. Acidic foods with a pH below 7, or alkaline foods with a pH above 7, may stop or slow down the rate of bacterial growth.
T		**Time** - If provided with the optimum conditions for growth, bacteria can multiply to millions over a small period of time via binary fission. This is when a bacterium divides in two every 20 minutes.
T		**Temperature** - Bacteria need warmth to grow. The temperature a food is stored, prepared and cooked at is crucial. If this is not followed correctly then the food will not be safe to eat. The optimum temperature range for bacterial growth is between 5-63°C. This is known as the **danger zone** as it is dangerous for some foods to be in this temperature range for prolonged periods of time.
O		**Oxygen** - Microorganisms that that require oxygen to grow are called aerobic such as most yeast.
M		**Moisture** - Bacteria need moisture in order to grow. This is why they grow on foods with high moisture content such as chicken. Foods that are dehydrated or freeze-dried can be stored for much longer as the moisture has been removed.

Literacy / key words

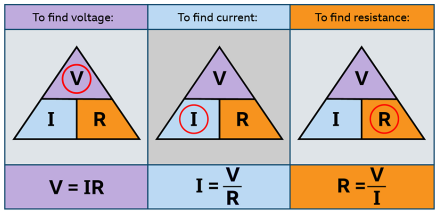
Collaboration and design fixation: Collaborative design is an excellent way of gaining feedback for designs from your peers. This helps with design fixation, where a designer might get stuck or not know how to develop their design further. This brings fresh ideas and new innovation to any project.



Electrical circuit: is a loop through which an electrical current can flow. It consists of a power source, wires and components.

A **prototype** is an early model built to test a concept or process. It is a term used in a variety of contexts, including semantics, design, electronic s, and software programming. A prototype is generally used to evaluate a new design to enhance precision by system analysts and users.

The quantities voltage, current and resistance are linked by the relationship:



Ohm's law

Electronic Systems

When designing electronic systems, electrical engineers start with a block diagram called a systems diagram.
Systems diagrams help the designers to work out how the electronic system will work and which parts need to be connected together.

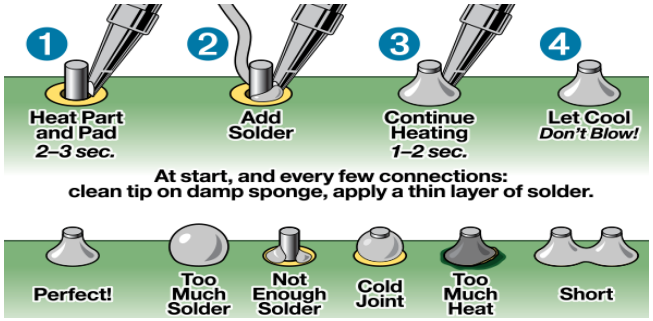
INPUT → PROCESS → OUTPUT

This is the trigger to make the circuit do what ever it is supposed to do. This is normally a switch or a sensor.

This is the part of the circuit that receives a signal from the input components and then tells the output components what to do. This could be a transistor or an integrated circuit, or even a microcontroller.

This is the part of the circuit that does the work, this could be an LED, a motor or a buzzer etc.

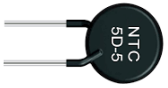
A good example of **components** would be: Light emitting diodes (LED's), buzzers and motors.



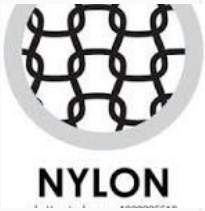
Safety rules when soldering:

- Never touch the hot tip of the soldering iron.
- Take great care to avoid touching the mains flex with the tip of the iron.
- Always return the soldering iron to its stand when not in use. Never put it down on your workbench.
- Work in a well-ventilated area.

Further your knowledge on electronic systems here.

Light can be produced in different ways; a **light-emitting diode (LED)** close light-emitting diode (LED)Light-emitting diodes (LEDs) glow when current passes through them. Are the most common component used for producing light.	**Switches:** A push-to-make (PTM) switch allows current to flow (or a signal to be passed on for processing) when pressed - therefore 'making' the circuit. A push-to-break (PTB) switch does the reverse and 'breaks' the circuit. 	**Transistors** are a type of processing device and a special type of switch. When a small amount of volts are applied to the **Base** leg, a large current is allowed to flow from the **Collector** leg to the **Emitter** leg. 
Resistors are an example of a processing device. Resistors are used to restrict the flow of current around a circuit and can prevent damage to components. 	**Lamps** contain a thin coil of wire called the filament. This heats up when an electric current passes through it and produces light as a result. 	A **capacitor** is a device for storing electrical energy, consisting of two conductors in close proximity and insulated from each other. 
A **buzzer** or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke. 	**Speaker:** When an electrical signal is sent to the voice coil, it creates a magnetic field that interacts with the magnetic field of the permanent magnet. This interaction causes the voice coil to move back and forth, which in turn causes the diaphragm to vibrate and produce sound waves.	A **thermistor** is a component where resistance changes with its temperature. Usually, increasing temperature decreases the resistance. We can use a thermistor to turn a heater off when a house reaches certain temperatures. 

Synthetic Textiles

Material	Properties	Common Uses
Polyester 	Strong, wrinkle-resistant, quick-drying	Sportswear, outerwear, home furnishings
Nylon 	Elastic, abrasion-resistant, lightweight	Activewear, hosiery, parachutes, backpacks
Acrylic 	Soft, warm, lightweight, fade-resistant	Knitwear, blankets, imitation wool products
Elastane (Spandex/Lycra) 	Highly stretchable, resilient	Sportswear, swimwear, fitted garments
Rayon (semi-synthetic) 	Soft, absorbent, drapes well	Dresses, blouses, linings, upholstery

Natural Textiles

Material	Properties	Common Uses
Cotton 	Soft, breathable, absorbent, durable	T-shirts, jeans, bedding, casual wear
Wool 	Warm, insulating, elastic, moisture-wicking	Sweaters, coats, suits, blankets
Silk 	Smooth, lustrous, strong, lightweight	Luxury clothing, ties, scarves, lingerie
Linen 	Crisp, breathable, quick-drying, strong	Summer clothing, tablecloths, upholstery
Hemp 	Durable, breathable, eco-friendly	Bags, eco-fashion, ropes, canvas

Design and Technology:

Literacy / key words

Ergonomics: The study of how products and environments are designed to minimise effort and discomfort.

Primary, Secondary, Tertiary recycling – know the differences.

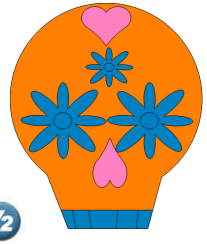
Appliqué: Pieces of fabric in different shapes and colours are attached to a larger piece of fabric to make a picture or pattern.

Embroidery: is the art of decorating fabric or other materials using a needle to stitch thread or yarn. Embroidery may also incorporate other materials such as pearls, beads, quills, and sequins.

Fast fashion: is replicating trends and mass-producing them at a low cost, bringing them to retail quickly while demand is at its highest: throwaway fashion.

The 6 r's of Sustainability

Advantage of CAD: Ideas can be drawn and developed quickly, where as...



A disadvantage would be that it needs a skilled workforce.

We use **ACCESS FM** to help us write a **specification** - a list of requirements for a design - and to help us **analyse and describe** an already existing product.

ACCESS FM - Helpsheet

A is for **Aesthetics**
Aesthetics means **what does the product look like?**
What is the: Colour? Shape? Texture? Pattern? Appearance? Feel? Weight? Style?

C is for **Cost**
Cost means **how much does the product cost to buy?**
How much does it: Cost to buy? Cost to make?
How much do the different materials cost? Is it good value?

C is for **Customer**
Customer means **who will buy or use your product?**
Who will buy your product? Who will use your product?
What is their: Age? Gender?
What are their: Likes? Dislikes? Needs? Preferences?

E is for **Environment**
Environment means **will the product affect the environment?**
Is the product: Recyclable? Reuseable? Repairable? Sustainable? Environmentally friendly? Bad for the environment?
6R's of Design: Recycle / Reuse / Repair / Rethink / Reduce / Refuse

S is for **Size**
Size means **how big or small is the product?**
What is the size of the product in millimeters (mm)? Is this the same size as similar products? Is it comfortable to use? Does it fit? Would it be improved if it was bigger or smaller?

S is for **Safety**
Safety means **how safe is the product when it is used?**
Will it be safe for the customer to use? Could they hurt themselves? What's the correct and safest way to use the product? What are the risks?

F is for **Function**
Function means **how does the product work?**
What is the products job and role? What is it needed for? How well does it work? How could it be improved? Why is it used this way?

M is for **Material**
Material means **what is the product made out of?**
What materials is the product made from? Why were these materials used? Would a different material be better? How was the product made? What manufacturing techniques were used?

Natural Fibres

Plant-derived

Cotton

Linen

Animal-derived

Wool

Silk

Properties of fabric:

Elasticity - The ability of a material to stretch and then return to its original shape and size when the stretching force is removed.

Flexibility - The ability of a fabric to regain its shape when stretched can be improved by adding elastic fibres into the blend,

Softness - Describes the clothing comfort performance. Along with compression, smoothness and flexibility of fabrics being handled and their end-uses.

Insulation - A material that reduces or prevents the transmission of heat or sound or electricity.

Absorbency - To take in moisture and retain liquids within its structure, affects skin comfort, static build–up, shrinkage, water repellency and wrinkle recovery.

Weight - How heavy or light a fabric is, usually measured in grams per square meter (GSM). It's a crucial factor influencing the drape, durability, and functionality of a fabric.

Extra - Read/watch/do

Fast Fashion and how the way we dress impacts the environment.
What is meant by Fairtrade?

Create a login for Tinker Cad

TINKERCAD

You will be assessed on:
- Fast fashion and sustainability.
- How to write a design specification.
- Electronic circuit construction.
- Final piece and evaluation.

FAIRTRADE

Links to curriculum:
Computing
Science
Mathematics
Art and Engineering