KNOWLEDGE ORGANISER

£2

NAME & FORM

YEAR 9

SPRING TERM

English Knowledge Organiser

YEAR 9 – Sherlock Language Paper 1

Spring 1

Sherlock Holmes – The Speckled Band

Where this is a gap, fill it with a quote or an idea about the investigation:

Suspects and Motives:

Dr Roylott:

Very angry and aggressive:

Has previously harmed people:

_____"a certain annual sum should be allowed to each us in the event of marriage"

The Gypsies:

_____

"He would give these vagabonds leave to encamp upon the few acres of bramble-covered land"

Other Suspects:

The client – Miss Helen Stoner:

Young but aged:

Frightened:

: "has done me the honour to ask my hand in marriage"

Information about the case:

- Helen's sister died _____ weeks before her own wedding, and Helen is about to wed.
- Helen's sister heard _____
- When she was killed she shouted _____
- It was an unusual death because

Question 1: List 4 Things

Marks: **Timing:**

Approach: Read very carefully through the lines given. Write in short, complete sentences such as "He lived alone." or "He didn't own a car."

Key Skill(s): Information retrieval

Question 2: Language

Marks: **Timing:**

Amount: Aim to produce two-three paragraphs analysing different quotations in detail.

Approach: Identify the lines of the extract the question asks you to write about and draw a box around those lines. Read through the lines and highlight anything which could help you answer the question. Add annotations to identify effects and techniques within the quotations. Complete 2-3xQTA paragraphs in your response.

Key Skill(s): Q_ _ _ _ T_ _ _ _ _ _ _ _ A_ _ _ _ _ _ _

Remember to… clearly explain your points using causal connectives like "because", "as" or "meaning that" and zoom in on key words to analyse language on a deeper level. Use the sentences starters given on your Language Paper 2, Q3 KO!

Question 3: Structure

Marks: **Timing:**

Amount: Aim to produce two-three paragraphs analysing how the writer has structured the text at different points.

Approach: Read through the source and make a note of what each paragraph (or section of dialogue) focuses on. Identify any links between different parts of the text, such as motifs or references that occur more than once, and add annotations to identify effects and techniques within these. Complete 2-3xQTA paragraphs in response to the question.

Key Skill(s): Q_ _ _ _ T_ _ _ _ _ _ _ _ A_ _ _ _ _ _ _

Remember to… clearly explain your points using words like "because" or "meaning that" and ensure you cover more than one part of the text. Make sure not to analyse language here, either!

Possible sentence starters to consider:

At the beginning of the extract, the writer has chosen to focus on… when they wrote "…"

I think the writer has opened the extract with this because…

The writer then moves on to talk about… as shown in "…"

It is quite clear from this shift in focus from… to… that the writer wanted to…

Question 4: Evaluation

Marks: **Timing:**

Amount: Aim to produce two-three paragraphs evaluating to what extent you agree with the statement in the question.

Approach: Similar to Q2. : Identify the lines of the extract the question asks you to write about and draw a box around those lines. Read through the lines and highlight anything which could help you answer the question. Add annotations to identify effects and techniques within the quotations. Complete 2-3xQTA paragraphs in your response.

Key Skill(s): Q_ _ _ _ T_ _ _ _ _ _ _ _ A_ _ _ _ _ _ _ E_ _ _ _ _ _ _ _ _

Remember to… use all your language analysis skills from question 2, but always link every point back to the statement and whether you agree/disagree with it.

Focus on: Finding evidence to back up the evaluative statement!

Possible sentence starters to consider:

One way the writer (reference to question) is… in "…"

This clearly portrays that… because…

The word '…' is particularly effective at conveying this idea because…

Alternatively, the writer may also be implying that…

As a reader, this description…

It is quite clear from this that the writer (reference to question)…

However, it could also be said that…

English Knowledge Organiser – Prejudice Scheme Y 9

Definition of Prejudice

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

Prejudices come from a variety of origins:

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

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

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

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

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

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

UK DIALECTS

Can you fill in the blanks?

1. He's got a right cob on - someone is in a mood – _____
2. _____ – telling someone off - Yorkshire
3. Boggin – _____ - Scotland
4. Slummy - loose change -_____
5. _____ – a fine meal - Wales
6. Netty – toilet – _____
7. _____– exhausted – South East (Oxfordshire)
8. Belve – to shout or sing loudly - _____
9. I took an awful reddener – I got really embarrassed – _____
10. Quit ya belly-aching – _____ – Midlands (Birmingham)

What slang do you use? How has it entered our language?

Slang I use	How it has entered language

Slang enters our language in lots of different ways:

Portmanteau:

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

Acronym:

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

New words:

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

Abbreviations:

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

Repurposing old words:

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

Women Rights' Timeline:

1660 1866 1869 1885 1886 1914 1919 1922 1925 1928 1937 1975 1983 1986 1993

English Knowledge Organiser Y9 Prejudice Spring 2

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

1680 – 1834
Transatlantic slave trade

1686 – 1733
Nanny of the Maroons leads escaped Jamaican slaves

1841 - 1853
Solomon Northup kidnapped into slavery for 12 years

1854 - 1857
Mary Seacole nurses soldiers in the Crimean war

June 1948
Windrush brings first modern Caribbean immigrants to UK

2004
John Agard writes 'checking out me history'

Task: *LOOK/COVER/SAY*

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

Upper class

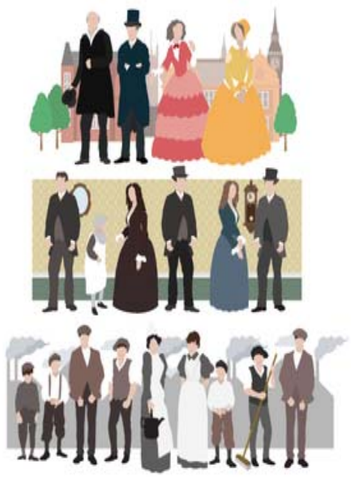
- ✓ Rich; usually inherits wealth
- ✓ Aristocracy (earls, dukes etc)
- ✓ Private schools, country houses

Middle class

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

Lower/ working class

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

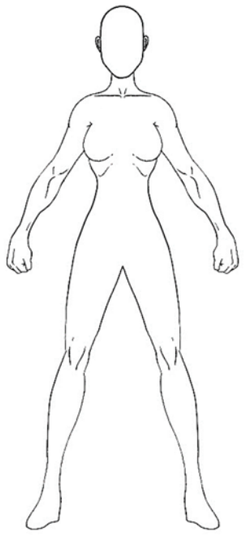


Colonialism = forcibly taking over or controlling another country

Task: *Can you list FOUR countries that were part of the British Empire?*

1.
2.
3.
4.

Task: *Design/label your strong female character*



Look/Cover/Say

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

Look/Cover/Say

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

Neville Page

Key features:

Dark- Intricate- Detail- Hybrid- Tonal- Highlights- Shadow- Proportionate- Conceptual- Textured.

Working in the style of an artist:

You need to use these techniques and features in your own study.

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

Prototype- Concept- Evolve- Adaptation- Hatching- Cross hatching- Scumbling- Tonal- Hybrid- Proportion- Texture- Rendering- Gradient.

Hybrid Creatures

Year 9 Spring term

Biro Techniques:

In the style of:

When creating a piece of art in the style of an artist it is very important you thoroughly understand their techniques in order to copy them effectively.

Besides using their techniques, you also need to take pride in your work and be as neat as possible.

Here are some things to consider:

- Have you used directional lines?
- Have you used a range of mark making?
- Have you used correct proportions?
- Have you included appropriate texture?
- Have you included all the detail?
- Is your blending smooth?
- Have you shown a gradient?

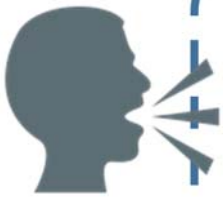
KEY WORDS AND MEANINGS:	
Mixed Media	A term used to describe artworks composed from a combination of different media or materials.
Scumbling	A shading technique achieved by overlapping lots of little circles.
Hatching	An artistic technique used to create tonal or shading effects by drawing closely spaced parallel lines.
Cross-hatching	When the hatching lines are placed at an angle to one another, it is called cross-hatching.
Mark Making	The different lines, dots, marks, patterns, and textures we create in an artwork.
Prototype	An experimental process where the artist implements ideas into a final format.
Hybrid	a thing made by combining a few different elements.
Adaptation	The dynamic evolutionary process that fits organisms to their environment.
Proportion	How the sizes of different parts of a piece of art or design relate to each other.
Tonal	The range between light and dark or one colour to another.

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

Drama Knowledge Organiser

Role Play – The act of pretending to be somebody else, of taking on a role. Thinking and acting differently to your ordinary self can help you empathise with a person and better understand an issue or theme.

Thought Tracking - when a character steps out of a scene to tell the audience how they're feeling. Sharing thoughts in this way provides deeper insight into the character for an audience.

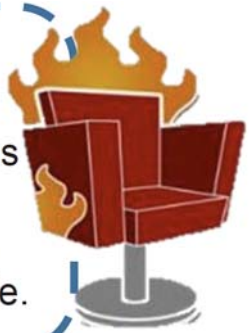


Narrating - A spoken commentary about the action onstage. A narrator is like a storyteller informing the audience about the plot.

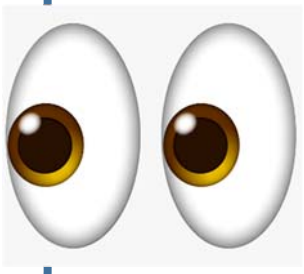
Cross-cutting/Split Focus - a device to move between two or more scenes staged in the space at the same time.

EXPLORATIVE STRATEGIES

Tableau – A still image which communicates meaning. It can provide insight into character relationships with a clear focus upon use of space, levels, body language and facial expression.

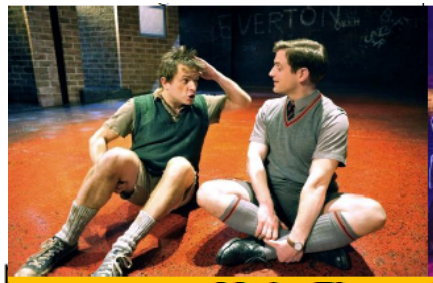


Hot Seating - An actor sits in the hot-seat and is questioned in role, spontaneously answering questions they may not have considered before. Hot-seating helps an actor become more familiar with their role.



Marking the Moment – A way of highlighting the most important moment in a scene in order to draw the audience's attention to its significance. This can be done by using tableau, repetition, slow motion, narration, thought tracking, lighting and sound.

BLOOD BROTHERS KNOWLEDGE ORGANISER




Main Characters – Consider what Russell intended through his characterisation of each of the below...

Mickey – Mickey is the biological twin of Edward who Mrs Johnstone opts to keep. Mickey has a harsh working-class upbringing, but at his heart he is honest and sincere. He takes a number of knocks in life (that Edward is fortunate enough to avoid) for example impregnating his girlfriend (Linda) and getting laid off from his industrial job. He hardens as the play goes on, becoming cynical after time in prison, and becomes addicted to anti-depressants.	**Edward** – Edward is the biological twin of Mickey, who Mrs Johnstone gives to Mrs Lyons to raise as her own. Like Mickey, Edward is honest and sincere, remaining kind and down-to-earth despite his luxury upbringing with the snobbish Mrs Lyons. Unlike Mickey, however, Edward benefits from every advantage in life, such as attending private schools and university. He uses his position as a councilman to help Mickey, but also begins an affair with Linda.
Mickey Quote: "Do you wanna be my blood brother, Eddie?"	**Edward Quote:** "It's just a secret, everybody has secrets, don't you have secrets?"
The Narrator – All-knowing and slightly menacing, the Narrator takes on a number of roles throughout the play. Sometimes he plays parts (e.g. the Milkman) whilst at other times he stands back and comments upon the action as it unfolds. The Narrator reminds the audience of the terrible act that causes the tragedy to unfold, and warns the audience of the tragic events that are to come.	**Linda** – Linda begins the play as a tomboy who enjoys playing with Mickey and Edward, but she soon becomes an object for their desire. At the beginning of her adolescence, she seems solely attracted to Mickey, telling him that she loves him even before their first kiss. However, after years of poverty (and Mickey's imprisonment) she turns to Edward for comfort and the two begin an affair.
Narrator Quote: "So did y'hear the story of the Johnstone twins?"	**Linda Quote:** "You can get up off the ground again"
Mrs Johnstone – Mrs Johnstone is the biological mother of Mickey and Edward, as well as a number of other children. She is a deeply superstitious woman who has to struggle to get by, however she also has a good heart and a strong sense of right and wrong. She gives up one of her twins as she genuinely believes that she has no choice after being left by her husband. As the play progresses, she is overcome by regret, however she always remains kind and loving.	**Mrs Lyons** – Mrs Lyons is the opposite of Mrs Johnstone – arrogant, snobbish, and infertile. She adopts Edward and brings him up as a wealthy, middle-class boy. Like Mrs Johnstone, Mrs Lyons is racked with guilt from the deed of separating the twins, but this influences her to create a superstition to keep Mrs Johnstone away. She eventually becomes so unhinged and paranoid that she will lose her son that she attempts to kill Mrs Johnstone.
Mrs Johnstone Quote: "In the name of Jesus, the thing was done,"	**Mrs Lyons Quote:** "Oh...you mean you're superstitious?"

Key Themes

Childhood Adolescence
Superstition
Violence
Nature Vs Nurture
Social Class

Set from 1960 – 1980
In Liverpool, England

Themes:

Superstition: The audience is constantly reminded of this. The narrator asks us if superstition is to blame for boys' fate.

Class: Russell shows us the injustice of the class divide with the Johnstones and Lyons, as well as M and E. Related to education, opportunity and power.

Nature vs. Nurture: Splitting up the twins shows us how the environment can have a huge impact on life chances.

Relationship: The development and change in friendship between M, E, and Linda. The interaction between Mr and Mrs L, mother and son, and Mrs J and society.

Script Writing and Devising

How do we format a script?

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

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

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

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

MICKEY: Look

LINDA: What?

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

LINDA: Oh…he's gorgeous, isn't he?

MICKEY: What?

Dialogue is indented from the character name.

Stage directions are typed in *italics*.

KEYWORDS:

Devising	Performance
Stimulus	Audience
Character	Playwright
Brainstorm	Dialogue
Structure	Theatre

How do we devise?

BICS!

- **Themes**
- **What is your educational message?**
- **BRAINSTORM**
- **Create a story board to come up with your story**
- **STRUCTURE**
- **Highlight your key scenes and keep them in the piece**
- **Devising**
- **IMPROVISE**
- **Don't just talk through – get up and just try out a scene**
- **Characters**
- **How do you know each other?**
- **Name /age**
- **Try different genres. The scene could work better as a comedy or more serious**

DEVISING TECHNIQUES:

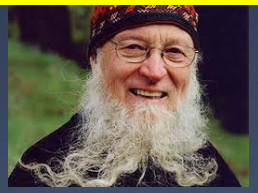
Tableau	Monologue
Slow Motion	Narration
Thought-track	Direct Address
Flashback/forward	Role-Play
Split-focus	Multi-role

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

Background

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

Steve Reich

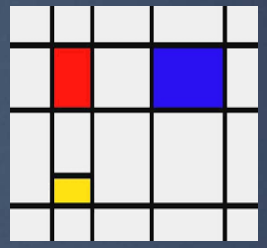


Terry Riley

Philip Glass

Minimalist Music

Year 9: Term 2



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

Key principles of Minimalist Music:

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

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

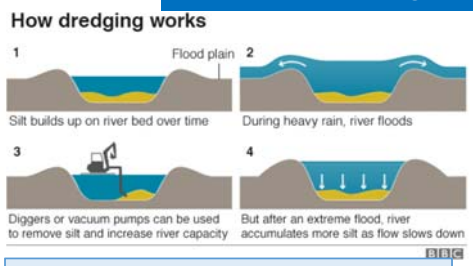
KEY WORDS AND MEANINGS (Tier 2 words in ORANGE, Tier 3 words in BLUE)	
Ostinati	Musical repetition
Counterpoint	Melodies that are against other melodies (played at the same time)
Polyrhyhms	Many rhythms played at the same time
Looping	When referring to old fashioned tape recorders – you literally loop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

Geography Knowledge Organiser – Asia (Continued)

Case Study: Bangladesh Floods

- Floods are an annual event. **The majority of the 157 million people** that live in Bangladesh live on **floodplains** of the Padma (Ganges) and Jamuna (Brahmaputra).
- Flooding is essential as it brings water to irrigate the crops. Also as the rivers flood it lines the fields with silt which fertilises the soil.
- 75% of the country is below 10m above sea level.

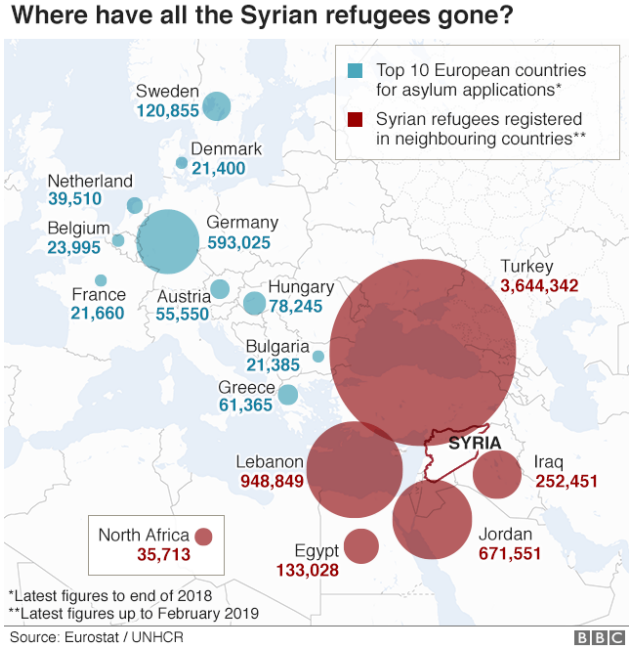
How could Bangladesh prevent future flood risk?



The basic aim of dredging is to **remove silt** - which consists of fine sand, clay and small particles of rock - from the river's bed, potentially increasing its capacity to carry water downstream

Houses could be built on flood plains to reduce the impact of flood water and to reduce the displacement of local people.

Proportional Circle Map to show you where the Syrian refugees fled to



How far do you agree?
- Small
- Medium
- Large

- **Volunteers** and aid workers were repaired damage
- The UN launched and appeal to raise $74 million, but had received only 20% of this
- **USA donated a weather station** to help forecast future catastrophic flooding.

- Syria is located in the continent of Asia.
- Syria is SW of the UK.

To what extent were the long term responses more effective than the immediate responses of a flood you have studied (9 +3 SPaG)

Better than?
More useful?

- Food **supplies**, medicine, clothing and blankets were distributed.
- Local people helped search for missing people.
- **Water Aid** helped by bringing water purification tablets and education campaigns.
- Free seed given to farmers (these took months to grow)

When a river bursts its banks

Human causes:	**Physical causes:**
• Deforestation • Urbanisation • Impermeable surfaces	▪ Monsoon seasons ▪ Snow melt ▪ Heavy precipitation

A peaceful uprising against the president of Syria on the 15th March 2011 turned into a full scale civil war.

Geography Knowledge Organiser - Coasts

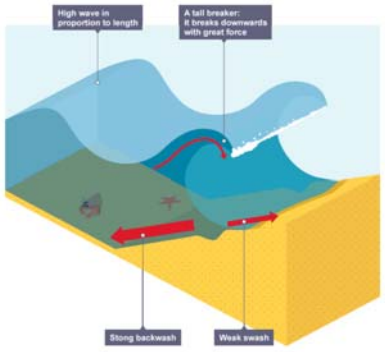
How do waves shape the coastline?

Waves form when the wind blows over the sea. The size and energy of the wave depends on:

- The fetch
- Strength of the wind
- How long the wind has been blowing

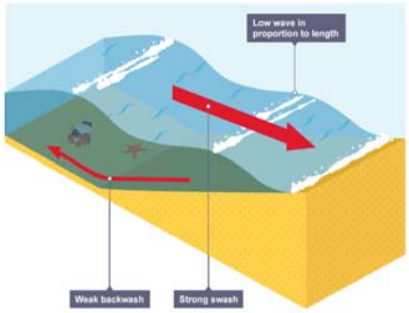
Find out more about longshore drift.

Destructive Wave

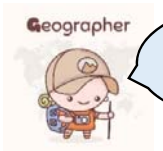


- Weak swash
- Strong backwash
- Removes sand (sediment) from the beach
- Destroys the beach
- The waves are steep and close together

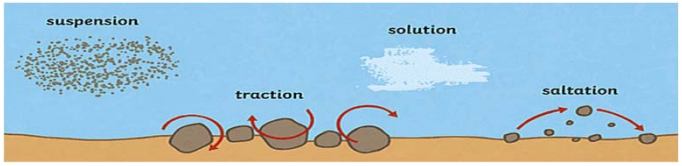
Constructive Wave



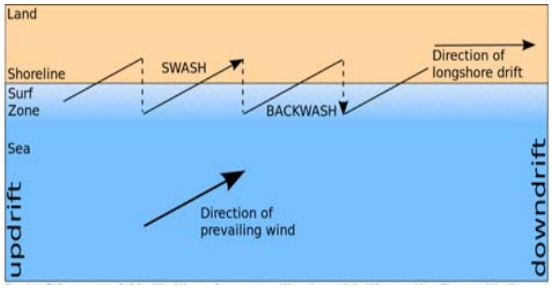
- Strong swash
- Weak backwash
- Brings sand (sediment) on to the coast and builds the beach
- Creates the beach
- The waves are low and further apart



Fetch is how far a wave travels



How does longshore drift move material along the coast?



Sediment is any solid material eroded, transported and deposited along the coast

Swash is the movement of sediment **up** the beach at an **angle.**

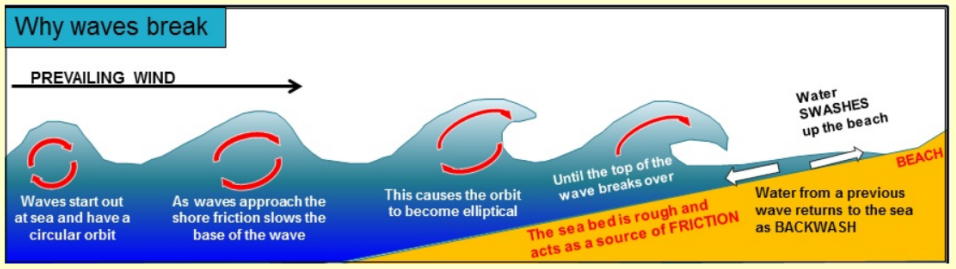
Backwash is the movement of sediment **back** towards the sea at a 90 degree angle.

Longshore drift is the movement of material along the coast. The prevailing wind blows waves carrying sediment into the beach at an angle, the waves break on the shore and as the water runs back into the sea it carries sediment back down the beach in a **zig zag** motion.

Why do waves break?

Waves break because of:

- Change in wind direction
- Friction with the land
- Friction with coastal management

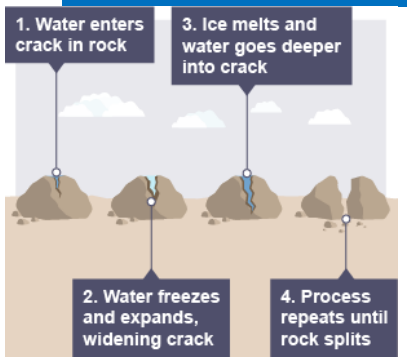


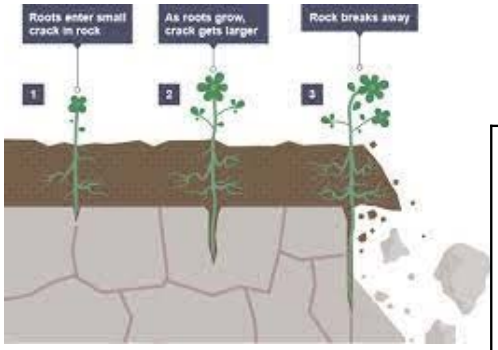
Transportation

Solution - when minerals in rocks like chalk and limestone are dissolved in sea water and then carried in solution. The load is not visible.	**Suspension** - small particles such as silts and clays are suspended in the flow of the water.	**Saltation** – where small pieces of shingle or large sand grains are bounced along the sea bed.	**Traction** – where pebbles and larger material are rolled along the sea bed

Geography Knowledge Organiser - Coasts

Weathering





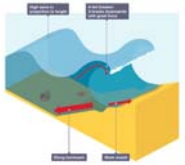
Freeze thaw weathering:

- Water enters cracks in the rock.
- When temperatures drop, the water freezes and expands causing the crack to widen.
- The ice melts and water makes its way deeper into the cracks.
- The process repeats itself until the rock splits entirely.

Biological weathering:

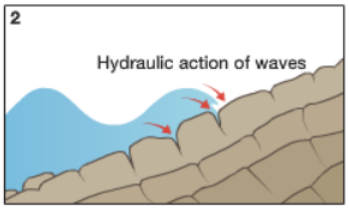
- Plant roots can get into small cracks in the rock.
- As the roots grow, the cracks become larger.
- This causes small pieces of rock to break away.

Erosion

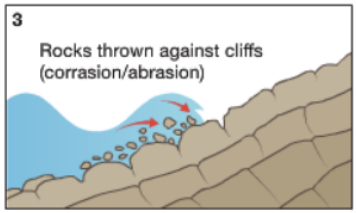


Erosion – is the wearing away of rock along the coastline. **Destructive waves** are responsible for the erosion (breaking down) of the coastline.

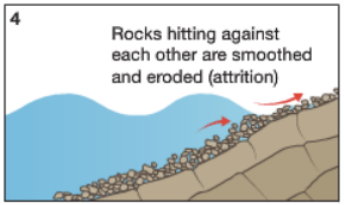
Hydraulic action - this is the sheer power of the waves as they smash against the cliff. Air becomes trapped in the cracks in the rock and causes the rock to break apart.



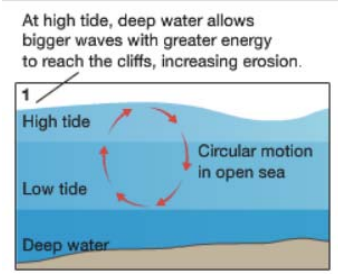
Abrasion - this is when pebbles grind along a rock platform, much like sandpaper. Over time the rock becomes smooth



Attrition - this is when rocks that the sea is carrying knock against each other. They break apart to become smaller and more rounded.



Solution - this is when sea water dissolves certain types of rocks. In the UK, chalk and limestone cliffs are prone to this type of erosion.



Mass Movement

Another way material can be moved on the coastline is through **mass movement**. Mass movement is the downhill movement of sediment that moves because of gravity.

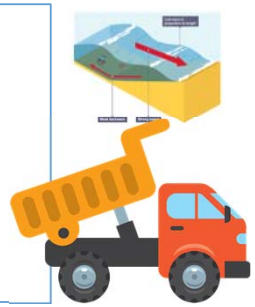
Find out more about Mass Movement

Deposition

Deposition is **when material that is being transported is dropped by constructive waves**. It happens because waves have less energy. Deposition happens when the swash is stronger than the backwash and is associated with constructive waves

Deposition is likely to occur when:

- waves enter an area of shallow water;
- waves enter a sheltered area, eg a cove or bay;
- there is little wind;
- a river or estuary flows into the sea reducing wave energy;
- there is a good supply of material and the amount of material being transported is greater than the wave energy can transport.



Test yourself – complete the BItesize quiz

Geography Knowledge Organiser – Coasts

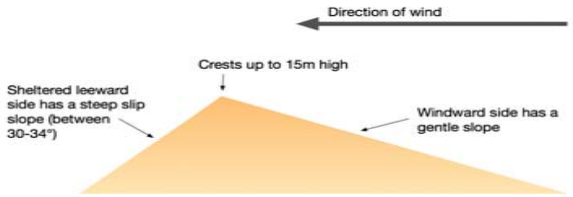
Features formed by deposition

Sand Dunes

The conditions required for sand dunes to form include:

- a large supply of sand
- a large flat beach
- time for sand to dry, so a large tidal range is needed
- an onshore wind (wind blowing from the sea to the land) for sand to be moved to the back of the beach
- an obstacle for the dune to form against e.g pebble or driftwood

Characteristics of sand dunes



- Sand dunes are created around obstacles on the beach eg a dead animal
  The sea brings sediment to the beach and then the wind redistributes that sediment.
- When the wind encounters the beach obstacles velocity falls and sediment is **deposited – this creates the embryo dune.**
  Over time, tough plants known as **pioneers** such as Marram grass take root on the dune, their root systems helping to stabilise the sand.

Spits

A **spit** is an extended stretch of beach material that projects out to sea and is joined to the mainland at the other end.

Spits are formed where the prevailing wind blows at an angle to the coastline, resulting in **longshore drift.**

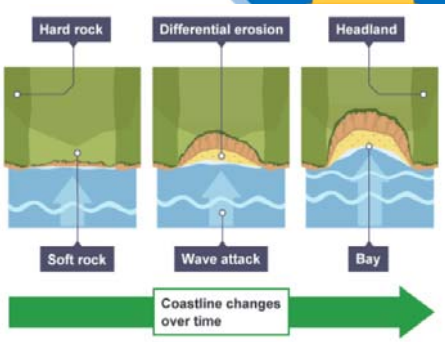
1.**Longshore drift** moves material along the coastline.
2.A **spit** forms when the material is deposited.
3.Over time, the spit grows and develops **a hook** if wind direction changes further out.
4.Waves cannot get past a spit, which creates a sheltered area where silt is deposited and mud flats or **salt marshes** form

Features formed by erosion

Headlands and Bays

Headlands and bays form at a **discordant coastline** where there are layers of hard and soft rock.

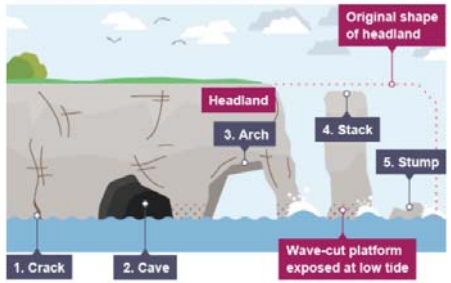
- The bands of soft rock, such as sand and clay, erode more quickly than the more resistant rock, such as chalk.
- The section of land jutting out into sea is called a headland.
- The area where the soft rock has eroded away is called a bay.
- Sand is deposited in the sheltered bay to form beaches.



Caves, Arches, Stacks and Stumps

Caves occur when waves force **(hydraulic action)** their way into cracks in the cliff face.

If the cave is formed in a headland, it may eventually break through to the other side forming an **arch**.



The arch will gradually become bigger until it can no longer support the top of the arch. When the arch **collapses**, it leaves the headland on one side and a **stack** (a tall column of rock) on the other

The stack will be attacked at the base in the same way that a wave-cut notch is formed. This weakens the structure and it will eventually **collapse** to form a **stump**

The cliffs around Old Harry Rocks are made of chalk. Wave refraction causes **erosion of the headland** and deposition in the bays either side.

Old Harry

Geography Knowledge Organiser – Coasts

Coastal Management

Hard engineering involved building artificial, man made structures which try to control natural processes and reduce erosion.

Sea Walls – Are concrete walls that are placed at the foot of a cliff to prevent erosion. They are curved to reflect the wave energy back to sea.

☺ Effective at protecting the base of the cliff
☺ Sea walls can be used as promenades so people can walk along them

☹ Expensive – approximately £2,000 per metre
☹ Waves are still powerful and can break down and erode the sea wall

Soft engineering does not involve building artificial structures, but takes a more sustainable approach to managing erosion.

Beach nourishment – Sand is pumped onto an existing beach to build it up.

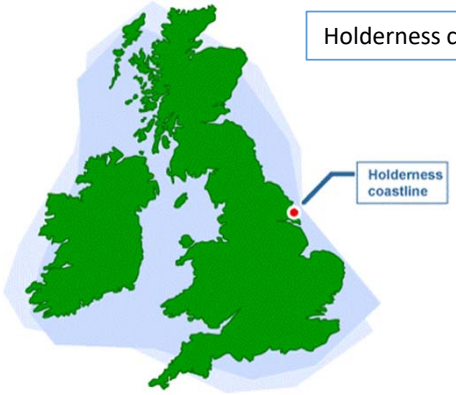
☺ Blends in with the existing beach
☺ Larger beaches appeal to tourists

☹ Needs to be constantly replaced
☹ The sand has to be brought in form elsewhere

Managed Retreat - Do nothing!

Managed retreat is where the council decide to not protect an area. They council will let the section of coastline erode and pay compensation to the residents that live in the area.

Holderness Coast



Holderness coast is in the north east of England.

What causes the Holderness coastline to retreat?
The problem is caused by:

•strong prevailing winds creating **longshore drift** that moves material south along the coastline

•the cliffs which are made of a soft boulder clay, and will therefore **erode** quickly, especially when saturated.

The village of Mappleton, perched on a cliff top on the Holderness coast, has approximately 50 properties. Due to the erosion of the cliffs, the village is under threat.

In 1991, the decision was taken to **protect** Mappleton. A coastal management scheme costing £2 million was introduced involving two types of hard engineering - placing rock armour along the base of the cliff and building two rock groynes.

How far do you agree?
- Small
- Medium
- Large

Mappleton: Rock groynes to protect Mappleton and B1242. Rock groynes trap material on the beach **(cost £2 million)**

Fastest eroding coastline in Europe

NE of the UK

Made of boulder clay which erodes quickly when saturated.

To what extent has coastal management protected Holderness coast? (9 + 3 SPaG)

Where the land meets the sea

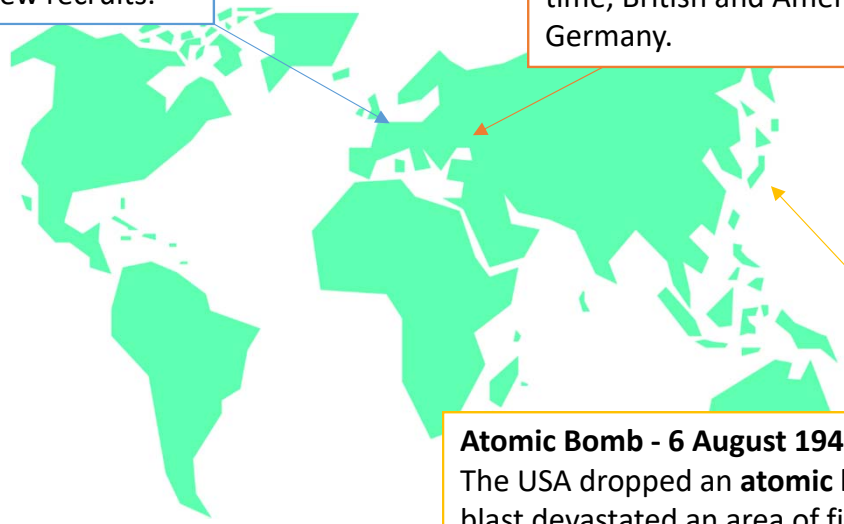
Hornsea: Timber groynes have been used to trap sediment and build the beach.

61km from North – south

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

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

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



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

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

History Knowledge Organiser:

Holocaust and Genocide

Timeline: Persecution of the Jewish community

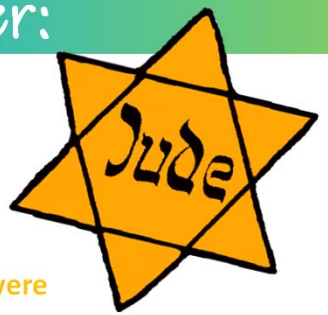
1933
- The **SA** organised a **boycott** of Jewish shops and businesses.
- Books by Jewish authors were publicly burnt.
- Jewish civil servants, lawyers and teachers were sacked, and Jewish doctors and dentists could not treat **Aryans**.
- Science lessons about race were introduced which **taught that Jews were subhuman.**

1934
- Jewish shops were marked with a **yellow star**.
- Jews had to sit on separate seats on buses and trains. Many councils banned them from public spaces.

1935
- The **Nuremberg Laws** stripped Jews of German citizenship, outlawed marriage and sexual relations between Jews and Germans, and removed all the civil and political rights of the Jews. These laws were to be the foundation for much of the extreme persecution which took place later.

1938
- Jews were ordered to register all wealth and property.
- Jews were forced to change their first names: males would be known as Israel, females as Sarah.
- **Kristallnacht** - *9 November* (The Night of Broken Glass). The **SS** organised attacks on Jewish homes, businesses and synagogues in retaliation for the assassination of the German ambassador to France by a Jew. During Kristallnacht, 400 synagogues and 7,500 shops were destroyed. Jews were then made to clear up the destruction on their hands and knees and pay a fine of one billion marks to the government. The remaining Jewish property was then confiscated.

1939
- The Nazis, who had been encouraging Jews to emigrate from 1933 onwards, now started "forced" emigration.



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

Holocaust – Who was to blame?

Adolf Hitler, in his writings and speeches talked of destroying the Jewish race and passed laws against Jewish people. His anti-Semitic beliefs and policies were implemented soon after the Nazis came to power.

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

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

Otto Wolff was a SS soldier at Treblinka. As an SS guard, one of his duties was to supervise and operate the gas chambers. After the war, he said at his trial: "*I didn't ask to be sent to Treblinka, I had no choice. I was just doing my job.*"

Remember many other persecutors, collaborators & bystanders

History Knowledge Organiser:

Holocaust and Genocide

Death camps

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

Key words:

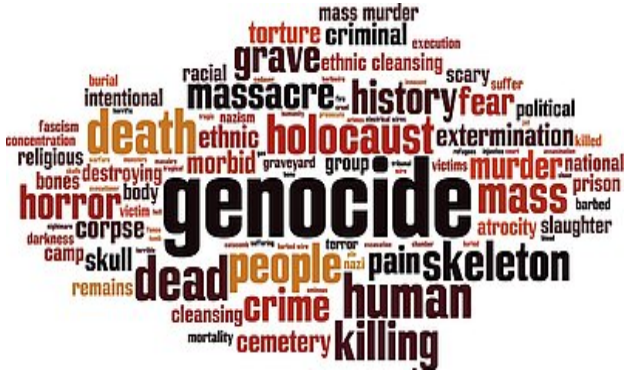
Holocaust - the mass murder of Jewish people under the German Nazi regime during the period 1941–5. More than 6 million European Jews, as well as members of other persecuted groups such as Romani, gay people, and disabled people, were murdered at concentration camps such as Auschwitz.

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

Hitler's hate list

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

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



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

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

RE Knowledge Organiser. Relationships

Key concepts / words

Gender Equality – All genders have the same rights

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

Roles – The position of a person

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

Families and gender roles

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

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

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

Marriage

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

Divorce and remarriage

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

Key concepts / words

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

Divorce – Legally ending a marriage

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

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

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

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

RE Knowledge Organiser. Human Rights

Key concepts / words

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

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

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

Personal Conviction - Something a person strongly feels of believes in

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

Religious expression -

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

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

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

Wealth and Charity

Christians believe people should use their wealth to support others and they will be **rewarded in the afterlife**. The Bible teaches ***'It is easier for a camel to pass through the eye of a needle than for a rich man to get into heaven.'*** Christians also believe they should support those in need and charities as Jesus taught ***'love your neighbour'.*** **Parable of the Good Samaritan** teaches us to help those in need. **Christian Aid** aim to end poverty and injustice. Muslims believe **wealth is gift from Allah** and should be used correctly. You will be judged on how you have used your wealth. Muslims are expected to give **Zakah**. This is the third pillar of Islam and it is a Muslims duty to give 2.5% of wealth to charity to help those in need. They follow the example of the **Prophet Muhammad.** **Islamic relief** is an example of an Islamic charity.

Year 9 Foundation Knowledge Organiser Spring

Maths Knowledge Organiser

ANGLE FACTS INCLUDING ON PARALLEL LINES

Key Concepts

Angles in a **triangle equal 180°**.

Angles in a **quadrilateral equal 360°**.

Vertically opposite angles are equal in size.

Angles on a **straight line equal 180°**.

Base angles in an isosceles triangle are equal.

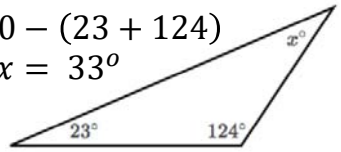
Alternate angles are equal in size.

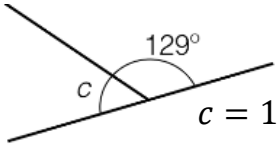
Corresponding angles are equal in size.

Allied/co-interior angles are equal 180°.

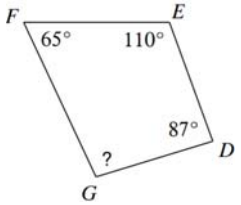
Examples

$x = 180 - (23 + 124)$
$x = 33^o$

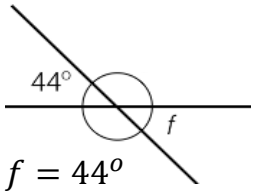




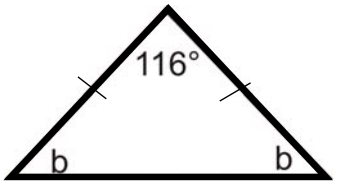
$c = 180 - 129$
$x = 51^o$



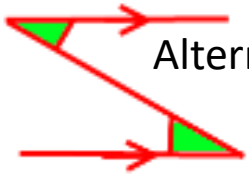
$? = 360 - (65 + 110 + 87)$
$? = 98^o$



$f = 44^o$

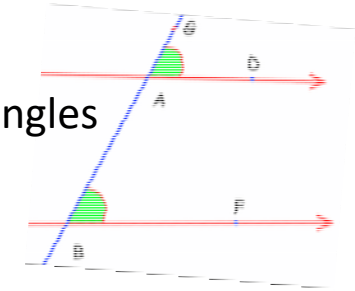


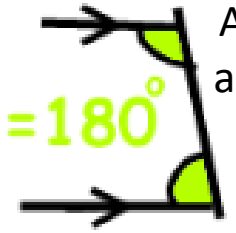
$b = (180 - 116) \div 2$
$b = 32^o$



Alternate angles are equal

Corresponding angles are equal





Allied/co-interior angles equal 180°

Y9 Foundation

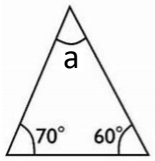
Key Words

Angle
Vertically opposite
Straight line
Alternate
Corresponding
Allied
Co-interior

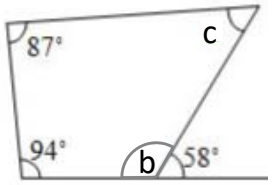
Questions

Calculate the missing angle:

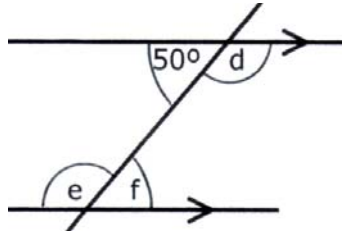
a)



b)



c)



ANSWERS: 1) a=50° 2) b=122° c=57° 3) d=130° e=130° f=50°

Maths Knowledge Organiser

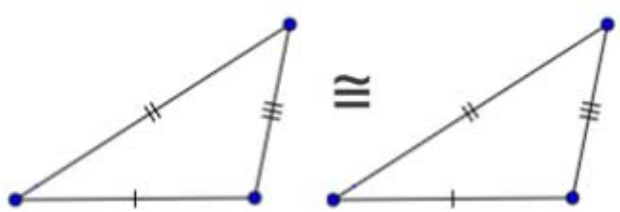
FOUR RULES OF CONGRUENCE

Key Concepts

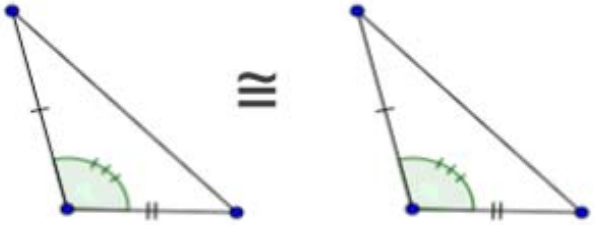
Congruent triangles are triangles that have the **same size and shape**. This means that the corresponding sides are equal and the corresponding angles are equal.

There are four rules of congruency that prove whether a triangle is congruent or not.

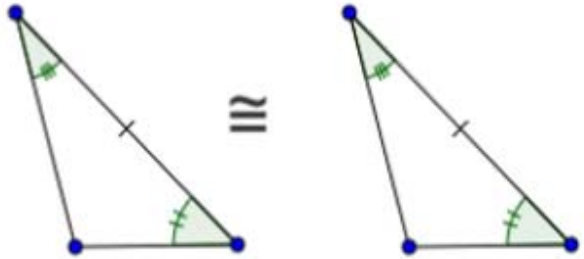
Examples



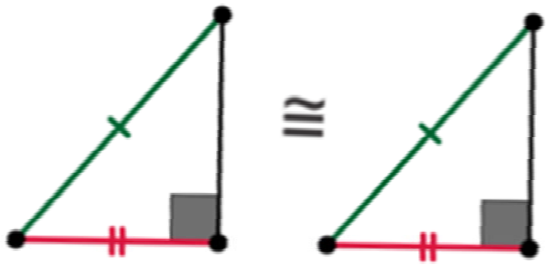
SSS = 3 sides on triangle A are equal to those on triangle B



SAS = 2 sides with the included angle on triangle A are equal to those on triangle B



ASA = 2 angles with the included side on triangle A are equal to those on triangle B



RHS = When the hypotenuse and another side on triangle A are equal to those on triangle B

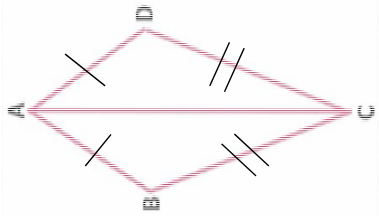
Y9

Key Words

Congruent

Angle

Side



Prove that triangle ACD and ABC are congruent to one another.

ANSWERS AD = AB, CD = BC, AC is common to both triangles, therefore they are congruent proved by the SSS rule.

Maths Knowledge Organiser

PYTHAGORAS AND TRIGONOMETRY

Key Concepts

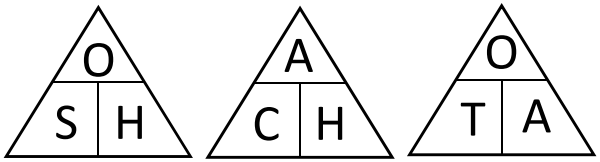
Pythagoras' theorem and basic trigonometry both only work with **right angled triangles**.

Pythagoras' Theorem – used to find a missing length when two sides are known

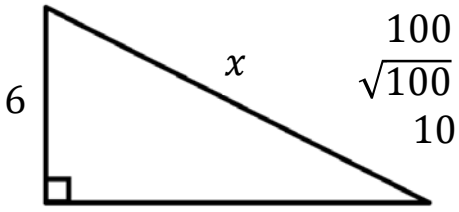
$$a^2 + b^2 = c^2$$

c is always the hypotenuse (longest side)

Basic trigonometry SOHCAHTOA –
used to find a missing side or an angle

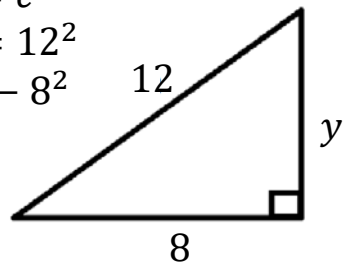


Pythagoras' Theorem

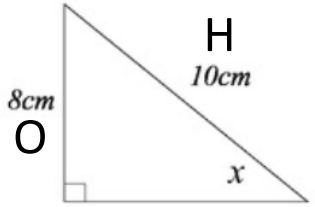


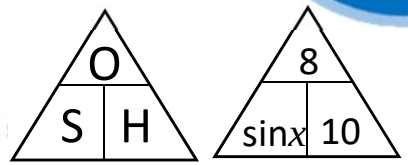
$$a^2 + b^2 = c^2$$
$$6^2 + 8^2 = x^2$$
$$100 = x^2$$
$$\sqrt{100} = x$$
$$10 = x$$

$$a^2 + b^2 = c^2$$
$$y^2 + 8^2 = 12^2$$
$$y^2 = 12^2 - 8^2$$
$$y^2 = 80$$
$$y = \sqrt{80}$$
$$y = 8.9$$

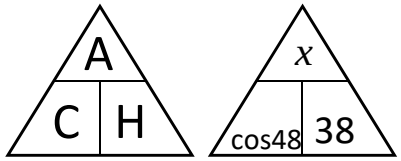


Examples

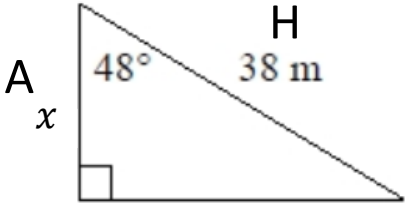




$$\sin x = \frac{8}{10}$$
$$x = \sin^{-1}\left(\frac{8}{10}\right) = 53.1^o$$



$$\cos 48 = \frac{x}{38}$$
$$x = 38 \times \cos 48 = 25.4m$$



Y9

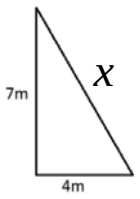
Key Words

Right angled triangle
Hypotenuse
Opposite
Adjacent
Sine
Cosine
Tangent

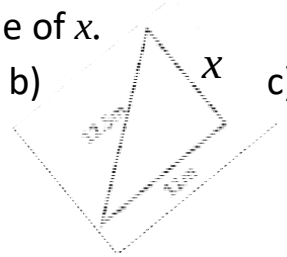
Questions

Find the value of x.

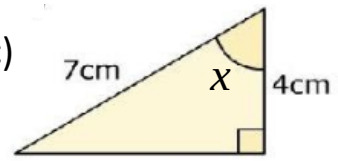
a)



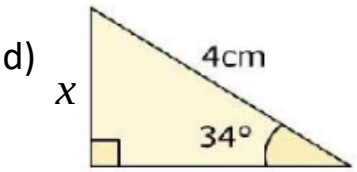
b)



c)



d)



ANSWERS: a) 8.06m b) 5.94m c) 55.15° d) 2.34cm

Maths Knowledge Organiser

PERCENTAGES

Key Concepts

Calculating percentages of an amount without a calculator:

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

Calculating percentages of an amount with a calculator:

Amount × percentage as a decimal

Calculating percentage increase/decrease:

Amount × (1 ± percentage as a decimal)

Calculating a percentage – non calculator:

Calculate 32% of 500g:

10% → 500 ÷ 10 = 50
30% → 50 × 3 = 150
1% → 500 ÷ 100 = 5
2% → 5 × 2 = 10

32% = 150 + 10 = 160g

Calculating a percentage – calculator:

Calculate 32% of 500g:

$Value \times (percentage \div 100)$
$= 500 \times 0.32$
= 160g

Percentage change:

Examples

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

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

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

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

Y9

Key Words
Percent
Increase/decrease
Appreciate
Depreciate
Multiplier
Divide

1) Write the following as a decimal multiplier: a) 45% b) 3% c) 2.7%
2) Calculate 43% of 600 without using a calculator
3) Calculate 72% of 450 using a calculator
4a) Decrease £500 by 6%
b) Increase 65g by 24%
c) Increase 70m by 8.5%

ANSWERS 1a) 0.45 b) 0.03 c) 0.027 2) 258 3) 324 4a) £470 b) 80.6g c) 76.8cm

Maths Knowledge Organiser

PERCENTAGE CHANGE AND REVERSE PERCENTAGE

Key Concepts

Calculating percentages of an amount without a calculator:

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

Calculating percentages of an amount with a calculator:

Amount × percentage as a decimal

Calculating percentage increase/decrease:

Amount × (1 ± percentage as a decimal)

Percentage change:

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

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$= 80 \times (1 - 0.35)$
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A house price appreciates by 8% in a year. It originally costs £120,000, what is the **new value** of the house?

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

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

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

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

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

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

Examples

Y9

Key Words
Percent
Increase/decrease
Reverse
Multiplier
Inverse

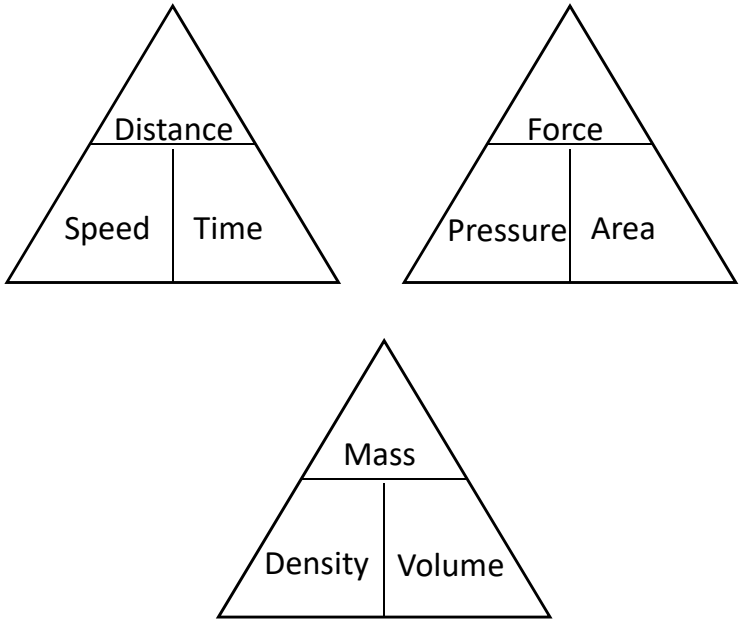
1a) Decrease £500 by 6%
b) Increase 70 by 8.5%
2) A camera costs £180 in a 10% **sale**. What was the **pre-sale** price
3) The cost of a holiday, including **VAT** at 20% is £540. What is the **pre-VAT** price?

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

Maths Knowledge Organiser

COMPOUND MEASURES

Key Concepts

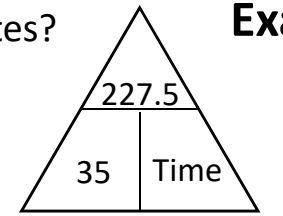


Examples

A car is travelling at a speed of 35mph and is scheduled to travel 227.5 miles. How long will this take in hours and minutes?

$$Time = \frac{distance}{speed}$$

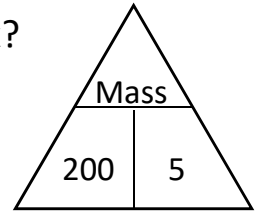
$$Time = \frac{227.5}{35} = 6.5hours = 6\ hours\ 30\ minutes$$



A 5m^3 box has a density of 200g/m^3. What is the mass of the box?

$$Mass = Density \times Volume$$

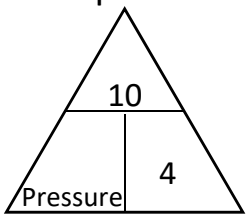
$$Mass = 200 \times 5 = 1000g$$



10N of force are applied to a block with area 4m^2. Calculate the pressure.

$$Pressure = \frac{force}{area}$$

$$Pressure = \frac{10}{4} = 2.5N/m^2$$



Y9

Key Words

Speed
Distance
Time
Pressure
Force
Area
Density
Mass
Volume

1) A block exerts a force of 120 Newtons on the ground. The block has an area of 2 m^2.
Work out the pressure on the ground.

2) A piece of gold has a mass of 760 grams and a volume of 40 cm^3.
Work out the density of the piece of gold.

3) Dani leaves her house at 08 00. She drives 63 miles to work. She drives at an average speed of 27 miles per hour. At what time does Dani arrive at work?

ANSWERS 1) 60N/m^2 2) 19g/cm^3 3) 10:20am

Maths Knowledge Organiser

RATIO AND DIRECT PROPORTION

Key Concepts

To calculate the **value** for a single item we can use the **unitary method**.

When working with best value in monetary terms we use:

$$Price\ per\ unit = \frac{price}{quantity}$$

In recipe terms we use:

$$Weight\ per\ unit = \frac{weight}{quantity}$$

If 20 apples weigh 600g. How much would 28 apples weigh?

600 ÷ 20 = 30g ⟶ weight of 1 apple

30 × 28 = **840g**

Box A has 8 fish fingers costing £1.40.
Box B has 20 fish fingers costing £ 3.40.
Which box is the better value?

$$A = \frac{£1.40}{8} = £0.175 \qquad B = \frac{£3.40}{20} = £0.17$$

Therefore Box B is better value as each fish finger costs less.

Examples

The recipe shows the ingredients needed to make 10 Flapjacks.
How much of each will be needed to make 25 flapjacks?

Ingredients for 10 Flapjacks
80 g rolled oats
60 g butter
30 ml golden syrup
36 g light brown sugar

Method 1: Unitary

80 ÷ 10 = 8
8 × 25 = **200g**

30 ÷ 10 = 3
3 × 25 = **75g**

60 ÷ 10 = 6
6 × 25 = **150g**

36 ÷ 10 = 3.6
3.6 × 25 = **90g**

Method 2: 5 flapjacks

80 ÷ 2 = 40
40 × 5 = **200g**

30 ÷ 2 = 15
15 × 5 = **75g**

60 ÷ 2 = 30
30 × 5 = **150g**

36 ÷ 2 = 18
18 × 5 = **90g**

Y9

Key Words

Unitary
Best Value
Proportion
Quantity

Ingredients to make 16 gingerbread men	
180 g	flour
40 g	ginger
110 g	butter
30 g	sugar

1) How much will we need to make 24 gingerbread men?

2) Packet A has 10 toilet rolls costing £3.50.
Packet B has 12 toilet rolls costing £3.60.
Which is better value for money?

3) If 15 oranges weigh 300g. What will 25 oranges weigh?

ANSWERS 1) 270g flour, 60g ginger, 165g butter, 45g sugar 2) Packet B 30p per roll 3) 500g

DIRECT AND INVERSE PROPORTION

Key Concepts

Variables are **directly proportional** when the **ratio is constant** between the quantities.

Variables are **inversely proportional** when **one quantity increases in proportion to the other decreasing.**

Examples

Direct proportion:

Value of A	32	P	56	20	72
Value of B	20	30	35	R	45

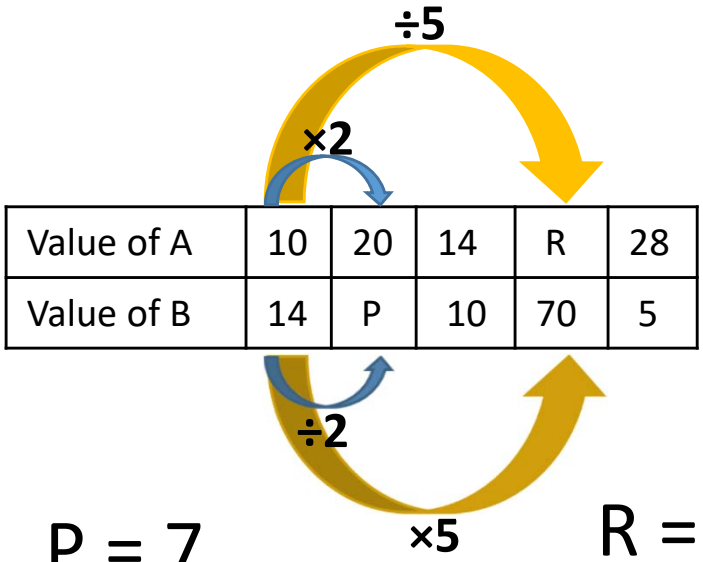
Ratio constant: $20 \div 32 = \frac{5}{8}$

From A to B we will multiply by $\frac{5}{8}$.

From B to A we will divide by $\frac{5}{8}$.

$P = 30 \div \frac{5}{8} = 48$ $\quad$ $R = 20 \times \frac{5}{8} = 12.5$

Inverse proportion:



P = 7 $\quad$ R = 2

Y9

Key Words

Direct
Inverse
Proportion
Divide
Multiply
Constant

Complete each table:

1) Direct proportion

Value of A	5	P	22
Value of B	9	28.8	Q

2) Inverse proportion

Value of A	4	P	18
Value of B	9	3	Q

ANSWERS 1) P = 16, Q = 39.6 2) P = 12, Q = 2

AVERAGES FROM A TABLE

Key Concepts

Modal class (mode)
Group with the highest frequency.

Median group
The median lies in the group which holds the $\frac{total\ frequency+1}{2}$ position. Once identified, use the cumulative frequency to identify which group the median belongs from the table.

Estimate the mean
For grouped data, the mean can only be an estimate as we do not know the exact values in each group. To estimate, we use the midpoints of each group and to calculate the mean we find $\frac{total\ fx}{total\ f}$.

Examples

Length (L cm)	Frequency (f)	Midpoint (x)	fx
$0 < L \leq 10$	10	5	10 × 5 = 50
$10 < L \leq 20$	15	15	15 × 15 = 225
$20 < L \leq 30$	23	25	23 × 25 = 575
$30 < L \leq 40$	7	35	7 × 35 = 245
Total	55		1095

a) Estimate the mean of this data.
step 1: calculate the total frequency
step 2: find the midpoint of each group
step 3: calculate $f \times x$
step 4: calculate the mean shown below

$$\frac{Total\ fx}{Total\ f} = \frac{1095}{55} = 19.9\text{cm}$$

b) Identify the modal class from this data set. ***" the group that has the highest frequency "***
Modal class is $20 < x \leq 30$

c) Identify the group in which the median would lie. Median $= \frac{Total\ frequency+1}{2} = \frac{56}{2} = 28th\ value$

" add the frequency column until you reach the 28th value " Median is the in group $20 < x \leq 30$

Y9

Key Words
Midpoint
Mean
Median
Modal

Cost (£C)	Frequency	Midpoint	
$0 < C \leq 4$	2		
$4 < C \leq 8$	3		
$8 < C \leq 12$	5		
$12 < C \leq 16$	12		
$16 < C \leq 20$	3		

From the data:
a) Identify the modal class.
b) Identify the group which holds the median.
c) Estimate the mean.

ANSWERS: a) $12 < C \leq 16$ b) $\frac{25+1}{2} = 13^{th}$ value is in the group $12 < C \leq 16$ c) $\frac{294}{25} = £11.76$

Maths Knowledge Organiser

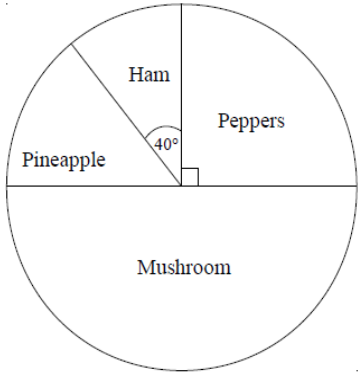
PIE CHARTS AND SCATTER-GRAPHS

Key Concepts

Pie charts use angles to represent, proportionally, the quantity of each group involved.

Pie charts can only be compared to one another when the total frequency or populations are given.

Scatter-graphs show the relationship between two variables. This relationship is called the **correlation**.



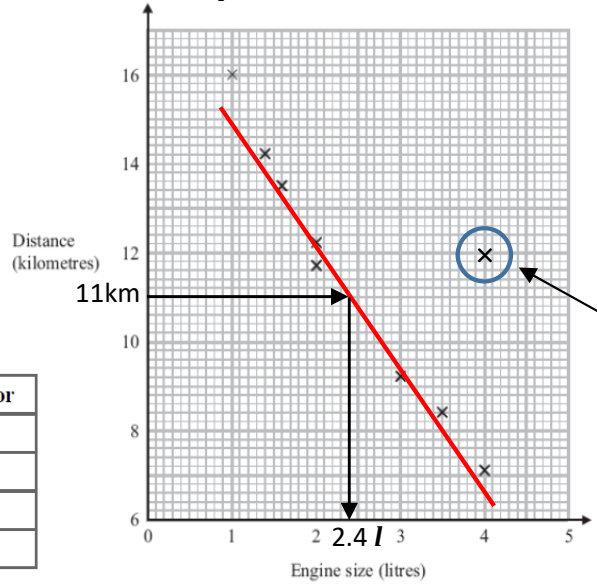
Topping	Frequency	Angle of Sector
Peppers	18	90°
Mushroom	36	180°
Pineapple	10	50°
Ham	8	40°

Total=72 360°

360° ÷ 72

×5

Examples



A scatter-graph is drawn to show the relationship between the engine size of a car and how far it can travel.

It shows negative correlation.

This is an **outlier**.
It does not match the trend.

We draw a **line of best fit** through the data points to help estimate readings, based on the data sample. For example, estimating the engine size of a car that can travel 11km would be 2.4 litres.

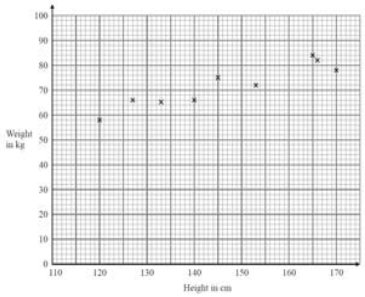
Y9

Key Words

Pie chart
Scatter-graph
Correlation
Outlier
Variable

1) Calculate the angle for each category:

Region	Frequency
Southern England	9
London	23
Midlands	16
Northern England	12
Total	60



2a) What type of correlation is shown?
b) Using a line of best fit estimate the weight when the height is 135cm.

ANSWERS: 1) 360°÷60=6° , Angles = 54°, 138°, 96°, 72° 2) a) positive b) 64kg - 66kg

Year 9 Higher Knowledge Organiser Spring

Maths Knowledge Organiser

TYPES OF ANGLE AND ANGLES IN POLYGONS

Key Concepts

Regular polygons have equal lengths of sides and equal angles.

Angles in polygons

Sum of interior angles

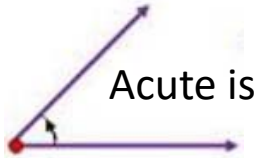
$= (number\ of\ sides - 2) \times 180$

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

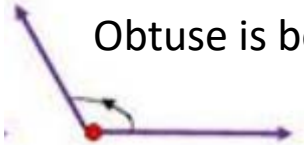
Types of angle

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

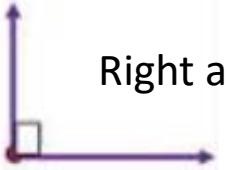
Examples



Acute is less than 90°



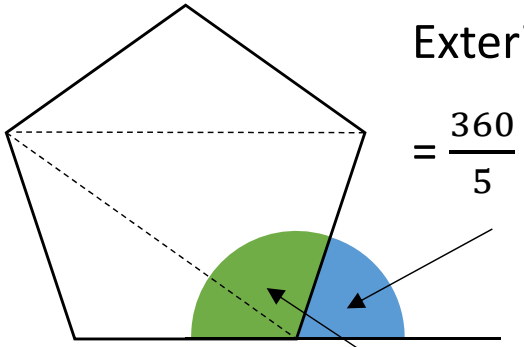
Obtuse is between 90° and 180°



Right angled is 90°

Reflex is between 180° and 360°

Regular Pentagon



Exterior angles

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

Sum of interior angles

$= (5 - 2) \times 180$

$= 540^o$

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

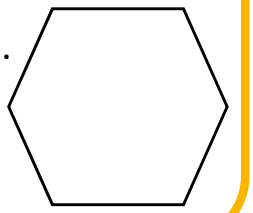
Y9

Key Words

Polygon
Interior angle
Exterior angle
Acute
Obtuse
Right angle
Reflex

Questions

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



ANSWERS: 1) 720° 2) 60° 3) 120°

Maths Knowledge Organiser

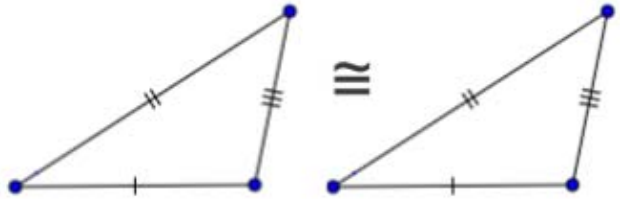
FOUR RULES OF CONGRUENCE

Key Concepts

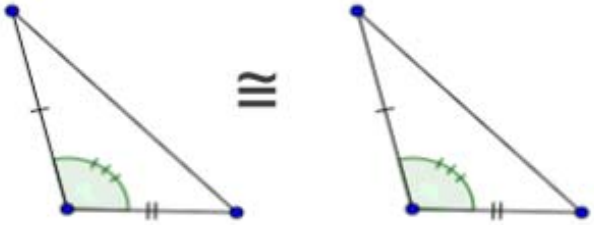
Congruent triangles are triangles that have the **same size and shape**. This means that the corresponding sides are equal and the corresponding angles are equal.

There are four rules of congruency that prove whether a triangle is congruent or not.

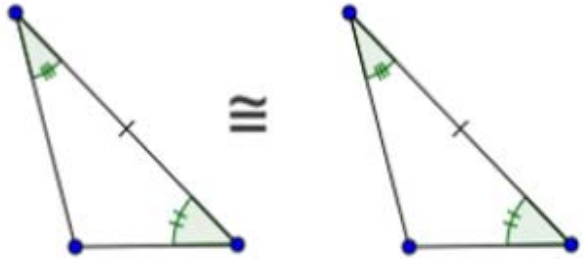
Examples



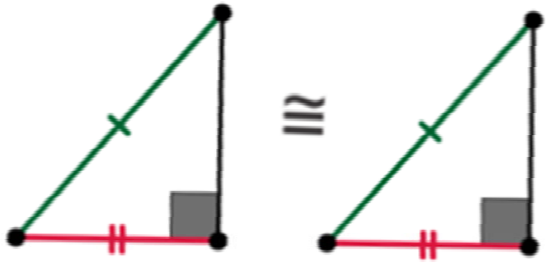
SSS = 3 sides on triangle A are equal to those on triangle B



SAS = 2 sides with the included angle on triangle A are equal to those on triangle B



ASA = 2 angles with the included side on triangle A are equal to those on triangle B



RHS = When the hypotenuse and another side on triangle A are equal to those on triangle B

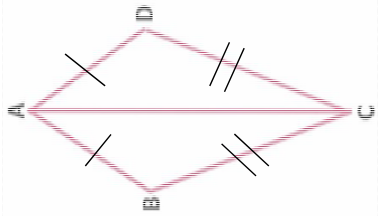
Y9

Key Words

Congruent

Angle

Side



Prove that triangle ACD and ABC are congruent to one another.

ANSWERS AD = AB, CD = BC, AC is common to both triangles, therefore they are congruent proved by the SSS rule.

Maths Knowledge Organiser

SIMILARITY - LENGTHS

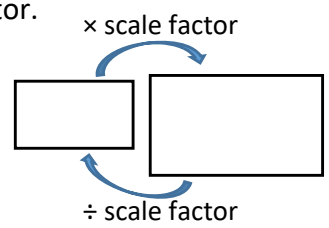
Key Concepts

Similar shapes are an enlargement of one another.

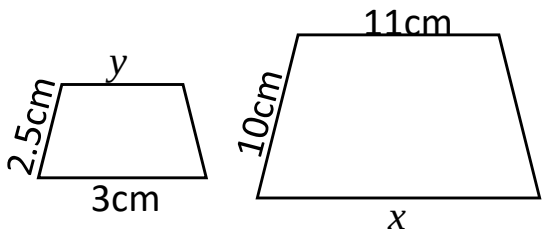
A **scale factor** is used, whereby all lengths are multiplied by the same number.

When finding a missing length on the larger shape we **multiply** by the scale factor.

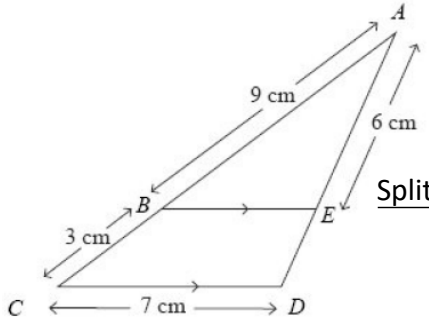
When finding a missing length on the smaller shape we **divide** by the scale factor.



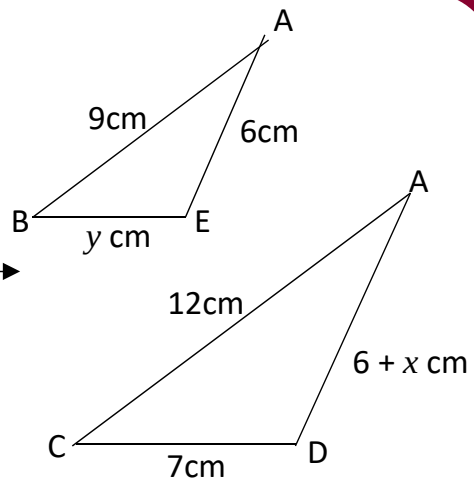
Examples



$$Scale\ factor = \frac{10}{2.5}$$
$$= 4$$
$$x = 3 \times 4$$
$$= 12cm$$
$$y = 11 \div 4$$
$$= 2.75cm$$



Split the diagram



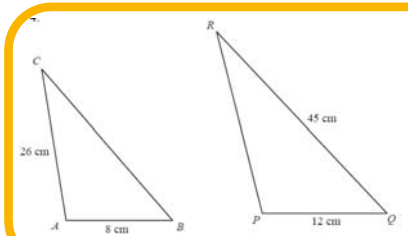
$$Scale\ factor = \frac{12}{9}$$
$$= \frac{4}{3}$$

$$x + 6 = 6 \times \frac{4}{3}$$
$$x + 6 = 8$$
$$x = 8 - 6$$
$$x = 2cm$$

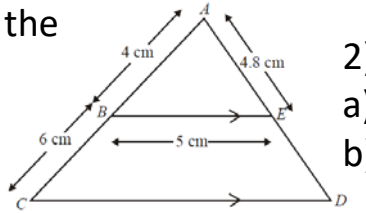
$$y = 7 \div \frac{4}{3}$$
$$= 5.25cm$$

Y9
Higher

Key Words
Similar
Scale factor
Enlarge
Length



1) Calculate the length of:
a) PR
b) BC



2) Calculate the length of:
a) CD
b) ED

ANSWERS 1a) 39cm b) 30cm 2a) 12.5cm b) 7.2cm

Maths Knowledge Organiser

PYTHAGORAS AND TRIGONOMETRY

Key Concepts

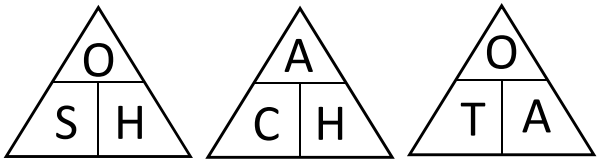
Pythagoras' theorem and basic trigonometry both only work with **right angled triangles**.

Pythagoras' Theorem – used to find a missing length when two sides are known

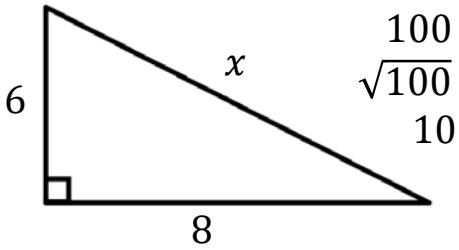
$$a^2 + b^2 = c^2$$

c is always the hypotenuse (longest side)

Basic trigonometry SOHCAHTOA –
used to find a missing side or an angle

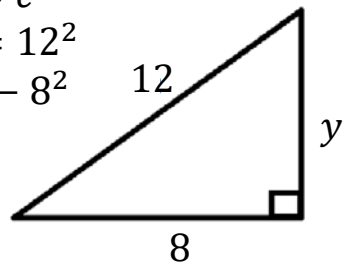


Pythagoras' Theorem

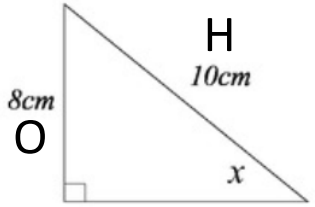


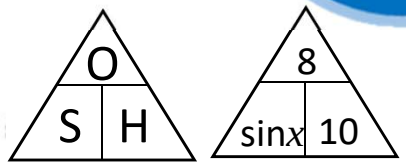
$$a^2 + b^2 = c^2$$
$$6^2 + 8^2 = x^2$$
$$100 = x^2$$
$$\sqrt{100} = x$$
$$10 = x$$

$$a^2 + b^2 = c^2$$
$$y^2 + 8^2 = 12^2$$
$$y^2 = 12^2 - 8^2$$
$$y^2 = 80$$
$$y = \sqrt{80}$$
$$y = 8.9$$

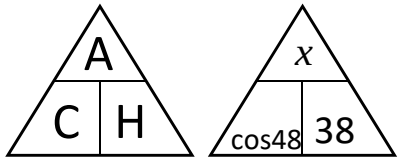


Examples

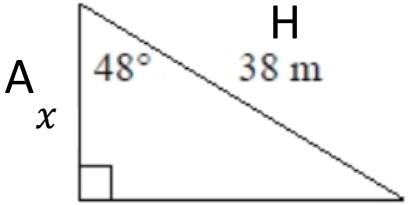




$$\sin x = \frac{8}{10}$$
$$x = \sin^{-1}\left(\frac{8}{10}\right) = 53.1^o$$



$$\cos 48 = \frac{x}{38}$$
$$x = 38 \times \cos 48 = 25.4m$$



Y9

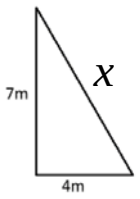
Key Words

Right angled triangle
Hypotenuse
Opposite
Adjacent
Sine
Cosine
Tangent

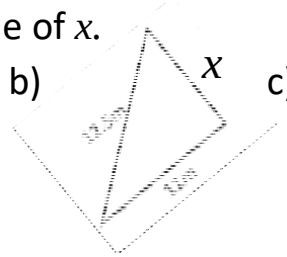
Questions

Find the value of x.

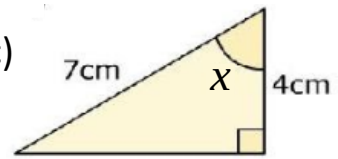
a)



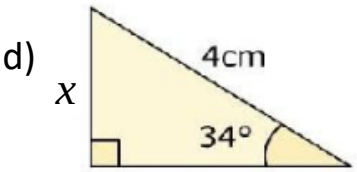
b)



c)



d)



ANSWERS: a) 8.06m b) 5.94m c) 55.15° d) 2.34cm

Maths Knowledge Organiser

PERCENTAGE CHANGE AND REVERSE PERCENTAGE

Key Concepts

Calculating percentages of an amount without a calculator:

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

Calculating percentages of an amount with a calculator:

Amount × percentage as a decimal

Calculating percentage increase/decrease:

Amount × (1 ± percentage as a decimal)

Percentage change:

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

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

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

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

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

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

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

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

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

Examples

Y9

Key Words
Percent
Increase/decrease
Reverse
Multiplier
Inverse

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

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

PERCENTAGES AND INTEREST

Key Concepts

Calculating percentages of an amount without a calculator:

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

Per annum is often used in monetary questions meaning **per year.**

Depreciation means that the value of something is going down or reducing.

Examples

Simple interest:

Joe invest £400 into a bank account that pays 3% **simple interest** per annum.
Calculate how much money will be in the bank account after 4 years.

3% = £4 × 3
= £12
4 years = £12 × 4
Interest = £48
Total in bank account = £400 + £48
= £448

Compound interest:

Joe invest £400 into a bank account that pays 3% **compound interest** per annum.
Calculate how much money will be in the bank account after 4 years.

$Value \times (1 \pm percentage\ as\ a\ decimal)^{years}$
$= 400 \times (1 + 0.03)^4$
$= 400 \times (1.03)^4$
= £450.20

Y9
Higher

Key Words
Percent
Depreciate
Interest
Annum
Simple
Compound
Multiplier

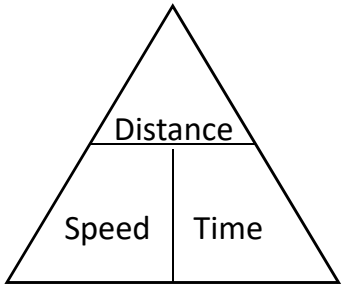
1) Calculate a) 32% of 48 b) 18% of 26
2) Kane invests £350 into a bank account that pays out simple interest of 6%. How much will be in the bank account after 3 years?
3) Jane invests £670 into a bank account that pays out 4% compound interest per annum. How much will be in the bank account after 2 years?

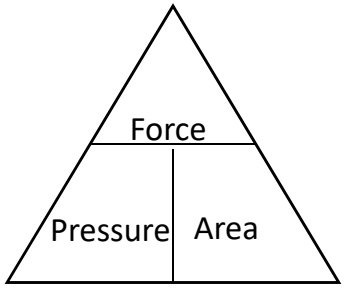
ANSWERS A 1a) 15.36 b) 4.68 2) £413 3) £724.67

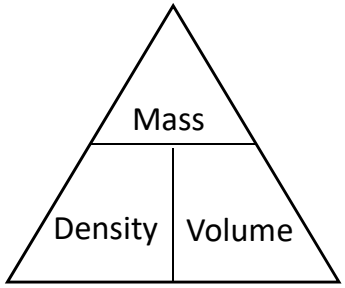
Maths Knowledge Organiser

COMPOUND MEASURES

Key Concepts





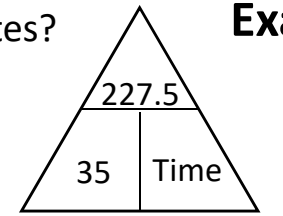


Examples

A car is travelling at a speed of 35mph and is scheduled to travel 227.5 miles. How long will this take in hours and minutes?

$$Time = \frac{distance}{speed}$$

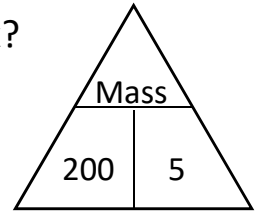
$$Time = \frac{227.5}{35} = 6.5hours = 6\ hours\ 30\ minutes$$



A 5m^3 box has a density of 200g/m^3. What is the mass of the box?

$$Mass = Density \times Volume$$

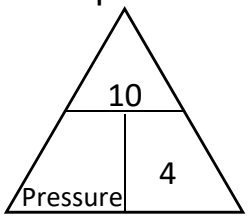
$$Mass = 200 \times 5 = 1000g$$



10N of force are applied to a block with area 4m^2. Calculate the pressure.

$$Pressure = \frac{force}{area}$$

$$Pressure = \frac{10}{4} = 2.5N/m^2$$



Y9

Key Words

Speed
Distance
Time
Pressure
Force
Area
Density
Mass
Volume

1) A block exerts a force of 120 Newtons on the ground. The block has an area of 2 m^2.
Work out the pressure on the ground.

2) A piece of gold has a mass of 760 grams and a volume of 40 cm^3.
Work out the density of the piece of gold.

3) Dani leaves her house at 08 00. She drives 63 miles to work. She drives at an average speed of 27 miles per hour. At what time does Dani arrive at work?

ANSWERS 1) 60N/m^2 2) 19g/cm^3 3) 10:20am

DIRECT AND INVERSE PROPORTION USING ALGEBRA

Key Concepts

Variables are **directly proportional** when the **ratio is constant** between the quantities.

Variables are **inversely proportional** when **one quantity increases in proportion to the other decreasing.**

α is the symbol we use to show that one variable is in proportion to another.

Direct proportion: $y \propto x$

Inverse proportion: $y \propto \frac{1}{x}$

Examples

Direct proportion:

g is directly proportional to the square root of *h*
When *g* = 18, *h* = 16
Find the possible values of *h* when *g* = 2

$$g \propto \sqrt{h}$$
$$g = k\sqrt{h}$$
$$18 = k\sqrt{16}$$
$$18 = 4k$$
$$4.5 = k$$
$$g = 4.5\sqrt{h}$$

$$g = 4.5\sqrt{h}$$
When $g = 2$
$$2 = 4.5\sqrt{h}$$
$$\frac{2}{4.5} = \sqrt{h}$$
$$\left(\frac{4}{9}\right)^2 = h$$
$$\frac{16}{81} = h$$

Inverse proportion:

The time taken, t, for passengers to be checked-in is inversely proportional to the square of the number of staff, s, working.
It takes 30 minutes passengers to be checked-in when 10 staff are working. How many staff are needed for 120 minutes?

$$t \propto \frac{1}{s^2}$$
$$t = \frac{k}{s^2}$$
$$30 = \frac{k}{10^2}$$
$$3000 = k$$
$$t = \frac{3000}{s^2}$$

$$t = \frac{3000}{s^2}$$
$$120 = \frac{3000}{s^2}$$
$$s^2 = \frac{3000}{120}$$
$$s^2 = 25$$
$$s = \sqrt{25}$$
$$s = 5$$

Y9 Higher

Key Words
Direct
Inverse
Proportion
Divide
Multiply
Constant

1) e is directly proportional to f
When $e = 3$, $f = 36$
Find the value of f when $e = 4$

2) x is inversely proportional to the square root of y.
When $x = 12$, $y = 9$
Find the value of x when $y = 81$

ANSWERS 1) $f = 48$ 2) $x = 4$

AVERAGES FROM A TABLE

Key Concepts

Modal class (mode)
Group with the highest frequency.

Median group
The median lies in the group which holds the $\frac{total\ frequency+1}{2}$ position. Once identified, use the cumulative frequency to identify which group the median belongs from the table.

Estimate the mean
For grouped data, the mean can only be an estimate as we do not know the exact values in each group. To estimate, we use the midpoints of each group and to calculate the mean we find $\frac{total\ fx}{total\ f}$.

Examples

Length (L cm)	Frequency (f)	Midpoint (x)	fx
$0 < L \leq 10$	10	5	10 × 5 = 50
$10 < L \leq 20$	15	15	15 × 15 = 225
$20 < L \leq 30$	23	25	23 × 25 = 575
$30 < L \leq 40$	7	35	7 × 35 = 245
Total	55		1095

a) Estimate the mean of this data.
step 1: calculate the total frequency
step 2: find the midpoint of each group
step 3: calculate $f \times x$
step 4: calculate the mean shown below

$$\frac{Total\ fx}{Total\ f} = \frac{1095}{55} = 19.9\text{cm}$$

b) Identify the modal class from this data set. ***" the group that has the highest frequency "***
Modal class is $20 < x \leq 30$

c) Identify the group in which the median would lie. Median $= \frac{Total\ frequency+1}{2} = \frac{56}{2} = 28th\ value$

" add the frequency column until you reach the 28th value " Median is the in group $20 < x \leq 30$

Y9

Key Words
Midpoint
Mean
Median
Modal

Cost (£C)	Frequency	Midpoint	
$0 < C \leq 4$	2		
$4 < C \leq 8$	3		
$8 < C \leq 12$	5		
$12 < C \leq 16$	12		
$16 < C \leq 20$	3		

From the data:
a) Identify the modal class.
b) Identify the group which holds the median.
c) Estimate the mean.

ANSWERS: a) $12 < C \leq 16$ b) $\frac{25+1}{2} = 13^{th}$ value is in the group $12 < C \leq 16$ c) $\frac{294}{25} = £11.76$

Maths Knowledge Organiser

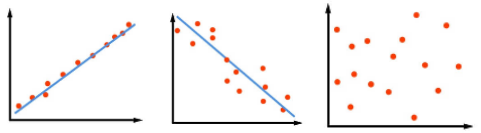
STATISTICAL DIAGRAMS

Key Concepts

A **frequency polygon** is a line graph which connects the midpoints of grouped data.

A **pie chart** represents data into proportional sections.

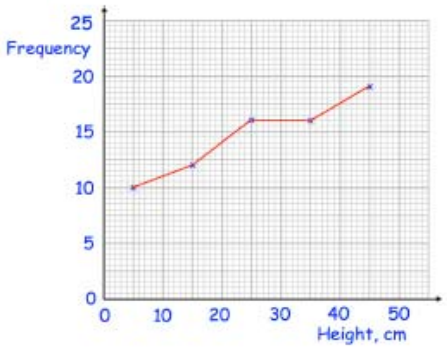
A **scatter-graph** shows the relationship between two variables. **Correlation** is used to describe the relationships.



Positive Correlation | **Negative Correlation** | **No Correlation**

Plot at the midpoint

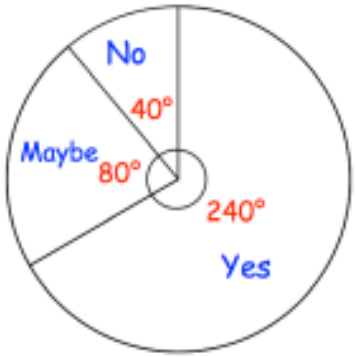
Length, cm	Frequency
$0 < x \leq 10$	10
$10 < x \leq 20$	12
$20 < x \leq 30$	16
$30 < x \leq 40$	16
$40 < x \leq 50$	19

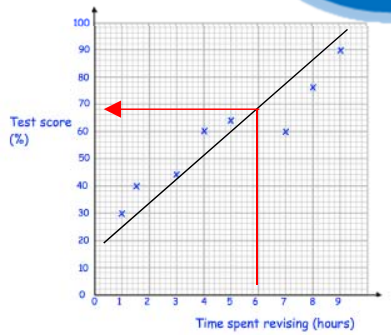


Examples

Answer	Frequency	Angle
Yes	60	240
No	10	40
Maybe	20	80
Total	90	360

× 4





a) What type of correlation is shown?
Positive correlation

b) Another student spent 6 hours revising for the test. Find an estimate of their test score.
Draw a line of best fit and read from it - 68%

c) Explain why it might not be sensible to use the scatter graph to estimate the score for a student that spent 15 hours revising.
It is out of the data range.

Y9

Key Words

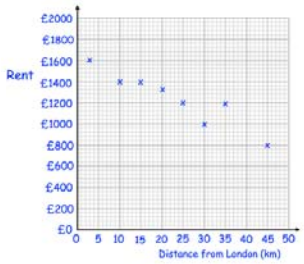
Midpoint
Frequency polygon
Pie chart
Degrees
Scatter graph
Correlation
Line of best fit

1) Draw a frequency polygon using this data.

Marks	Frequency
$0 < m \leq 10$	8
$10 < m \leq 20$	11
$20 < m \leq 30$	23
$30 < m \leq 40$	19
$40 < m \leq 50$	15

2) Draw a pie chart using this data.

Make	Frequency
Ford	8
Mazda	14
Volkswagen	21
Fiat	20
Honda	9



3a) What type of correlation is shown?

b) The distance from London of a house is 22km. What is an estimate of the rent it will cost?

ANSWERS: 2) Angles – 40, 70, 105, 100, 45 3a) Negative correlation b) Between £1200 and £1300

MFL Knowledge Organiser KO. Yr9 L2mod 4 De vacaciones

Tenses

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

FUTURE Saying what you are going to do

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

PAST preterit	AR	ER/ IR	IR-to go
I (yo)	é	í	Fui *I went*
You (tú)	aste	iste	Fuiste
He/she (él /ella)	ó	ió	Fue
We (nosotros)	amos	imos	Fuimos
You (pl) vosotros	asteis	isteis	Fuisteis
They (ellos/ellas)	aron	ieron	fueron

Opinions & Pronouns

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

Me chifla

Me queda bien
(it suits me)

Me hace feliz
(it makes me happy)

Me enfada (angers)

Me repugna

Me irrita

Me aburre

Connectives

También / además	also/furthermore
Pero / sin embargo	but / however
que	which
Donde	where
Porque / dado que	because/ given that
Aunque	although
Así que / por eso	there fore /so

Complexity

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

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

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

Adjectives

Guay /chulo	cool
emocionante	exciting
Bonito / hermoso	beautiful
pinturesco	picturesque
limpio	Clean
sucio	dirty
impresionante	impressive
rápido	smart
gracioso	Funny
Pesado /aburrido	boring
fascinante	Fascinating
maravilloso	Marvelous

Inglaterra **es más caro que** Espana = *is more expensive than*

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

KO. Yr9 L2mod 4 De vacaciones
TOPIC VOCABULARY TRANSLATED

DONDE fuiste?

Fui a…

La costa
El campo
Un pueblo
Un camping
Una ciudad

Inglaterra
Escocia
Francia
Gales
Irlanda
España
Francia
Italia
Grecia
Turquía

<u>Me alojé en….</u>
Un hotel
Una tienda – a tent
Un apartamento
Una casa

Transporte

En coche	by car
En tren	by car
En avión	by boat
En autocar	by coach
En barco	by boat

Lugares (places)

El museo	the museum
El espectáculo	the show
El palacio	the palace
El parque temático	the theme park
El paseo marítimo	the promenade
El Castillo	the castle
El partido de fútbol	the football match
El estadio	the stadium
El Puerto	the port
El centro comercial	the shopping centre
El mar	the sea

La playa	the beach
La costa	the coast
La plaza de toros	the bullring
La piscina	the pool
Las tiendas	the shops
La excursion	the trip
La cathedral	the cathedral

El tiempo / el clima

Hace (mucho) sol	it is (very) hot
Hace (un poco) frío	it is (a bit) cold
Hace (bastante) sol	it is (quite) sunny
Hace (demasiado) viento	it is (too) windy
Llueve (llover)	it is raining (to rain)
Nieva (nevar)	it is snowing (to snow)
Está nublado	it is cloudy

PAST TENSE WEATHER

Hace >	HIZO
Llovió	
Nevó	
Estuvo	

Los verbos

- Ir de excursion- to go on a trip
- Ir de paseo – tp go for a stroll
- Ir a discotecas- to go to clubs
- Ir de compras – to go shopping
- Descansar – to relax
- Tomar el sol – to sunbathe

- Nadar en el mar – to swim in the sea
- Montar en bicicleta – to ride
- Montar a caballo – to ride a horse
- Sacar fotos – to take photos

- Bañarse* – to bathe /swim
- Alojarse* - to stay (in accommodation)
- cenar en los restaurantes
- Hacer surfing- to do surfing

Important Spanish Question Words

¿Cuándo? - *When?*

¿Para qué? - *For what purpose?*

¿Cómo? - *How?*

¿Adónde? - *Where?*

¿Cuánto? - *How much / many?*

¿Quién? - *Who?*

¿Qué? - *What?*

¿Por qué? - *Why?*

¿De dónde? - *From where?*

¿Cuál? - *Which one?*

MFL Knowledge Organiser KO. Yr9 L2mod 5 Diviértete

Tenses

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they	-an	-en	-en

FUTURE Saying what you are going to do

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vas		*Tocar*
va		*jugar*
vamos		*nadar*
vais		*leer*
van		*Ver*

PAST preterit	AR	ER/ IR	IR-to go
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He/she (él /ella)	ó	ió	Fue
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Me hace feliz
(it makes me happy)

Me enfada (angers)

Me repugna

Me irrita

Me aburre

Connectives

SEQUENCING

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

Complexity

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

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

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

Adjectives

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

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

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

KO. Yr9 L2mod 5 Diviértete

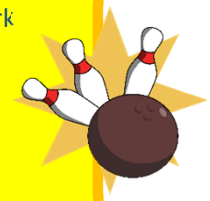
TOPIC VOCABULARY TRANSLATED

UNA CITA - a date

DONDE

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

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



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

Los verbos

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

¿Qué hora es? Es... / Son...

Important Spanish Question Words

¿Cuándo? - *When?*

¿Para qué? - *For what purpose?*

¿Cómo? - *How?*

¿Adónde? - *Where?*

¿Cuánto? - *How much / many?*

¿Quién? - *Who?*

¿Qué? - *What?*

¿Por qué? - *Why?*

¿De dónde? - *From where?*

¿Cuál? - *Which one?*

Science Knowledge Organiser

B2: Cells and control

Lesson sequence

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

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

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

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

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

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

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

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

Science Knowledge Organiser

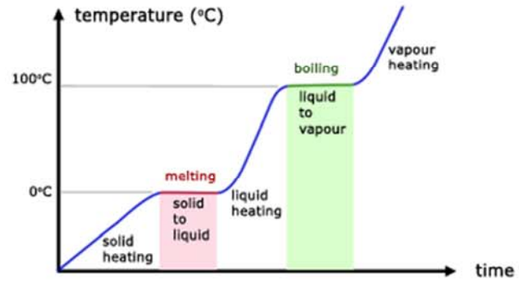
C1 & 2: States of matter and separating substances

Lesson sequence

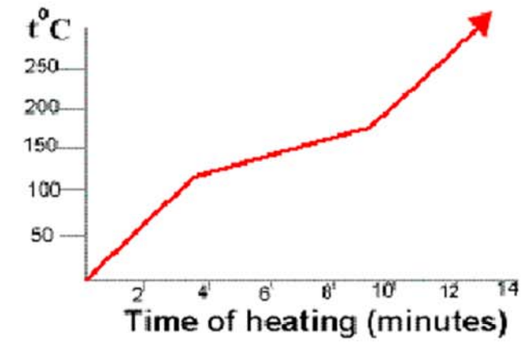
1. States of matter
2. Mixtures
3. Filtration and crystallisation
4. Paper chromatography
5. Distillation
6. Core practical – investigating inks (CP7)
7. Drinking water

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

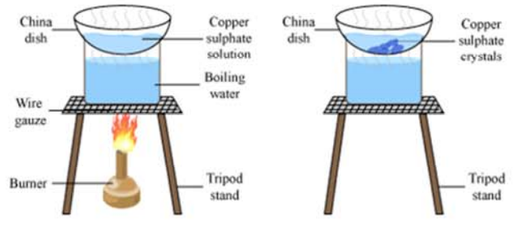
****Heating curve for a pure substance**	Temperature rises as you heat a solid, levels out as it melts, continues rising once fully liquid, levels out whilst boiling and rises again once fully gas.



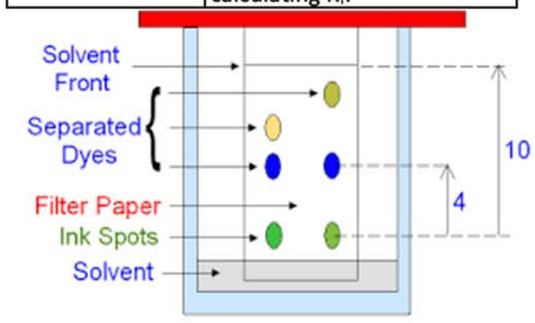
2. Mixtures	
***Element**	A substance made from only one type of atom.
***Compound**	A substance made from two of more different elements bonded together.
***Mixture**	A substance made of two of more substances (elements or compounds) mixed but not bonded together.
****Melting point of mixtures**	Mixtures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



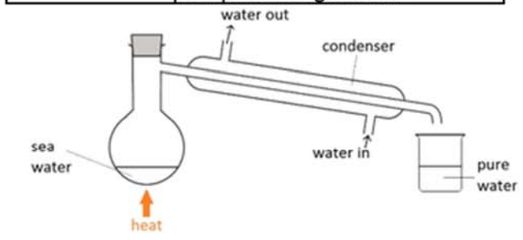
3. Filtration and crystallisation	
***Dissolve**	When a substance mixes with a liquid by breaking down into individual particles (atoms or molecules).
***Soluble**	When a substance can be dissolved by a liquid.
***Insoluble**	When a substance can't be dissolved by a liquid.
***Filtration**	A method of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

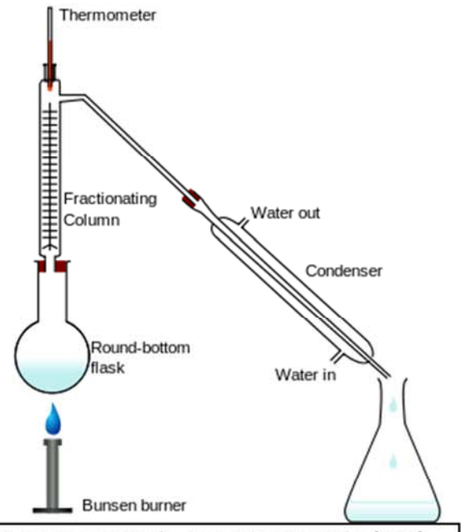


4. Paper chromatography	
***Paper chromatography**	A method of separating out mixtures of liquids to show what is in them, by letting them travel up a piece of chromatography paper.
***Chromatography method**	1. Draw pencil line on paper 2. Place sample spot on line 3. Place paper in solvent, with solvent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



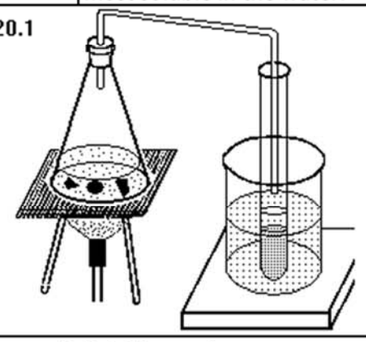
5. Distillation	
***Distillation**	A method used to collect pure liquid from a solution, such as getting pure water from seawater.
****Condenser**	A glass tube surrounded by a glass jacket containing cold tap water. Used to condense gases back to liquids.
****How distillation works**	The solution is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





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

3.20.1



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

Science Knowledge Organiser

C3 & 4: Atoms and the periodic table

Lesson sequence

1. Structure of atoms
2. Detailed structure of atoms
3. Isotopes
4. Mendeleev's periodic table
5. The modern periodic table
6. Electron configuration

1. Structure of atoms	
***Particle**	The tiny pieces that all matter is made from.
***Atom**	The smallest independent particle. Everything is made of atoms.
****Size of atoms**	About 1 x 10^{-10} m in diameter.
****Dalton's model of atoms**	- Tiny hard spheres - Can't be broken down - Can't be created or destroyed - Atoms of an element are identical - Different elements have different atoms
***Subatomic particles**	Smaller particles that atoms are made from.
***Proton**	Mass = 1 Charge = +1 Location = nucleus
***Neutron**	Mass = 1 Charge = 0 Location = nucleus
***Electron**	Mass = 1/1835 (negligible) Charge = -1 Location = shells orbiting nucleus
***Nucleus**	Central part of an atom, 100,000 times smaller than the overall atom

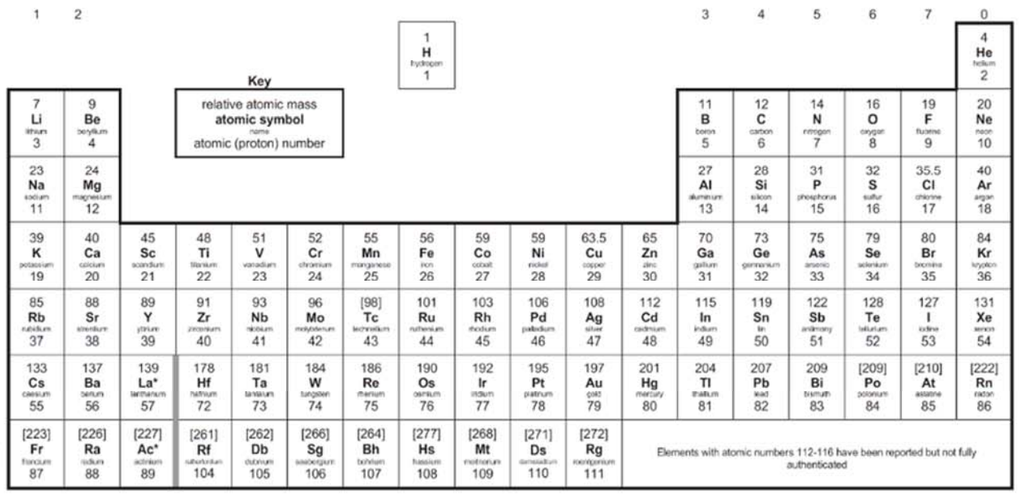
2. Detailed structure of atoms	
****Alpha particle**	Small positively charged particle made of two protons and two neutrons.
****Scattering**	When particles bounce back or change direction.
****Rutherford's experiment**	Fired alpha particles at gold leaf, used a phosphor-coated screen to track where they went.
****Rutherford's results**	Most alpha particles went through, some scattered (changed direction).
****Rutherford's explanation**	Scattered particles hit a solid nucleus. Most did not hit it, therefore nucleus is small
***Atomic number**	The bottom number on the periodic table, gives the number of protons and electrons.
***Atomic mass**	The top number on the periodic table, gives the total protons and neutrons together.
***Number of protons**	The atomic number.
***Number of electrons**	The atomic number.
***Number of neutrons**	Atomic mass minus atomic number.
***Number of protons and electrons**	Equal, because each negative electron is attracted to a positive proton in the nucleus.

3. Isotopes	
****Isotopes**	Atoms with the same number of protons but different number of neutrons.
****Describing isotopes**	Mass after the name (e.g. boron-10) or superscript mass before the symbol (^{10}B).
***Nuclear fission**	Large unstable atoms break into two smaller stable ones.
****Uses of fission**	Nuclear power, nuclear weapons.
****Relative atomic mass, A_r**	The weighted average of the masses of all of the isotopes of an element.
*****Isotopic abundance**	The percentage of an element that is made of a particular isotope.
*****Calculating A_r**	- Multiply each mass by the decimal % - Add these up **Note:** (decimal % = %/100)

4. Mendeleev's periodic table	
***Dmitri Mendeleev**	Russian chemist, developed the periodic table.
***Mendeleev's periodic table**	Ordered by increasing A_r, some elements switched according to their properties.
***Chemical properties**	Includes reaction with acid and formula of oxide.
***Physical properties**	Includes melting point and density.
****Gaps in Mendeleev's periodic table**	Mendeleev left gaps where no known element fitted and predicted these would be filled with newly discovered elements.
****Eka-aluminium**	An element that Mendeleev thought would fill a gap. He predicted its properties, which matched gallium when discovered.

5. The modern periodic table	
***Noble gases**	Gases that do not react: He, Ne, Ar, Kr.
****Moseley's experiment**	Fired electrons at samples of elements and measured X-rays produced.
****Moseley's results**	Energy of x-rays produced proportional to the positive charge of the element.
****Conc. from Moseley's work**	The atomic number must be the number of protons in the atoms.
****Pair reversals**	Elements (like Ar and K) that are not in order of increasing mass.
****Explaining pair reversals**	It means elements should be order elements by increasing atomic number instead.

6. Electron configuration	
***Shells**	Electrons orbit atoms in shells.
***First shell**	Holds up to two electrons.
***Second shell**	Holds up to eight electrons.
***Third shell**	Holds up to eight electrons.
***Number of electrons**	Given by the atomic number.
***Filling shells**	Fill shells from the first shell out. Move up a shell when current one is full.
***Electron configuration**	The number of electrons in each shell (e.g. Al is 2.8.3).
***Outer shell**	The last shell with any electrons in it.
****Groups**	Columns in the periodic table, tell you the number of electrons in the outer shell.
****Periods**	Rows in the periodic table, tell you the number of electron shells.



Science Knowledge Organiser

P1: Motion

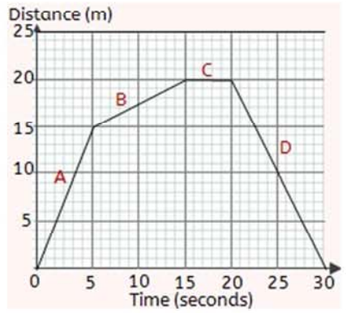
Lesson sequence

1. Vectors and scalars
2. Speed-time graphs
3. Distance-time graphs
4. Acceleration
5. Velocity-time graphs

1. Vectors and scalars	
Magnitude	A scientific word for size.
Scalar quantity	A quantity with magnitude (but no direction).
Scalar examples	Distance – 10 m Speed – 25 m/s Mass – e.g. 50 kg
Vector quantity	A quantity with magnitude and direction.
Vector examples	Displacement – 10 m north Velocity – 25 m/s east Force – 30 N left Acceleration – 3 m/s² south Momentum – 400 N m/s right
Vector arrows	Vectors can be represented by arrows, with the length of the arrow representing the magnitude.
Displacement	The distance and direction travelled in a straight line.
Velocity	Your speed in a certain direction.

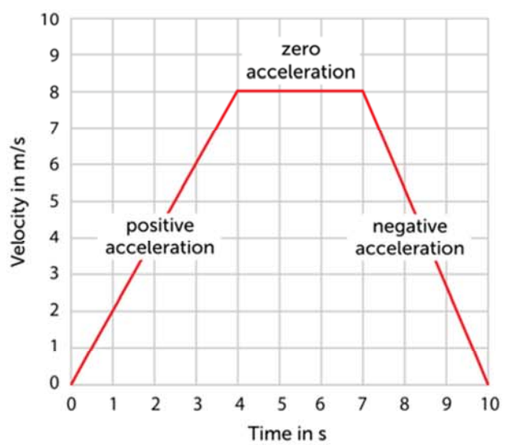
2. Speed	
Units of speed	Metres per second, m/s.
Speed – word equation	Speed = distance / time Speed = m/s Distance = m Time = s
Speed – symbol equation	v = x/t v = speed x = distance t = time
Instantaneous speed	Speed at a particular point in time.
Average speed	The average speed across the whole of a journey, calculate from v = x/t.
Calculating distance travelled – word equation	Distance = average speed x time x = v x t Distance = m Average speed = m/s Time = s
Measuring speed	Measure the distance between two points and time how long an object takes to pass, then calculate using v = x/t.
Light gates	Equipment that can be used for measuring time accurately with fast-moving objects to help find their speed.
Some typical speeds	Walking – 1-2 m/s Running – 3-8 m/s Cycling – 5-20 m/s Driving – 10-40 m/s Flying – 250 m/s

3. Distance-time graphs	
Distance-time graph	A graph describing how your distance from the start changes over the course of a journey. Time is on the x-axis and distance on the y-axis.
Distance-time graphs – stationary	Horizontal line
Distance-time graphs – constant speed	Forwards – line sloping up Backwards – line sloping down
Distance-time graphs – line gradient	Steeper line = faster
Calculating speed from a distance-time graph	Speed = change in distance / change in time Speed = change in y / change in x



4. Acceleration	
Acceleration	Changing velocity
You accelerate when…	- You change speed - You change direction
Units of acceleration	Metres per second squared, m/s²
Positive and negative acceleration	Positive acceleration = speeding up Negative acceleration = slowing down
Deceleration	Slowing down, negative acceleration.
Acceleration – word equation	Acceleration = change in speed / time Acceleration = m/s² Change in speed = m/s Time = s
Acceleration – symbol equation	a = (v – u)/ t a = acceleration v = final speed u = initial speed t = time
Linking acceleration and Velocity travelled	Use the equation: x = (v² – u²) / 2a x = Velocity travelled a = acceleration v = final speed u = initial speed
Acceleration during free fall	10 m/s²

5. Velocity-time graphs	
Velocity-time graph	A graph showing how your velocity (speed) changes over time. Time is on the x-axis, velocity is on the y-axis.
Velocity-time graphs – constant speed	Horizontal line
Velocity-time graphs – acceleration	Speeding up – line sloping up Slowing down – line sloping down
Velocity-time graphs – Stationary	Horizontal line on the x-axis
Velocity-time graphs – line gradient	Steeper line = greater acceleration
Calculating acceleration on a velocity-time graph	Acceleration = change in velocity/ change in time Acceleration = change in y / change in x
Calculating distance travelled from a velocity-time graph	Distance = area under the graph. Divide the graph into rectangles and triangles, find the area of each and add them together.



Science Knowledge Organiser

P2: Forces and motion

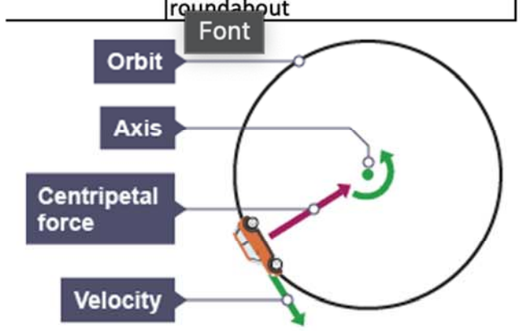
Lesson sequence

1. Resultant forces
2. Newton's first law
3. Mass and weight
4. Newton's second law
5. Core practical – investigating acceleration (CP12)
6. Newton's third law
7. Momentum (HT)
8. Stopping distances
9. Car safety

1. Resultant forces	
***Scalar quantity**	A quantity with magnitude (but no direction).
***Vector quantity**	A quantity with magnitude and direction.
***Force arrows**	Arrows can be used to represent forces: - Direction = direction of force - Length = size of force
****Resultant force**	The force left over when forces acting in opposite directions are cancelled out.
****Calculating resultant force**	Subtract the total force in one direction from the total force in the other direction.
***Balanced forces**	When the resultant force is zero (because forces acting in opposite directions are the same size).
***Unbalanced forces**	When the resultant force is non-zero (because there is more force in one direction than another).

2. Newton's first law	
***Newton's first law of motion**	An object will move at the same speed and direction unless it experiences a resultant force.
****The effect of resultant forces**	Resultant forces cause acceleration: speeding up, slowing down or changing direction

****Effect of forces on motion**	Forces make you start moving, stop moving or change direction, they are not needed to keep you moving!
*****Circular motion**	Moving in a circle is a type of acceleration because you are changing velocity (your direction changes even if your speed does not).
*****Centripetal force**	A force acting towards the centre of a circle that enables objects to move in a circle.
*****Sources of centripetal force**	Gravity – keeps the Earth orbiting the sun Tension – lets a bucket swing in circles on a rope Friction – keeps cars turn round a roundabout



3. Mass and weight	
***Mass**	The quantity of matter in an object is made of. Units = kilograms, kg.
***Weight**	A force caused by gravity pulling downward on an object. Units = newtons, N.
***Force meter**	An instrument for measuring forces. They usually involve a spring that stretched more the more the force.
****Gravitational field strength**	The strength of gravity, which is different on different planets. Units = newtons per g=kilogram, N/kg.
****Gravitational field strength on Earth**	10 N/kg

****Calculating weight**	Weight = mass x gravitational field strength W = m x g Weight = N Mass = kg Gravitational field strength = N/kg
****Air resistance**	A force greater by the air pushing against you as you move. Faster movement → greater air resistance.
*****Motion whilst falling**	Accelerate until the air resistance is equal to the weight; now there is no resultant force so speed stays constant.

4. Newton's second law	
***Newton's second law of motion**	Force = mass x acceleration
****Acceleration is greater when…**	- The force is greater - The mass is smaller
***Calculating forces**	Force = mass x acceleration F = m x a Force = N Mass = kg Acceleration = m/s^2
***Calculating acceleration**	Acceleration = mass / force a = F / m Force = N Mass = kg Acceleration = m/s^2
*****Inertial mass**	The mass calculated by measuring the acceleration produced by force, using the equation 'm = F / a'
*****The point of inertial mass**	Inertial mass is the same as mass measured with a mass balance, but it gives us a way to measure mass where there is no gravity, such as in space.

5. Core practical – investigating acceleration (CP12)	
***CP12 - Aim**	To investigate how changing force changes acceleration.
***CP12 - Setup**	A trolley on a ramp with 90 g masses. 10 g mass hanger attached to trolley via a string over a pulley.
***CP12 – Data collection**	Release the trolley, use light gates to measure the acceleration.
***CP12 – Variations**	Move 10 g of mass from the trolley to the mass hanger each time.
***CP12 – Independent variable**	The force: each 10 g mass = 0.1 N force
***CP12 - Results**	Ore mass → more force → greater acceleration.

6. Newton's third law	
***Newton's third law**	For every action force there is an equal but opposite reaction force.
***Action force**	The force you push or pull with.
***Reaction force**	A force of the same size but opposite direction to an action force.
***Action-reaction forces**	If, A applies an action force to B, B applies a reaction force of same size and opposite direction to A.
****Action-reaction vs balanced forces**	Similarities: same sizes, opposite directions Differences: balanced forces act on same object, action-reaction act on different objects
*****Action-reaction forces - collisions**	E.g. kicking a ball: the foot pushes the ball, the ball pushes back on the foot.

7. Momentum (HT)	
***Momentum**	The tendency of an object to keep moving.

***Calculating momentum**	Momentum = mass x velocity field strength p = m x v Momentum = kg m/s Mass = kg velocity = N/kg
Momentum and force calculations	Force = change in momentum / time F = (mv – mu)/t Force = N Mass = kg Velocity = m/s Time = s
***Conservation of momentum**	Total momentum before and after a collision is the same.

****Three car safety features**	Crumple zones, (stretchy) seat belts, air bags
*****Collision forces**	Greater momentum change → greater force
****Calculating collision forces**	Force = change in momentum / time F = (mv – mu)/t Force = N Mass = kg Velocity = m/s Time = s

8. Stopping distances	
***Stopping distance**	The distance travelled from when a hazard is seen to when you fully stop.
***Thinking distance**	The distance travelled from when a hazard is seen to when you brake.
***Braking distance**	The distance travelled from when you brake to when you fully stop.
****Calculating stopping distance**	Stopping distance = thinking distance + braking distance
****Thinking distance and reaction time**	Slower reactions = greater thinking distance
****Thinking distance increased by…**	Higher speed, tiredness, illness, drugs, distractions, old age
****Braking distance increased by**	Higher speed, poor brakes, poor tyres, wet/icy/gravelly road, downhill, heavier load

9. Crash hazards	
****Crash danger**	Crashes involve large decelerations, creating large forces which can injure you.
****Car safety features**	Increase the time a collision takes, reducing deceleration and forces.

Science Knowledge Organiser

B3: Genetics

Lesson sequence

1. Meiosis
2. DNA
3. DNA extraction
4. Alleles
5. Inheritance
6. Gene mutation
7. Variation

1. Meiosis	
***Gametes**	Egg cell and sperm cell
***Fertilisation**	Sperm cell fuses with egg cell and nuclei combine
***Zygote**	Single cell formed by fertilisation
***Gene**	Length of DNA coding for a protein. Controls your characteristics
***Genome**	All the DNA and genes in an organism
***Protein**	Polymer made from amino acids
****Polymer**	Long molecule made by chaining together many shorter ones
***Diploid**	A cell with 23 pairs of chromosomes (46 in total)
***Haploid**	A cell with 23 single chromosomes
***Meiosis**	Cell division that makes gametes
****Meiosis stages**	DNA replicates, cell divides into 2 diploid cells, these divide into 4 haploid daughters.
*****Why gametes are different**	Chromosomes in a pair are slightly different. Different gametes get different combinations of chromosomes.

2. DNA	
***Chromosome**	Large DNA molecule made into a small package by tightly coiling DNA around a protein.
***DNA structure**	Two strands, double helix, complementary base pairs, sugar-phosphate backbone
***DNA bases**	Adenine, A; thymine, T; cytosine, C; guanine, G
***Complementary base pairs**	A pairs with T C pairs with G
****Hydrogen bonds**	Weak force holding the two strands of DNA together.
*****DNA analysis**	Uses small differences in DNA to determine family relationships or link people to crimes.

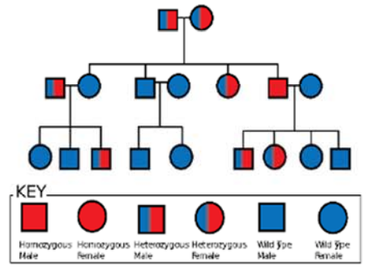
3. DNA extraction	
***DNA extraction: Mix water, salt and detergent.**	Salt makes DNA clump together, detergent breaks down cell membranes to release DNA
***DNA extraction: Mash fruit/veg and add the solution**	Increases the surface area
***DNA extraction: Leave in water bath at 60°C**	Heat makes it react quicker
***DNA extraction: Filter the mixture and collect filtrate**	To remove unwanted lumps
***DNA extraction: Measure out 10 cm^3 of filtrate**	It's easier to work with a small amount
***DNA extraction: Add two drops of protease solution**	Protease breaks down proteins around the DNA
***DNA extraction: Gently add ice-cold ethanol**	DNA is insoluble in ethanol so precipitates
***DNA extraction: Leave for several minutes**	So white DNA layer forms

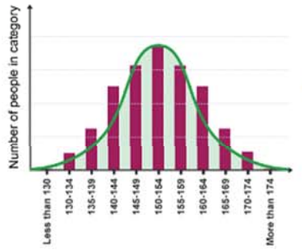
4. Alleles	
***Allele**	Different version of the same gene. We have two alleles of each gene.
****Homozygous**	We have two copies of the same allele
****Heterozygous**	We have two different copies of an allele
***Dominant allele**	One copy needed for characteristic to show. Written as a capital.
***Recessive allele**	Two copies for the characteristic to show. Written as lowercase.
***Genotype**	The combination of alleles in an organism.
***Phenotype**	The characteristics produced by the alleles.
****Genetic diagram**	Shows the likelihood of offspring produced by parents with certain genotypes

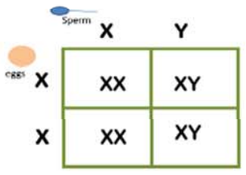
5. Inheritance	
***Sex chromosomes**	Female: XX Males: XY
***Inheriting sex**	All eggs are X, 50% of sperm are X and 50% are Y, so 50% of zygotes are XX and 50% are XY
***Punnett squares**	Uses the genotypes of male and female gametes to predict the genotypes of the offspring.
****Probability and Punnett squares**	Punnett squares tell you the likelihood of certain offspring, not what will actually happen.
****Cystic fibrosis**	Illness caused by a inheriting two copies of a faulty recessive allele.
****Family pedigree chart**	Chart showing how genotypes are inherited down through a family.

6. Gene mutation	
***Mutation**	A change to the bases in a gene.
****Effect of mutations**	Change the structure of a protein and how it works. Sometimes harmless, normally harmful, very rarely beneficial
***Cause of mutations**	Mistakes copying DNA during cell division, DNA damage from chemicals or radiation
***Inheriting mutations**	Only if they occur in gametes (egg and sperm)
***Human Genome Project**	(HGP) Project involving many scientists from many countries to find the order of bases in human DNA
****How is the HGP useful?**	To tailor drugs to genes, to design better drugs
****Genetic differences**	HGP found 99% of DNA in all people is identical.

7. Variation	
***Variation**	Natural differences between members of a species that affect the chance of survival.
***Genetic variation**	Variation caused by genes
***Environmental variation**	Caused by interaction with the surroundings – such as food, climate etc.
***Causes of most variation**	A combination of genes and the environment.
****Acquired characteristics**	Changes caused by the environment during your lifetime, such as losing a leg
****Continuous variation**	Can be anywhere within a range, such as height , following a normal distribution.
****Discontinuous variation**	Can be only one of a few possibilities, such as blood type: A, B, AB, O
****Normal distribution**	Bell-shaped curve with more in the middle and fewer either side.







Science Knowledge Organiser

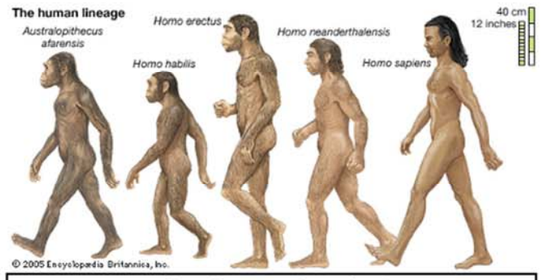
B4: Evolution

Lesson sequence

1. Human evolution
2. The theory of evolution
3. Resistance
4. Classification
5. How to modify species
6. Problems with modifying species
7. Genetic engineering of bacteria (HT)

1. Human evolution	
***Binomial naming**	Two-part names, first part = genus, second part = species. Written in italics.
***Homo sapiens**	Our species. Evolved about 200,000 years ago. Skull volume 1450 cm^3.
****Ardipithecus ramidus**	Aka 'Ardi'. 4.4 million years ago, walked upright and climbed trees, 350 cm^3 skull volume.
****Australopithecus afarensis**	Aka Lucy. 3.2 million years ago, walked upright, skull volume 400 cm^3.
****Homo habilis**	2.4-1.4 million years ago, walked upright, skull volume 5-600 cm^3.
***8Homo erectus**	1.8 to 0.5 million years ago, walked upright, skull volume 850 cm^3.
***Fossil evidence**	Many fossils have been found showing a gradual transition from 'ape-like' to 'human-like'.
****Stone tool evidence**	Older stone tools are simpler requiring less intelligence to make, younger stone tools are more complex requiring more intelligence to make.

****The Leakeys**	Mary and Louis discovered *Homo habilis*, their son Richard worked on *Homo erectus*.



2. The theory of evolution	
***Charles Darwin**	Develop the theory of evolution.
***Evolution**	The way that species develop by gradual changes over many generations due to natural selection.
***Variation**	Natural differences between members of a species that affect the chance of survival.
****Mutations and evolution**	Changes in DNA cause variation.
****Environmental change**	Change to factors such as food supply, climate or predators.
***Competition**	The fight to eat, survive and breed.
***Natural selection**	Organisms with the best genes and characteristics are more likely to survive, breed and pass on their better genes.
***Inheritance**	Gaining your genes from your parents.
****Well adapted**	An organism has features that make it better able to survive and breed.
****Evolution and the individual**	An individual does not evolve during its lifetime, populations of organisms evolve over many lifetimes.

****Human evolution**	Humans did not evolve from chimpanzees, we both evolved from a common ancestor.

3. Resistance	
***Resistance**	The natural ability of some members of a species to survive poisons that would kill the other members.
***Evolution of resistance**	Evolution of organisms that stops them from being affected by poisons.
****Rats and warfarin resistance**	Warfarin is used to kill rats. Some rats were naturally resistant, survived the warfarin, bred and passed on their resistance genes.
****Antibiotic resistance**	Antibiotics are used to kill bacteria. Some bacteria were naturally resistant, survived the antibiotics, bred and passed on their resistance genes.
****The problems of resistance**	Antibiotic resistance means that many infections that used to be simple to treat may become too resistant to treat, causing major health problems.

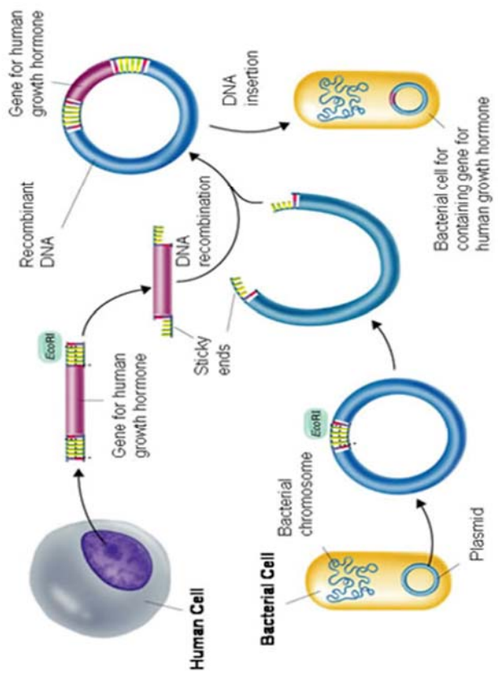
4. Classification	
***Carl Linnaeus**	Developed the modern system of classification.
***How to classify**	Based on similarities, group things into smaller and smaller groups with fewer and fewer similarities.
***Problems with classification**	Sometimes organisms that look similar are not actually related.
***Kingdoms**	Old idea, classifying living things into five kingdoms (including plants, animals and fungi)
****Carl Woese**	Developed the modern system of classification with three domains.
***Domains**	Modern idea of classifying living things into three main groups: bacteria, Archae, Eukarya.

****Bacteria**	Single-celled organisms with no nucleus and no unused sections of DNA.
****Archae**	Single-celled organisms with no nucleus but with unused sections of DNA.
****Eukarya**	(Often) multi-cellular organisms with a nucleus and unused sections of DNA. Includes plants, animals, fungi and protists.

5. How to modify species	
***Artificial selection**	When humans (normally farmers) select the animals/plants to breed with the best characteristics.
***Selective breeding**	Developing new breeds of plants or animals with better characteristics by selective breeding over many generations.
****Selective breeding in practice**	Choose parents with the best characteristics, breed them together, choose from their offspring with the best characteristics, breed them together, repeat for many generations.
***Genetic engineering**	Changing the characteristics of organisms by giving them genes from another organism.
***GMO**	Genetically modified organism: an organism that has had its genes changed.
****Bt corn**	Corn containing a gene from *Bacillus thuringiensis* that makes it produce a substance called Bt which kills insects.
***Medical GMOs**	GM bacteria are used to make insulin (for diabetes) and some antibiotics.
****Pros and cons of GM**	Quicker than selective breeding and can introduce more different characteristics but is expensive.

6. Problems with modifying species	
Over-selection	Farmers focussing too much on breeding for one characteristic (such as chicken breast size), don't spot problems with other characteristics (such as weak leg bones) causing suffering.
Gene leakage	The concern GMOs could breed with wild relatives, enabling the modified genes to escape into the wild. This could have ecological impacts.
Resistance	The concern that in areas growing Bt corn, insects simply evolve resistance to Bt.
Insulin	Insulin made by GM bacteria is not identical to human insulin, and some people suffer bad reactions to it.

7. Genetic engineering of bacteria (HT)	
****Plasmid DNA**	Small loops of DNA containing a few genes.
*****Restriction enzyme**	Enzymes that cut DNA, leaving sticky ends at each end of the piece of DNA.
*****Sticky end**	A short sequence of unpaired bases at the end of a piece of DNA.
*****Ligase**	An enzyme that joins two pieces of DNA by matching up the bases on their sticky ends.
*****Recombinant DNA**	DNA produced by combining together two of more pieces of DNA.
*****How to genetically engineer bacteria**	Cut out gene using restriction enzymes, remove plasmids from bacteria and open with restriction enzymes, use ligase to join gene and plasmid together, return plasmids to bacteria.



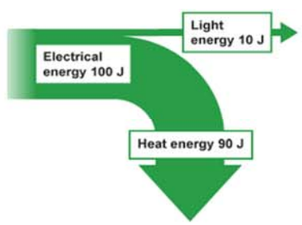
Science Knowledge Organiser

P3: Energy

Lesson sequence

1. Storing and transferring energy
2. Energy efficiency
3. Insulation
4. Stored energy
5. Non-renewable energy resources
6. Renewable energy resources

1. Storing and transferring energy	
***Energy**	The capacity to do work.
***Joules**	The units of energy, symbol = J.
***Kilojoules**	1000 J, symbol = kJ.
***Thermal energy**	Energy stored on hot objects.
***Kinetic energy**	Energy stored in moving objects.
***Chemical energy**	Energy stored in chemicals such as fuels.
***Nuclear energy**	Aka atomic energy. Energy stored in the nucleus of atoms.
****Gravitational potential energy**	Energy stored in objects based on how high they are.
****Elastic potential energy**	Aka strain energy. Energy stored in bent or stretched objects.
****Other forms of energy**	Light, sound, electrical.
****First law of thermodynamics**	Energy cannot be created or destroyed, just transferred from one form to another.
****Energy transfers**	Say what form the energy starts as *and* what it becomes.
****Sankey diagram**	Shows energy transfers. The thickness of the arrow relates to the amount of energy.



2. Energy efficiency	
****Dissipation**	The way energy spreads out, becoming less useful as it does.
***Wasted energy**	Energy that is transferred into forms that can't be used.
***Friction**	Causes energy loss as heat when two surfaces rub together.
****Lubrication**	Allows surfaces to move smoothly, reduces energy loss from friction.
****Electrical resistance**	Causes wires to heat up, wasting electrical energy.
***Calculating efficiency**	$Efficiency = \frac{useful\ energy\ transferred}{total\ energy\ transferred}$
****Energy efficiency numbers**	Efficiency is between 0 and 1. 1 = no energy wasted, 0 = all energy wasted.

3. Insulation	
***Convection**	Heat transfer caused when hot fluids (gas or liquid) rise because they are less dense.
***Conduction**	Heat transfer through solids caused by vibrating particles bumping into each other.
***Radiation**	Heat transfer by infrared radiation which heats objects up when they absorb it.
****Insulation**	Materials that contain lots of tiny air pockets that prevent heat loss by conduction.
****Thermal conductivity**	A measure of how well a material conducts heat.
****Draught-proofing**	Sealing gaps around doors and windows to prevent heat loss by convection.

4. Stored energy	
***Calculating kinetic energy**	$KE = \frac{1}{2}mv^2$ Where 'KE' is kinetic energy in J, 'm' is mass in kg, 'v' is velocity in m/s.
****Calculating v from KE**	$v = \sqrt{\frac{2KE}{m}}$
****Gravitational field strength**	The strength of gravity. Different on different planets. On earth: 10 N/kg.
****Calculating gravitational potential energy**	$GPE = mgh$ Where 'GPE' is gravitational potential energy in J, 'm' is mass in kg, 'g' is gravitational field strength in N/kg, 'h' is height change in m.

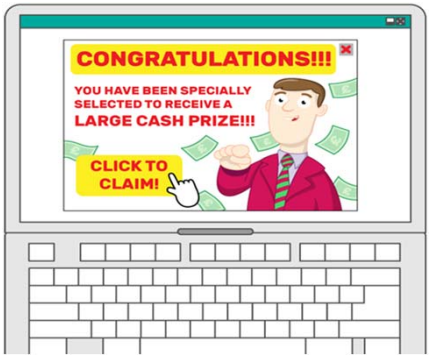
5. Non-renewable energy resources	
***Fossil fuels**	Coal, oil, natural gas. All are non-renewable.
***Non-renewable resource**	A resource that will one day run out because it is being used faster than it is being made.
****Harm from burning fossil fuels**	Carbon dioxide gas is released which causes global warming. Sulfur dioxide is released which causes acid rain.
***Renewable resource**	A resource will not run out.
***Nuclear power**	Electricity generated from nuclear fuels such as uranium.
****Nuclear power pros and cons**	😊 Lasts a long time, releases no carbon dioxide ☹ Produces very harmful waste, expensive to decommission, although rare, accidents are very dangerous.

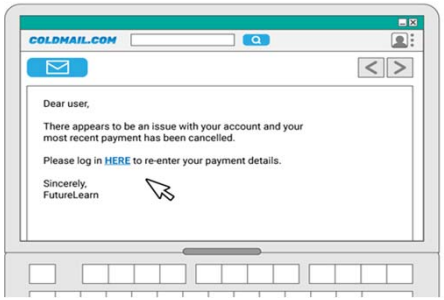
6. Renewable energy resources	
***Wind power**	Large turbines spun by the wind. 😊 No CO_2 ☹ Lots needed, ugly?, no wind no power
***Solar power**	Solar cells turn sunlight to electricity. 😊 No CO_2 ☹ No sun no power, need lots of space, not suitable for all countries
****Tidal power**	Uses water movement from tides to spin turbines
****Tidal barrage**	A damn built across an estuary that fills up when tide goes in. 😊 Huge amounts of energy, no CO_2 ☹ Destroys important mudflat habitats
****Hydroelectricity**	A damn is built across a river valley, water released from the damn spins turbines. 😊 Lots of energy, no CO_2 ☹ Destroys habitat by flooding
***Biofuels**	Fuels made from recently plant or animal matter, often waste. 😊 Carbon neutral ☹ Needs a lot of land, increases food prices
****Carbon neutral**	When burning a fuel releases the same CO_2 it absorbed when it was growing, so there is no CO_2 increase.

Computer Science Knowledge Organiser

CYBERSECURITY

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





Cybersecurity looking at common attacks and methods to protect ourselves and our networks against these attacks.
Data: raw facts and figures
Information: data that has been processed and has context

Data Protection Act 2018:
All organisations and people using and storing personal data must abide by the DPA principles . It states how data should be stored/accessed and what rights a data subject has for the protection of their data.
Computer Misuse Act 1990: It is an offence to

have unauthorised access to computer material

have unauthorised access with intent to commit or facilitate the commission of further offences

commit unauthorised acts with intent to impair, or with recklessness as to impairing, the operation of a computer.

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

Unethical versus ethical hacking

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

Computer Science Knowledge Organiser

REPRESENTATIONS GOING AUDIO VISUAL

Key Words	
Binary number	A number system that contains two symbols, 0 and 1. Also known as base 2
Pixel	The elements of a digital image are called pixels (**pict**ure **el**ements)
Bit (b)	The smallest unit of data. 0 or 1.
Resolution	The number of pixels in a digital image.
megapixels	1 Megapixel is a million individual pixels.
Colour depth	The fixed number of binary digits used to represent each pixel's colour. E.g. in a black and white image we would only need to use 0 for white and 1 for black so we have a colour depth of 1 bit.
Bitmaps or raster images	Digital images that are formed using a binary representation of each pixel's colour.
RGB colour	One way of representing colour is to use a sequence of 24 bits, which are divided into three separate 8-bit components, each representing the quantity of red, green, and blue in the combination .
Representation size	How many bits are required to represent an image or sound
Digitising	Converting analogue data to digital data.
Sampling rate	The number of samples taken per second.
Sample Size	The number of bits recorded per sample.

Sound Representation Size = Sampling rate x sample size x duration x channels

Image Representation Size = Resolution (rows x columns) x Colour depth

Computers represent all data, including numbers, letters, symbols, images, videos and sounds using binary numbers. All binary numbers are made up of the digits) and 1.

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

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

When computers store **bitmap or raster** images they are broken down into individual elements called **pixels** and each pixel is represented by a binary number which the computer can interpret to determine what colour to display.

The **more pixels** you have in an image the **higher the resolution is**. This allows you to capture more detail and have **higher quality** but it also makes the **file larger** which means you need more storage space, **more processing time** and **more time for transmission** (e.g. over the internet)

Image manipulation is when we change or edit an image in some way. No matter what type of manipulation we use, the computer has to perform arithmetic operations on the digits that store our image in order for our changes to be displayed.

All sound is created by a variation in air pressure. Microphones convert those variations in air pressure into variations in electric voltage. Digital devices represent these waveforms as sequences of bits this is called digitising.

Computer Science Knowledge Organiser

INTRODUCTION TO 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.

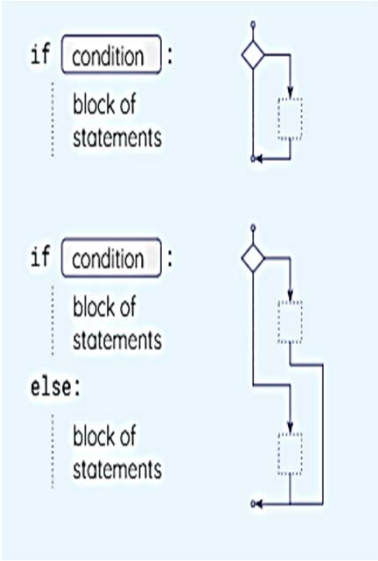
To execute a Python program, you need a **Python interpreter**.

This is a program that translates and executes your Python program.

Syntax Errors
All programming languages have rules for **syntax**, i.e. how statements can be assembled.
Programs written in a programming language must follow its syntax.
Programs with **syntax errors** cannot be translated and executed.

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.



Useful snippets of code	
print ("Year 8")	Will display the string "Year 8"
input ()	Reads a line of text from the keyboard and returns it
variable name = expression	Allows an expression to be assigned to a variable. E.g. year=1944
Name=[item1, item2, item3]	Allows ctreation of a list e.g. shopping = ["oranges", "apples", pears"]

Data types
Whole numbers—**integer**

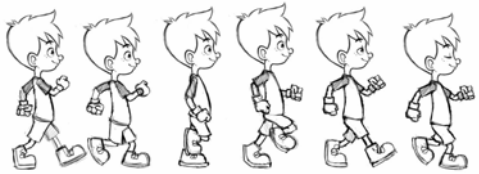
Yes/no or True/False—**boolean**

Letters, combination of letters, numbers—**string**

Arithmetic operators
+ addition
- difference
* multiplication
/ division
// integer division
% remainder of integer division
** exponentiation (to the power of)

Some common syntax errors in selection
- use if and else—no capitals
- A colon : is always required after thecondition and after else.
- Use **indentation** to indicate which statements 'belong' to the if block and the else block.
- The == operator checks for equality.
- A single = is only used in assignments

Computer Science Knowledge Organiser



MEDIA ANIMATIONS

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

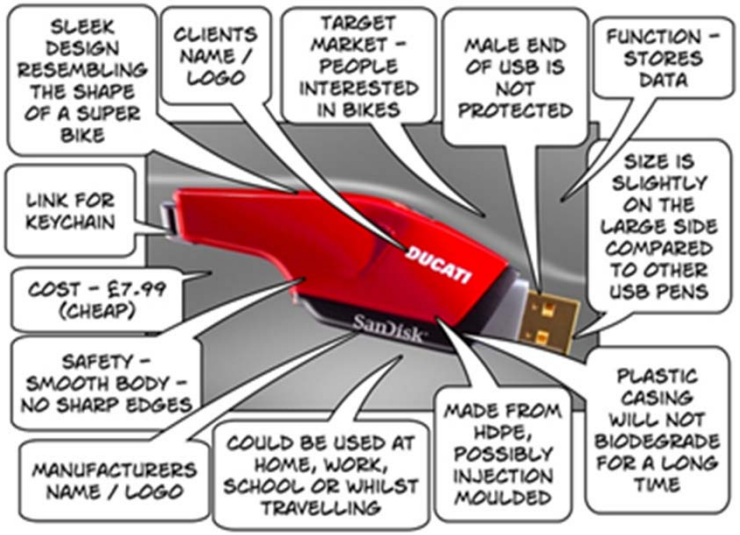
Key words		
add	colour	cut
edge	knife tool	extrude
face	keyframe	focus
edit	vertex	location
loop	tweening	object
organic	proportional	rotate
render	ray tracing	scale
timeline	subdivision	mode

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

Smart Materials

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

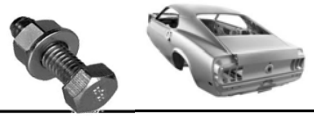
Product Analysis



Modern Materials

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

Nanomaterials are tiny particles of 1 to 100 nanometres (nm) that can be used in thin films or coatings such as the oleophobic coatings on smartphone screens that repel greasy fingerprints, or hydrophobic materials that repel water.

FERROUS	Properties	Uses	Products
Cast iron	Cheap to produce, easy to cast, is rigid, has high compressive strength, machines and absorbs vibrations well, has low tensile strength, it is brittle and cannot be forged	Pans, brake discs, large castings	
High-carbon steel (tool steel)	Hard but brittle, less malleable than mild steel, good electrical and thermal conductivity	Taps and tools, eg screwdrivers and chisels	
Low-carbon steel (mild steel)	Ductile and tough, easy to form, braze and weld, good electrical and thermal conductivity but poor resistance to corrosion	Nuts, bolts, screws, bike frames and car bodies	

NON FERROUS	Properties	Uses	Products
Aluminium	Light in weight and malleable but strong, a good conductor of heat and corrosion resistant	Drink cans, saucepans, bike frames	
Copper	An excellent electrical conductor of heat and electricity, extremely malleable and can be polished, oxidises to a green colour	Plumbing fittings and electrical wires, professional chef's saucepans	
Silver	A precious metal that is soft and malleable when heated, highly resistant to corrosion and an excellent electrical conductor of heat	Jewellery	

ALLOYS	Properties	Uses	Products
Brass (alloy of copper and zinc)	Non-ferrous metal that is strong and ductile, casts well and is gold coloured but darkens when oxidised with age, a good conductor of heat	Taps, screws, castings, locks and doorknobs	
Bronze (alloy of copper, aluminium and/or nickel)	Non-ferrous alloy, harder than brass and corrosion resistant, reddish/yellow in colour	Castings, bearings	
Stainless steel (alloy of steel also with chromium, nickel and magnesium)	Ferrous metal that is silver when polished, hard and tough with excellent resistance to corrosion	Cutlery, sinks, saucepans, surgical equipment	

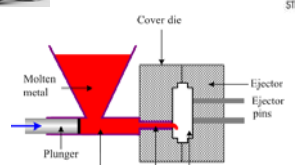
Manufacturing Methods

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

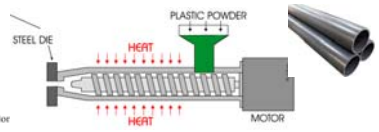
Scales of Production

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

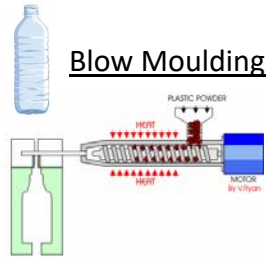
Die Casting



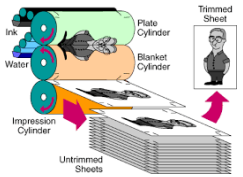
Extrusion



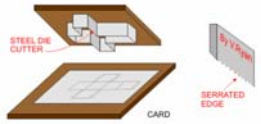
Blow Moulding



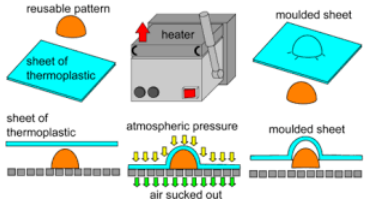
Lithography



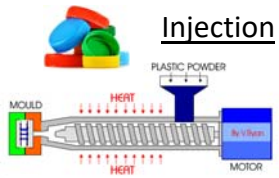
Die Cutter



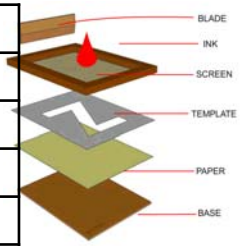
Vacuum forming



Injection



Screen Printing



6Rs	
Refuse	Is the product necessary?
Rethink	Are there alternative materials or design options that are more sustainable?
Reduce	Can the product be made from fewer materials? Can the amount of unsustainable materials be reduced?
Reuse	Can parts of the product be reused in a different product?
Recycle	Can the materials used be recycled? If the product made from recycled materials?
Repair	Can the product be repaired rather than being thrown away if it breaks?

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

Ergonomics and Anthropometrics

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

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

Market Pull and Technology Push

Market Pull is when a new product is produced in response to demand from the market.

Technology Push is when a development in materials, components or manufacturing methods leads to the development of a new product.

Life Cycle Analysis

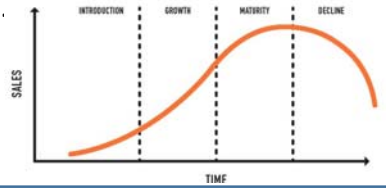
A **Life Cycle Analysis** is carried out to assess the environmental impact of a product during its entire life, from cradle-to-grave. It looks at use of materials, use of energy, impact of transporting the materials and the parts of the product at various points in its life.

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

Product Life Cycle

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

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



James Dyson

Key Facts

- Dyson is best known for is dual cyclone technology
- He invented the bagless vacuum prevents poor suction
- The Dyson Air blade dries hands in just 10 seconds and uses
- around 80% less electricity than conventional hand dryers. It has a sheet of unheated air traveling at 400 mph
- He developed the bladeless fan that creates smooth air flow
- He has developed several products using the **latest technology** and at the same time **reducing impact** on the environment by designing them so they use **less energy.**
- Parts to each of his products are easily replaced and fixed so they do not have to be thrown away.

Philippe Starck

Key Facts

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

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

Key Words and Definitions

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

Food Technology Knowledge Organiser

FOOD CHOICES
What makes us choose?

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

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

Types of vegetarians

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

Vegetarian alternatives to meat

Quorn- cultured fungus

Soya- soya bean

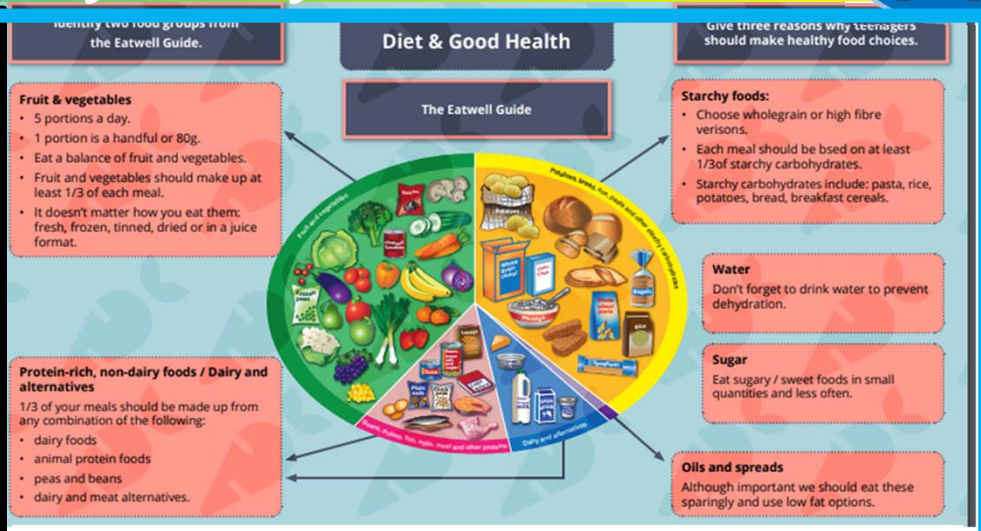
TVP- Textured vegetable protein

Tofu-soya bean curd

Key words

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

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



Nutrient Needs of Teens

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

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Diet related health conditions

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

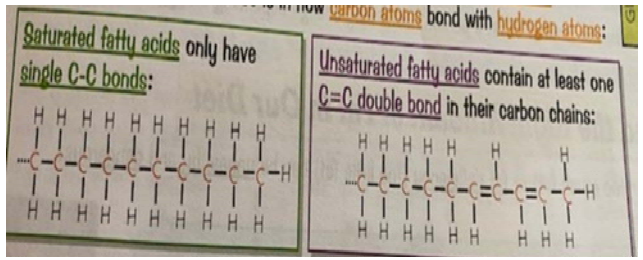
To reduce the outcome of CVD it is important to follow dietary guidelines and eat a diet that is low in saturated fat and instead eat foods higher in unsaturated fat such as oily fish, nuts and seeds, olive oil and the recommended 5-a-day of fruit and vegetables.

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

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

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

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



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Making a Roux Sauce

Food Science Topics

Keywords

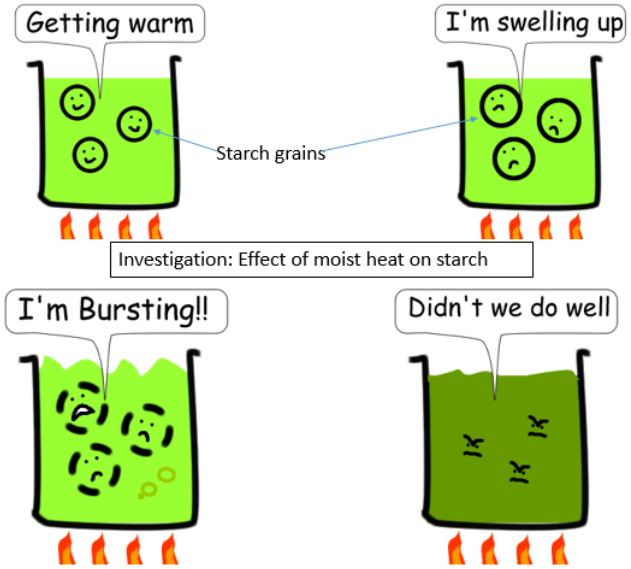
1. Gelatinisation
2. Viscosity
3. Consistency
4. Dextrinisation
5. Caramelisation

LOVE FOOD LOVE SCIENCE

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

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

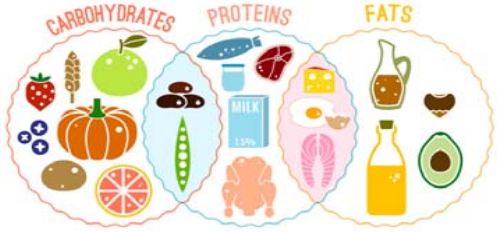
a. The starch grains when **heated** between 62◦C and 80◦ C with the liquid **absorbs the liquid.**
b. As it does so it **swells/expands.**
c. When it is no longer able to hold any more liquid the **starch grains burst** to release starch causing the **sauce to thicken.**



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

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

Carbohydrates
Starch
Sugars
Dietary fibre



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

Sugars : Monosaccharide
Disaccharide
Polysaccharide

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Key Words

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

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

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

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

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

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

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

Sources:

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

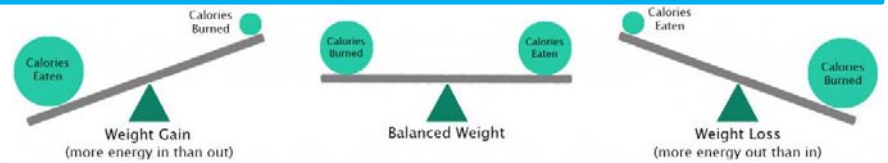
Fat: foods containing visible and invisible fats and oils. (1g of fat = 9 kcals of energy)

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

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

If we take in more energy from the food we use every day , the energy we do not use will be stored as fat and the body will gain weight.

If we take in less energy from food than we use every day, the energy stored in body fat will need to be used and the body will gradually lose weight. This is the basis of weight reducing diets.



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

Physical activity :

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

The recommended physical activity needed daily is suggested to be:

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

Amount of energy needed daily by each nutrient: Carbohydrate: 50%. Most of which should come from starch, intrinsic and milk sugars.

No more than 5% of the energy from carbohydrate should come from free sugars, intrinsic sugar found in fruit and vegetables.

Fat: 35% or less eat less saturated fats.

Protein: 15%

Art – Tier 2 and Tier 3 language

	Type	Keyword	Definition
SPRING 1: ART: Concept Art	Tier 2 language	Prototype	An experimental process where the artist implements ideas into a final format.
		Hybrid	a thing made by combining a few different elements.
		Adaptation	The dynamic evolutionary process that fits organisms to their environment.
		Proportion	How the sizes of different parts of a piece of art or design relate to each other.
		Tonal	The range between light and dark or one colour to another.
	Tier 3 language	Mixed Media	A term used to describe artworks composed from a combination of different media or materials.
		Scumbling	A shading technique achieved by overlapping lots of little circles.
		Hatching	An artistic technique used to create tonal or shading effects by drawing closely spaced parallel lines.
		Cross-hatching	When the hatching lines are placed at an angle to one another, it is called cross-hatching.
		Mark Making	The different lines, dots, marks, patterns, and textures we create in an artwork.

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

Computer Science – Tier 2 and Tier 3 language

SPRING 2: COMPUTER SCIENCE: Cybersecurity

Type	Keyword	Definition
Tier 2 language	Virus	Self-replicating software attached to another program/file.
	Encryption	Mathematically converts data into a form that is unreadable without a key.
	Biometrics	'Password' created from the user fingerprint, iris, retina, facial or voice.
	Authentication	Verifying the identity of a user or process.
	Hacking	Gaining unauthorised access to or control of a computer system.
Tier 3 language	Malware	A variety of forms of hostile or intrusive software.
	Phishing	Messages designed to steal personal details/money/identity.
	Trojans	Masquerades (pretends) as having a legitimate purpose but actually has malicious intent.
	Shouldering	Directly observing someone enter personal details e.g. PIN number or password.
	Blagging	Inventing a scenario to obtaining personal information.

SPRING 1: COMPUTER SCIENCE: HTML

Type	Keyword	Definition
Tier 2 language	Multimedia	Content that uses a combination of different types of media – text, audio, images.
	Website	A collection of webpages with information on a particular subject.
	Webpage	A hypertext document connected to the world wide web.
	Navigation	The elements of a website that allows the user to move around the website.
	JPG/PNG	JPG – main file used for images on WWW. PNG – another image file used on WWW.
Tier 3 language	Hyper text mark-up language (HTML)	Describes and defines the content of a webpage.
	Uniform resource locator (URL)	An address that identifies a particular file or webpage on the internet.
	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.
	Web script	A type of computer programming language used to add dynamic features to a webpages.

Computer Science - Tier 2 and Tier 3 language

SPRING 2: COMPUTER SCIENCE: Python	Type	Keyword	Definition
	Tier 2 language	Program	A detailed plan or procedure for solving a problem with a computer.
		Coding	How we communicate with computers.
		Errors	Problems occurring in a piece of code.
		Input	Computer hardware equipment used to provide data and control signals to a computer.
		Data	Facts and figures in their raw form.
	Tier 3 language	Variable	A memory location within a computer program where values are stored.
		Syntax	Errors/mistakes made in the piece of code.
		Iteration	Repeating steps, or instructions , over and over again.
		While loop	When the program needs to repeat actions, while a condition is satisfied.
		Condition	Statements that are created by the programmer which evaluates actions in the program.

SPRING 2: COMPUTER SCIENCE: Mobile App Development	Type	Keyword	Definition
	Tier 2 language	Application	A computer software package that performs a specific function directly for an end user.
		Blocks	Scratch bricks that we can use to code algorithms.
		Execute	A computer precisely runs through the instruction.
		Process	The instance of a computer program that is being executed by one or many threads.
		Output	Data that a computer sends to show the results of a users actions.
	Tier 3 language	Abstraction	Identify the important aspects to start with.
		Algorithm	Precise sequence of instructions.
		Selection	Making choices.
		Computational thinking	Taking a complex problem and breaking it down into a series of small, more manageable problems.
		GUI	Graphical User Interface.

Design & Technology - Tier 2 and Tier 3 language

	Type	Keyword	Definition
SPRING 1: D & T	Tier 2 language	Ecological	Ecological footprint is the impact of human activities measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated.
		Lamination	The process through which two or more flexible packaging webs are joined together using a bonding agent.
		Manufactured	A product produced on a large scale using machinery.
		Composite	A composite material is a combination of two materials with different physical and chemical properties.
		Accuracy	Correct or precise measurements of a product.
	Tier 3 language	Photochromic	Photochromic materials changes colour in response to light intensity changes.
		Thermochromic	Thermochromic material changes colour in response to temperature changes.
		Piezoelectric	Piezoelectric materials are materials that produce an electric current when they are placed under mechanical stress.
		Electroluminescent	Electroluminescent materials (ELs) emit light when an electrical current or voltage is applied to it, or when subject to a strong electric field.
		Geotextiles	Geotextiles are permeable fabrics which, when used in association with soil, have the ability to separate, filter, reinforce, protect, or drain.

	Type	Keyword	Definition
SPRING 2: D & T	Tier 2 language	Collaborative	Collaborative design is a process that brings together different ideas, roles and team members
		Contour	Outlining an image on 2D design to create a cut line.
		Visualisations	Visualisation during design refers to the visual mental images used by the designer during the design process.
		Production	Production methods include one-off, batch and mass. It is the scale at which a product will be manufactured.
	Tier 3 language	Microencapsulation	Scratch and sniff is created through the process of micro-encapsulation. The desired smell is surrounded by micro-capsules that break easily when gently rubbed.
		Lithography	Lithography is a printing process that uses a flat stone or metal plate on which the image areas are worked using a greasy substance so that the ink will adhere to them by, while the non-image areas are made ink-repellent
		Automation	The use of automatically computer controlled equipment or machinery to manufacture products
		Vector	The process of converting from a bitmap image to a vector

Drama - Tier 2 and Tier 3 language

SPRING 1: DRAMA

Type	Keyword	Definition
Tier 2 language	Devising	Creating a performance using your own ideas
	Stimulus	Something used to provide ideas in drama e.g. an image, a poem, a piece of music
	Script	The book that actors read from
	Brainstorm	Discuss ideas as a group
	Dialogue	The words spoken between two or more characters
	Atmosphere	The mood created in a scene
Tier 3 language	Improvise	To create a performance with no prior planning
	Playwright	The person who writes a play/script
	Direct Address	When a character talks directly to the audience
	Tableau	A still image

SPRING 2: DRAMA

Type	Keyword	Definition
Tier 2 language	Plot	The story/what happens in a performance
	Pace	The speed at which an actor speaks – slow/fast
	Pause	A moment of silence, used to build tension
	Tone	The way an actor speaks in order to show the emotion of the character e.g. angrily, happily, excitedly
	Pitch	How high or low an actors voice is
Tier 3 language	Explorative Strategies	Techniques that you can use to gain a deeper understanding of characters, to explore scenes and to experiment with characterisation
	Narration	A spoken commentary for the audience about the action onstage
	Hot-Seating	An actor sits in the hot-seat and is questioned **in role**, spontaneously answering questions they may not have considered before – this deepens an actors understanding of the character
	Marking the Moment	A way of highlighting the most important moment in a scene in order to draw the audience's attention to its significance
	Thought Tracking	When a character steps out of a scene to address the audience about how they're feeling

English - Tier 2 and Tier 3 language

SPRING 1: ENGLISH	Type	Keyword	Definition
	Tier 2 language	Identify	Selecting and choosing something, possible a key word from a text.
		Extract	To take or remove something. Could also be referring to the section of text you are addressing.
		Intriguing	Exciting or interesting.
		Evaluate	To consider the text carefully and provide your opinion, weighing up the limitations but also the positives.
		Prioritising	To choose something in order of importance.
	Tier 3 language	Omniscient Narrator	A narrator who can see everything in the story, and can also describe the thoughts and feelings of all the characters.
		Declarative sentence	A sentence that shows a statement.
		Interrogative sentence	A sentence that asks a question.
		Exclamatory sentence	A sentence reflecting emotion.
		Imperative sentences	A sentence which shows a command.

SPRING 2: ENGLISH	Type	Keyword	Definition
	Tier 2 language	Prejudice	A predetermined opinion that is not based on reason or actual experience
		Equality	Being equal, especially in status, rights, or opportunities
		Perceptions	The way in which something is regarded, understood, or interpreted
		Extract	A short passage taken from a text, film, or piece of music.
		Stereotype	A widely held but fixed and oversimplified image or idea of a particular type of person or thing, eg. Women like to bake.
	Tier 3 language	Accent	A distinctive way of pronouncing a language, especially one associated with a particular country, area, or social class.
		Dialect	A particular form of a language which is peculiar to a specific region or social group.
		Literature	Books and writings published.
		Colonialism	The policy or practice of acquiring full or partial political control over another country, occupying it with settlers, and exploiting it.
		Colloquial	Language used in ordinary or familiar conversation; not formal

Food Technology - Tier 2 and Tier 3 language

SPRING 1: FOOD TECHNOLOGY: Food Science	Type	Keyword	Definition
	Tier 2 language	Rupture	To break or burst suddenly.
		Absorb	To take in or soak up
		Viscosity	The internal friction of a liquid or its ability to resist flow
		Starch	A polysaccharide which forms a key store of energy in plant cells
		Amino acid	A unit from which proteins are constructed.
	Tier 3 language	Dextrinisation	Breaking up of the starch molecules into smaller groups of glucose molecules when exposed to dry heat, eg toast
		Gelatinisation	When starch granules swell when cooked with liquid, then burst open and release the starch, causing the liquid to thicken
		Roux	When a gelatinised liquid is left to cool and it gradually becomes too thick. This is because the starch rearrange itself again to a more crystalline structure
		Syneresis	A liquid such as water is expelled or extracted from a gel. E.g. when a gelatinised sauce is frozen then defrosted and it splits.
		Retrogradiation	When a gelatinised liquid is left to cool and it gradually becomes too thick. This is because the starch rearrange itself again to a more crystalline structure

SPRING 2: FOOD TECHNOLOGY: Diet and Health 1	Type	Keyword	Definition
	Tier 2 language	Intolerant	Unable to be given
		Coeliac	Cannot absorb the protein gluten. Can result in Coeliac disease: a chronic intestinal disorder caused by sensitivity to the protein gliadin contained in the gluten of cereals.
		Vegetarian	A lacto-vegetarian diet includes dairy products and plants, and a lacto-ovo vegetarian diet includes eggs, dairy products and nuts.
		Protein	A macronutrient that is essential to building muscle mass.
		Calories	A unit of measurement of the energy in the foods that you eat
	Tier 3 language	Lactose	A natural sugar found in milk and dairy products.
		Gluten	A mixture of two **proteins** present in cereal grains, especially wheat, which is responsible for the elastic texture of dough.
		Lacto-Ovo	Lacto-ovo-vegetarian diet excludes meat, poultry, and fish but includes eggs and dairy products.
		High Biological Value (HBV)	Protein foods that contain all the essential amino acids
		Kilojoules/Kilocalories	Are units of measurement of energy.

Geography - Tier 2 and Tier 3 language

SPRING 1: GEOGRAPHY: Asia

Type	Keyword	Definition
Tier 2 language	Population	Is the amount of people that live within an area.
	Dense	An area with a high population
	Sparse	An area with a low population
	Biome	Is an area classified according to the species that live in that location.
	Carbon Footprint	Is the measurement of the impact humans activity has on the environment (and how much CO2 is emitted)
Tier 3 language	Urbanisation	Is the increase in the proportion of people living in an urban area compared to a rural area.
	Megacity	A city with more than 10 million.
	Flood Plain	Is an area of land which is covered in water when a river bursts its banks.
	Emigrant	Is the process of leaving a country or area (exiting)
	Immigrant	Is the process of moving to a new country. (moving IN)

SPRING 2: GEOGRAPHY: Coasts

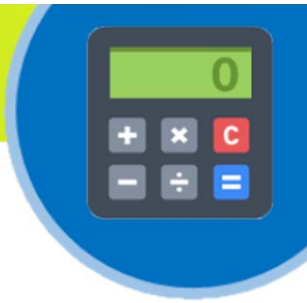
Type	Keyword	Definition
Tier 2 language	Coast	Where the land meets the sea.
	Relief	The height of land above sea level.
	Erosion	The process of wearing away materials.
	Deposition	The process of material being dropped.
	Transportation	The process of material being moved from one location to another.
Tier 3 language	Swash	Is when waves reach the shore and rush up the beach.
	Backwash	Is the movement of waves down the beach.
	Fetch	How far a wave has travelled
	Discordant	A coastline made of horizontal layers of hard and soft rock.
	Coastal Management	Is a defence against flooding and coastal erosion to protect the coastline.

History - Tier 2 and Tier 3 language

SPRING 1: HISTORY: Turning point WW2	Type	Keyword	Definition
	Tier 2 language	Invasion	An instance of invading a country or region with an armed force
		Evacuation	The action of leaving a place
		Aviation	The flying or operating of aircraft
		Supremacy	The state or condition of being superior (higher rank) to all others in authority, power, or status
		Evaluate	To form a judgement on an issue/factor
	Tier 3 language	Appeasement	The policy followed by Britain and France after WW1 in which they allowed Hitler to get away breaking the terms of the Treaty of Versailles to avoid conflict.
		Imperialism	An ideology of extending the rule over peoples and other countries, for extending political and economic access, power and control
		Nuclear proliferation	The spread of nuclear weapons, fissionable material, and weapons-applicable nuclear technology
		Axis powers	An alliance between Germany, Italy and Japan
		Luftwaffe	The aerial warfare branch of the Wehrmacht during World War II
		Wehrmacht	The German armed forces

SPRING 2: HISTORY: Holocaust and Genocide	Type	Keyword	Definition
	Tier 2 language	De humanisation	To deny the humanity of one group, and associate them with animals or diseases in order to turn people against them.
		Segregation	The action or state of setting someone or something apart from others
		Extermination	Committing mass murder
		Propaganda	Information, especially of a biased or misleading nature, used to promote a political cause or point of view.
		Persecution	Hostility and ill-treatment, on the basis of ethnicity, religion, sexual orientation or political beliefs.
	Tier 3 language	Indoctrination	The process of teaching a person or group to accept a set of beliefs (brainwashing)
		Genocide	The deliberate killing of a large number of people from a particular nation or ethnic group with the aim of destroying that nation or group
		Anti Semitism	Hostility to or prejudice against Jewish people
		Kristallnacht	'Night of broken glass' – an event in which Nazis coordinated an attack on Jewish property and people.
		Ghetto	An area of a city kept separate from others. Jewish people were separated away from others.

Maths - Tier 2 and Tier 3 language



SPRING 1: MATHS: Topic name	Type	Keyword	Definition
	Tier 2 language	Measure	A standard unit used to express the size, amount, or degree of something.
		Dimensions	Measurement -in length, width, and thickness.
		Construct	Geometry: to draw/build a figure/ shape accurately following the given specific conditions.
		Adjacent	Very near, next to, or touching.
		Inverse	A term is said to be in inverse proportion to another term if it increases (or decreases) as the other decreases (or increases).
	Tier 3 language	Perpendicular	Meeting a given line or surface at right angles.
		Hypotenuse	The side of a right triangle opposite the right angle.
		Significant figure	All the nonzero digits of a number and the zeros that are included between them or that are final zeros and signify accuracy.
		Compound Interest	Interest paid on both the principal and on accrued interest.
		Multiplier	A number by which another is multiplied

Maths - Tier 2 and Tier 3 language

	Type	Keyword	Definition
SPRING 1: MATHS	Tier 2 language	Factors	A number that divides another number exactly. E.g. 4 is a factor of 12
		Proportional	When quantities have the same **relative** size. In other words they have the same ratio
		Scale factor	How many times larger or smaller an enlarged shape will be.
		Simplify	To make the given expression/fraction/ratio simpler by collecting like terms or cancelling down common factors
		Solve	To calculate the value of any unknown/s
	Tier 3 language	Direct proportion	As one amount increases, another amount increases at the same rate
		Constant of proportionality	The constant value (often written **k**) relating amounts that rise or fall uniformly together
		Annum	A particular amount **per annum** means that amount each year
		Percentage	A fraction expressed as the number of parts per hundred and recorded using the notation %
		Decimal multiplier	Calculate *percentage increases* and *percentage decreases* very quickly, with one single multiplication.

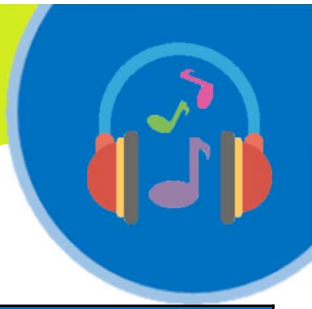
	Type	Keyword	Definition
SPRING 2: MATHS	Tier 2 language	Frequency	How many times something happens. Another word for 'total'
		Grouped data	Data that has been bundled together in categories
		Mean	A type of average found by adding up a list of numbers and dividing by how many numbers are in the list
		Range	The largest number take away the smallest value in a set of data
		Distribution	How data is shared or spread out
		Average	A value to best represent a set of data. There are three types of average - the mean, the median and the mode
		Outlier	A value that "lies outside" (is much smaller or larger than) most of the other values in a set of data.
	Tier 3 language	Discrete data	Data that can only take certain values
		Median	The middle value when a list of numbers is put in order from smallest to largest. A type of average.
		Mode	The most common value in a list of numbers. If two values are tied then there is two modes. A type of average

MFL - Tier 2 and Tier 3 language

SPRING : MFL: Topic name	Type	Keyword	Definition
	Tier 2 language	Preterite/Perfect (past) tense	**talk about completed actions at specific times in the past**
		Subordinate clause	has **a subject and a verb**, but it cannot stand alone as a complete sentence. ... Since the sun will shine today (the sun=subject; will shine=verb)
		Adjectival agreement	**the adjective 'agrees' with the noun it's describing in gender and number**
		Intensifier/quantifier	to give force or emphasis, for example *really* in *my feet are really cold*.
		Sequencers	**ords that organize your writing and speaking, words like first** , next , then , after that
	Tier 3 language	WWWWW	**Who What Where When Why**
		TOPCAT	Tenses Opinions Pronouns Conjuctions Adjectival Agreement Translate
		AVOW	Adjective Verb Order of Words
		PALM	People Action Location Mood
		IESAO (fr) SHET (sp)	Il y a - there is Est -is Sont -(They) are A - (he/she/it) has Ont – (they) have Son – (they) are Hay - (there is/ there are) Es ((it) is Tiene) (it) has)

SUMMER : MFL: Topic name	Type	Keyword	Definition
	Tier 2 language	Past participle (fr) prepositions (sp)	he form of a verb, typically ending in *-ed* in English
		Auxillary verb (fr)	verb used in forming the past tense
		Verb ending agreements (être) (fr)	Add an extra –e if feminine, -s if plural and masculine, - es if feminine plural
		Modal verbs	an auxiliary verb that expresses necessity or possibility
		Subordinate Clause	has **a subject and a verb**, but it cannot stand alone as a complete sentence. ... Since the sun will shine today (the sun=subject; will shine=verb)
	Tier 3 language	SAP SEP (fr)	Subject (person) Avoir (Auxillary verb) Past participle Subject (person) Être (Auxillary verb) Past participle
		IESAO (fr) SHET (sp)	Il y a - there is Est -is Sont -(They) are A - (he/she/it) has Ont – (they) have Son – (they) are Hay - (there is/ there are) Es ((it) is Tiene) (it) has)
		TOPCAT	Tenses Opinions Pronouns Conjuctions Adjectival Agreement Translate
		AVOW	Adjective Verb Order of Words
		PALM	People Action Location Mood

Music - Tier 2 and Tier 3 language



SPRING 1: MUSIC: Topic name	Type	Keyword	Definition
	Tier 2 language	Looping	When referring to old fashioned tape recorders – you literally loop a piece of tape so it repeats the music over and over
		Phasing	When two melodies or rhythms go out of synch and back in synch again
		Minimalism	A style in music that is repetitive, has gradual changes and is hypnotic
		Synchronisation	Bringing sounds together at the correct time
	Tier 3 language	Ostinati	Musical repetition
		Counterpoint	Melodies that are against other melodies (played at the same time)
		Polyrhyhms	Many rhythms played at the same time
		Static Harmony	Groups of notes that do not change much
		Motif/cell	A short melody/musical idea
		Metric Displacement	Moving a melody to another art of the beat

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

Religion and Ethics - Tier 2 and Tier 3 language

SPRING 1: RE: Issues of relationships	Type	Keyword	Definition
	Tier 2 language	Roles	Position, status or function of a person in society, as well as the characteristics and social behaviour expected of them
		Responsibilities	Actions / duties you are expected to carry out
		Commitment	A sense of dedication and obligation to someone or something
		Contraception	Methods used to prevent a woman from becoming pregnant during or after sexual intercourse
		Evaluate	To make a judgement on an issue or belief and consider the opposing view
	Tier 3 language	Cohabitation	To live together in a sexual relationship without being married or in a civil partnership
		Sacrament	An outward sign of an inward blessing by God. A ceremony blessed by God, for example marriage
		Divorce	To legally end a marriage
		Adultery	Having sexual relations with someone other than your marriage partner
		Ummah	The Muslim community
		Chastity	The state in which a person does not have sexual relationships before marriage.

SPRING 2: RE: Issues of Human Rights	Type	Keyword	Definition
	Tier 2 language	Prejudice	Pre judging – judging people to be inferior or superior without a cause
		Discrimination	Acts of treating groups of people, or individuals differently, based on prejudice
		Social Justice	Promoting a fair society by challenging injustice and valuing diversity. Ensuring that everyone has equal access to provisions, equal opportunities and rights
		Human Rights	The basic entitlement of all human beings, afforded to them because they are human
		Censorship	The practice of suppressing and limiting access to materials considered offensive or a threat to security. People maybe restricted by censorship laws.
	Tier 3 language	Personal Conviction	Something a person strongly feels of believes in
		Zakah	The third Pillar of Islam, a Muslims duty to give 2.5% of their wealth to charity to support those in need.
		Sadaqah	Islamic term for any good deed done out of compassion or generosity
		Pacifism	The belief and practice of none violence to settle disputes
		Relative poverty	A standard of poverty measured in relation to the standards of society in which a person lives.

Science - Tier 2 and Tier 3 language

SPRING 1: SCIENCE: Physics Topic 1 & 2	Type	Keyword	Definition
	Tier 2 language	Instantaneous	Existing or measured at a particular instant
		Magnitude	Word for “size”
		Motion	Change with time of the position or orientation of an object
		Rate	the speed at which something happens over a particular period of time
		Conservation	Prevention of wasteful use of a resource
	Tier 3 language	Centripetal	A force acting towards the centre of a circle that enables objects to move in a circle
		Displacement	The distance and direction travelled in a straight line
		Velocity	Your speed in a certain direction
		Acceleration	Change of velocity over time
		Momentum	The tendency of an object to keep moving.

SPRING 2: SCIENCE: Biology Topic 4 & Physics Topic 3	Type	Keyword	Definition
	Tier 2 language	Competition	The fight to eat, survive and breed.
		Resistance	The natural ability of some members of a species to survive poisons that would kill the other members.
		Inheritance	Gaining your genes from your parents.
		Dissipation	The way energy spreads out, becoming less useful as it does.
		Insulation	Materials that contain lots of tiny air pockets that prevent heat loss by conduction.
	Tier 3 language	Mutations	Changes in DNA that cause variation.
		Natural selection	Organisms with the best genes and characteristics are more likely to survive, breed and pass on their better genes.
		Genetic engineering	Changing the characteristics of organisms by giving them genes from another organism.
		Joules	The units of energy, symbol = J.
		Conduction	Heat transfer through solids caused by vibrating particles bumping into each other.