KNOWLEDGE ORGANISER

£2

NAME & FORM

YEAR 9

SUMMER TERM

English Knowledge Organiser A Midsummer Night's Dream Sum 1

AO3- Historical context/Shakespeare's ideas

Comedy genre:

-Shakespearean comedies end with a wedding, or several weddings, at the end of the play.

- Unlike the fatal conflicts of Shakespeare's tragedies, conflicts in his comedies are reconciled before serious harm can come to anyone

Chain of Being:

In Elizabethan society they believed in a social hierarchy known as 'The Chain of Being'. They believed that God ruled everything and was the most powerful, and that the King was chosen to rule by God. The higher you were up The Great Chain of Being, the more powerful you were.

Attitudes to women:

This hierarchy was copied in families. They believed that men had the right to rule from God. Women and children had to obey their male relatives. Women were generally viewed as men's property and not as individual human beings. Women were not even allowed to choose their spouse. It was common that this type of arrangement was made by their family, and husband. Determining factors were usually age, social status and wealth.

Fairies:

In traditional folklore, fairies were believed to be evil, larger than life spirits linked with the devil. Things that went wrong in the world were blamed on fairies. Shakespeare reinvented the idea of fairies by creating them as charming, but sometimes mischievous little sprites.

A reminder of the GCSE assessment objectives:

AO1 (quotes!)

AO2 (analysis of language, form and structure, make sure to mention techniques).

AO3- Historical context, Shakespeare's ideas.

Suggested Sentence Stems:

Shakespeare explores the theme of _____ by...

For example/in his use of...

This suggests/shows...

The word/phrase suggest...

Shakespeare has done this to/at the time it was written...

AO2- How can we improve our analysis?

The writer...		Analytical verbs...		Evaluative...		Connectives...	
Skillfully	Gradually	Creates	Presents	Striking	Compelling	Therefore	Whereas
Energetically	Rapidly	Evokes	Illustrates	Shocking	Disturbing	Equally	Consequently
Bitterly	Swiftly	Implies	Reveals	Provocative	Subtle	Similarly	Contrastingly
Powerfully	Critically	Highlights	Portrays	Challenging	Crucial	Moreover	However
		Establishes	Develops	Damning	Empathetic	Despite this	Crucially

A02- WHAT'S THE DIFFERENCE BETWEEN LANGUAGE, FORM AND STRUCTURE?		
If we want to discuss: LANGUAGE Words, phrases, clauses, language techniques, symbolism, motifs, imagery, sound patterns, repetitions, contrasts and juxtapositions, figurative language, exaggeration, hyperbole	**If we want to discuss: FORM** Characterisation, settings, genre features/devices, narrative view and voice, atmosphere, mood, tensions	**If we want to comment on: STRUCTURE** Shifts, changes, developments, chronology, cause/ effect, foreshadowing, flashback,

AO1- Key Quotes

The Great Chain of Being

Order	Disorder
e.g. 'If we shadows have offended, Think but this, and all is mended'.	e.g. 'the course of true love never did run smooth'. 'Lord what fools these mortals be!'
Anger 	Love 
"Though she be but little, she is fierce!	"Love looks not with the eyes, but with the mind, And therefore is wing'd Cupid painted blind."

Key Words:

Hierarchy- An order of something, often social. E.g. men were higher up the hierarchy than women.

Patriarchal- Men in power, ruling over women/others.

Hyperbole- Exaggeration.

Dramatic irony- A structural technique, where the audience know something that actors on stage do not.

English Knowledge Organiser

YEAR 9 – Of Mice and Men

Summer 2

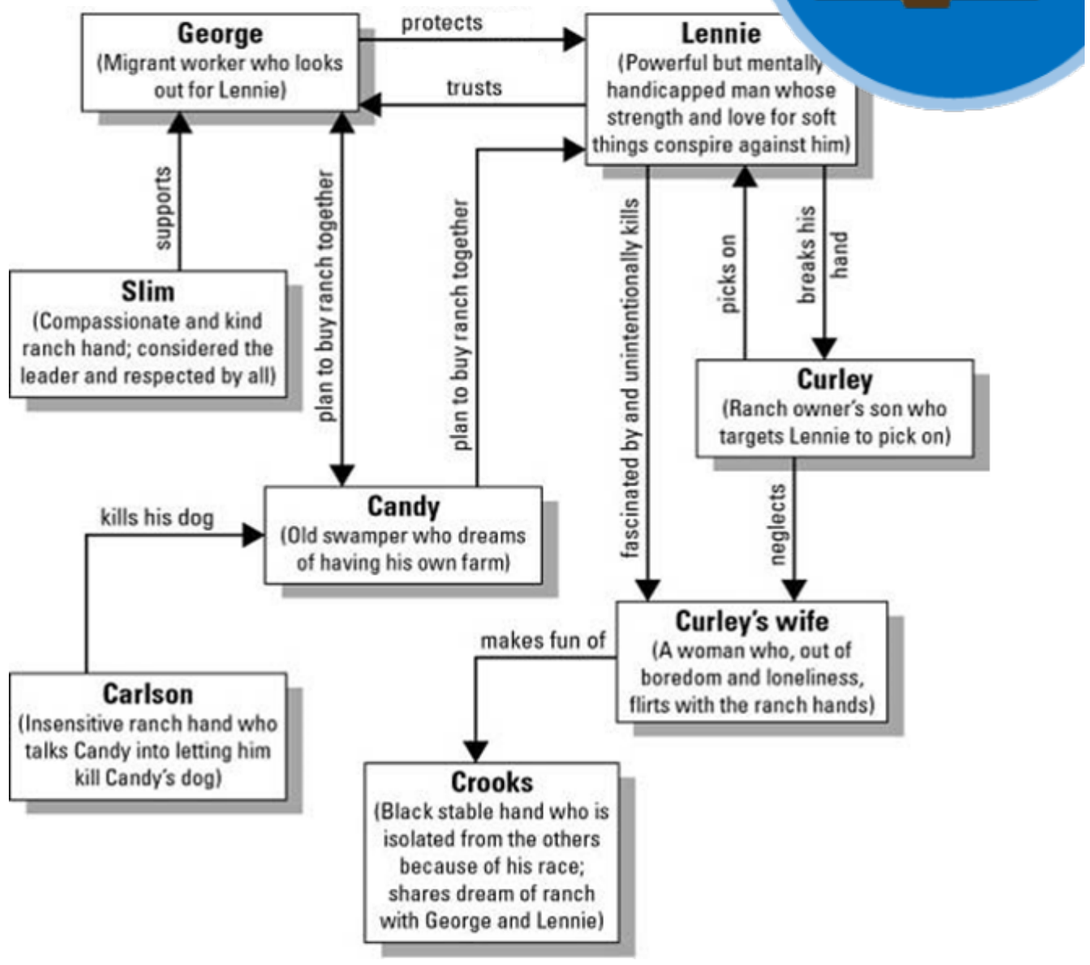
Historical Context (AO3):

- Of Mice and Men is set in California, America in the 1930s.
- An estimated 1.3 million people moved to California during this time in the hopes of finding work resulting in a lack of jobs for everyone.
- **The Great Depression** 1929 – 1939 = a global economic crash which led to the loss of millions of jobs, people were homeless, starving to death and being exploited.
- **The Dust Bowl** 1930-1940 = droughts and dust storms swept across America, the lack of water led to farmers being unable to grow enough crops and their land deteriorating. Farmers were unable to feed even their own families and often ended up in debt trying to grow crops for the country.
- **Life for African-Americans in the 1930s** – Racism increased in America again during this time as people were looking for a scapegoat for their problems. Violence and hatred towards African-Americans rose with organisations like the KKK growing in number.

Racial segregation remained and black Americans were forced to attend different schools, use different transport, restaurants, toilets, drinking fountains and public places. These were maintained by the Jim Crow Laws.

Around 50% of all African-Americans were unemployed by 1932 due to racism and the Great Depression.

- **The American Dream** = the idea that America was a place where all your dreams could come true and you would be successful and prosperous.
- **Disability** – Disabled people lived a hard life, they were often marginalised and excluded from society – people didn't understand learning disabilities and therefore shunned those with these illnesses.



Key Terms:

- Ranch = a large farm
- Migrant workers = people who moved around to find jobs
- Exploitation = abuse of somebody, particularly when they are in need
- Marginalisation = excluding somebody from a group or from society
- Segregation = separating people based on the colour of their skin
- Scapegoat = a group that are blamed for things that are not their fault
- Bindle = a bag or sack to carry belongings
- Bucking Barley = to pick up grain, bag it and load it onto a truck

Plot through quotations - Add your own quote where there is an underlined section

Chapter 1:

- Animal imagery about Lennie: “snorting into the water like a horse”, “he dabbled his big paw in the water”
- Imperatives - George to Lennie: “give it here”, “hide in the brush till I come for you”

  _____
- Juxtaposition: “I got you to look after me, and you got me to look after you”

Chapter 2:

- Light symbolism: “the morning sun threw a bright dust-laden bar through one of the side windows”, “the rectangle of sunshine was cut off”
- Repetition/colloquial language: “Curley’s like a lot of little guys. He hates big guys. He’s alla time picking scraps with big guys. Kind of like he’s mad at ‘em because he ain’t a big guy.”
- Colour connotations: _____

Chapter 3:

- Repetition: “he just scared her. I’d be scared too if he grabbed me.”
- Personification: “the silence fell on the room again. It came out of the night and invaded the room.” (Candy’s dog is about to be killed)
- Emotive language: “Candy went on excitedly”, “this thing they had never really believe in was coming true” _____
- Imperatives, George to Lennie: “Get him, Lennie. Don’t let him do it”, “Leggo of him Lennie. Let go.”

Chapter 4:

- Repetition: “I ain’t wanted in the bunkhouse and you ain’t wanted in my room”
- Emotive language: “A guy needs somebody to be hear him. He whined, a guy goes nuts if he ain’t got nobody.” _____
- Rhetorical question: “Think I don’t like to talk to somebody ever’ once in a while?”

Chapter 5:

- Simile: “her body flopped like a fish”
- Repetition: “shoot him in the guts”
- _____

Chapter 6:

- Cyclical structure: “we gonna get a little place”, _____

Sentence stems:

Steinbeck presents the character/ theme of… through _____

For example “…”

This _____ is effective as…

It makes the reader understand/realise/question/feel…

Additionally, it also has the effect that…

Steinbeck has presented this character/theme in this way to…

The use of the word (aim to use specific word class), “…” implies…

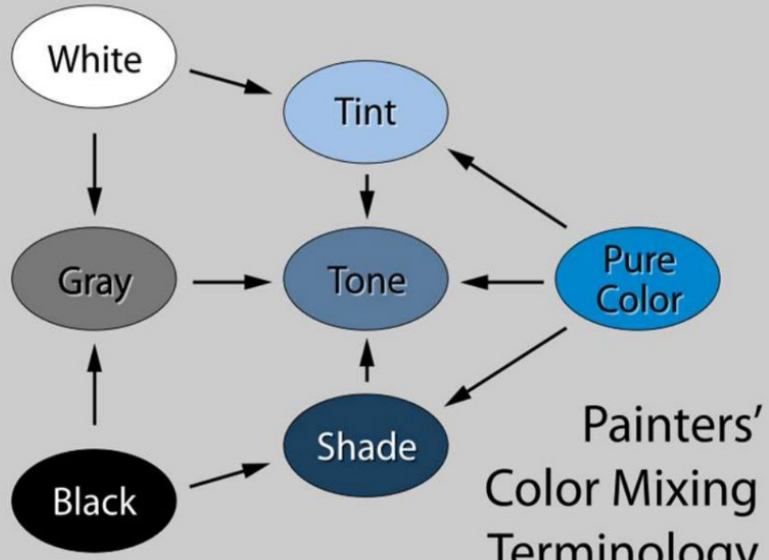
It also has connotations of…

Overall, this represents life in 1930s America because…

It is an effective example of how ….. was at this time as it shows…

AO1 **AO2** **AO3**

Art Knowledge Organiser



KEY WORDS – test yourself! (definitions on the next page)
Tint- Tone- Shade- Sponging- Flat wash- Gradient- Pattern- Accuracy- Wax resist- Mandala- Fineliner- Watercolour- Detail.

Watercolour
Year 9 Summer term

Watercolour techniques

Sponging

Colour to light gradient

Colour to colour gradient

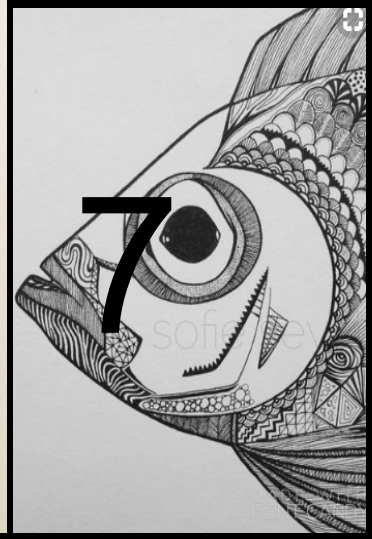
Flat wash

Jason Scarpace- pattern work

Watercolour and fineliner

Wax resist

Mandala

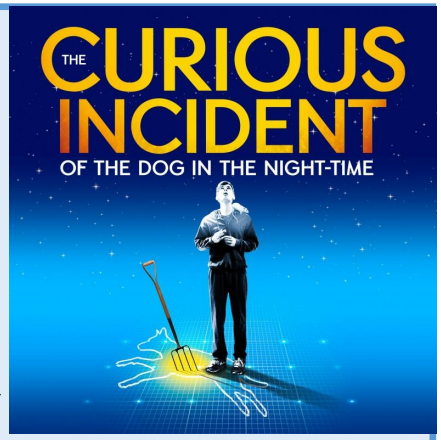


KEY WORDS AND MEANINGS:	
Flat wash	Brushing successive strokes of paint on a wet or dry surface to create an even layer of colour.
Fine liner	Pens with plastic or fine fibre needle-point tips that generally use water-based ink but sometimes use oil-based.
Wax resist	Placing wax on your paper, painting over the wax and the wax resists the watercolour leaving the white of the paper exposed.
Gradient	A gradual blending from one colour to another colour or from light to dark.
Dry brush	A painting technique in which a brush having a small quantity of pigment or medium is dragged across a surface.
Pattern	A design in which lines, shapes, forms or colours are repeated.
Accuracy	Degree of closeness of measurement. It means precision or correctness or exactness to the source image or object.
Detail	A distinctive feature of an object or scene which can be seen most clearly close up.
Bold	A very bright and noticeable colour or element of the work.
Tone	The relative lightness or darkness of a colour, or the range between black and white.

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

Drama Knowledge Organiser

Plot



The Curious Incident of the Dog in the Night-Time is an adaptation by Simon Stephens of the original novel by Mark Haddon.

The Curious Incident of the Dog in the Night-Time follows the story of Christopher Boone, a 15 year old, who is exceptional at Maths but finds people confusing.

The play opens with Christopher discovering a dead dog in his neighbour, Mrs Shears', garden. Despite his father, Ed, warning Christopher not to get involved, Christopher decides to investigate the death of the dog. In doing so he discovers that his mother is not dead as his father had told him, but alive and well, living in London.

He also discovers that it was his father who killed the dog. Christopher feels that his father is a murderer, who he cannot trust. He can no longer live with him and so he bravely travels to London to find his mother. Christopher has difficulty settling into his new life in London and returns to Swindon to take his A-level Maths exam.

The play ends with him passing the exam and the realisation that he can do anything he puts his mind to.

CHARACTERS

Christopher Boone	The protagonist. A 15-year-old boy who is very good at maths but finds people confusing.
Ed Boone	Christopher's Dad. He cares about his son but is very hot-headed and stubborn.
Judy Boone	Christopher's Mum. Left due to not being able to handle his odd behaviour. Has a fun and romantic view of life.
Siobhan	Christopher's teacher. She is calm, patient and encouraging. She gives Christopher advice on what he should do.
Rodger Shears	Christopher's Mum's boyfriend. He is not understanding towards Christopher's needs and is often sarcastic
Mrs Shears	Rodger's wife. Helped Ed and Christopher. Wellington's owner.
Mrs Alexander	An elderly woman who lives on Christopher's street. She is kind and welcoming, but could also be seen as a gossip.

Vocal skills

Pitch
Pace
Pause
Accent
Emphasis
Intonation
Tone

Physical Skills

Posture
Eye contact and its withdrawal
Gesture
Gait
Interaction
Body Language
Mannerisms

9

Constantin Stanislavski

1863 - 1938

'The actor must use his imagination to be able to answer all questions (when, where, why, how).'

Believed that the audience should emotionally connect with the characters.

Actors should use their own experience to make their characters as believable as possible.

Terminology and techniques:

- The fourth wall
- Emotional memory
- The magic 'if'
- Sense memory
- Objectives
- Given circumstances
- Subtext
- Method of physical actions

Naturalism

Bertolt Brecht

1898 – 1956

'Art is not a mirror to reflect reality, but a hammer with which to shape it.'

Believed that theatre should be used to spread a message and comment on society.

The audience should always be aware they are watching a play and constantly questioning what they see.

Terminology and techniques:

- Breaking the fourth wall
- Alienation (Verfremdungseffekt)
- Gestus
- Use of placards
- Narration
- Multi-role
- Minimal set/costume/props
- Masks

Epic theatre

Frantic Assembly

1994 – Present

FRANTIC ASSEMBLY

'We began with little more than a fierce work ethic and a desire to do something different and to do it differently.'

World-renowned theatre company who use physical theatre to devise performance.

Wanted to create non-realistic pieces of theatre through the use of movement and music.

Terminology and techniques:

- Chair duet
- Hymn hands
- Lifts
- Walk the grid
- Mirroring
- Round-By-Through

Physical theatre

To find out more about Naturalism, scan the QR code:

To find out more about Epic Theatre, scan the QR code:

To find out more about Physical Theatre, scan the QR code:

Music Knowledge Organiser

Year 9 Summer Term

The invention of the movie soundtrack changed the role of music in film. In the 1930s the role of the *film composer* began to emerge. Music was needed for the credits and for parts of the film with no dialogue, particularly the really dramatic sections Many have REALLY good themes (leitmotifs) for their characters e.g. James Bond, Jaws, Superman.
Composers in big budget films use a full symphony orchestra. In modern times, films that do not have the large amounts of money can now employ one person using sampled sounds and a keyboard to re-create the sounds of a full orchestra.

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

INTERVAL PEDAL NOTE OMINOUS ENDING FANFARE TRIPLETS LEITMOTIF RITENUTO STACCATO DISSONANCE PICCOLO CONTRAST OSTINATO

Features of Movie Music:

- **Lots of contrast to suit the drama – tempo changes, pitch changes, dynamics changes**
- **Syncopated rhythms**
- **Use of Symphony orchestra**
- **Leitmotifs (character themes)**
- **Cultural references in the music – choice of instruments and rhythms suitable to the location**
- **'Mickey Mousing'**
- **Interesting choice of tonality e.g. major = happy, minor = sad/mysterious, atonal = horror**
- **Diagetic music (can be heard by characters) and background music**

What is Mickey Mousing?

A film technique that matches the music with the actions on screen. Walt Disney films often used this technique where the music almost completely works to mimic the animated motions of the characters.

John Williams is an American composer, conductor and pianist and has won 25 Grammy Awards! He is regarded as one of the most influential film composers. His work has influenced other film composers, as well as contemporary classical and popular music. Some of his most well-known films include: Star Wars, Jaws, Close Encounters of the Third Kind, Harry Potter, Jurassic Park and E.T.

Hans Florian Zimmer is **a German film score composer and record producer.** His works are notable for integrating electronic music sounds with traditional orchestral arrangements. Since the 1980s, Zimmer has composed music for over 150 films. His works include The Lion King, Dune, Pirates of the Caribbean, Gladiator. His films have grossed over 28 BILLION dollars at the box office world –wide!

Quincey Jones' legendary career spans over six decades in the entertainment industry. Jones's highlight-laden career includes producing everything from hits for Frank Sinatra and Count Basie to piloting *Off the Wall*, *Thriller*, and *Bad* for Michael Jackson. His work for *The Color Purple* was nominated for Best Original Score and Best Original Song in Steven Spielberg's first movie without composer John Williams.
Key Score: ***In the Heat of the Night, The Italian Job, The Colour Purple***

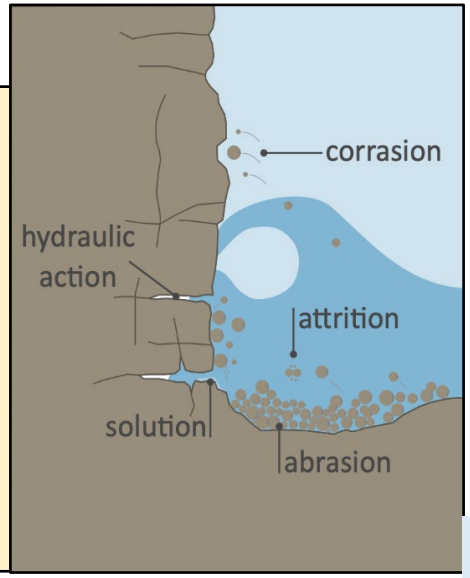
KEY WORDS AND MEANINGS: Tier two words in BLUE, Tier three words in ORANGE	
Interval	The distance between two notes e.g. a 4^{th}, 5^{th}, 7th
Pedal (note)	A long, sustained note OR a repeated not in the bass line
Ominous ending	A tense and worrying ending to the piece created by using a long, low pitched note on cello
Fanfare	A fancy, brass 'announcement' that something or someone important has arrived e.g. The Queen
Triplets	Three notes that can played in the space of two. Sounds like 'sau-sa-ges'
Contrast	Opposites e.g. Fast and Slow, Loud and Quiet, High and Low
Leitmotif	A theme for a character, place or item e.g. Luke Skywalker or the Death Star
Ritenuto	To gradually slow down
Staccato	To play the notes in a short and detached way
Dissonance	Clashing harmonies
Piccolo	A small flute – very high in pitch
Ostinato	Repetition – this could be a rhythm or a melody

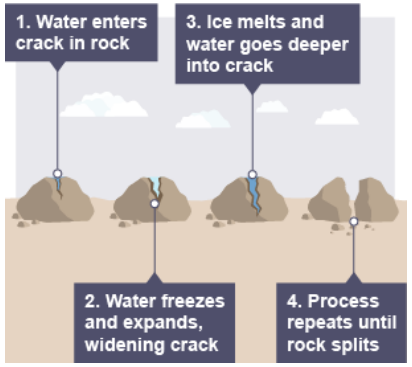
Geography Knowledge Organiser: Coasts

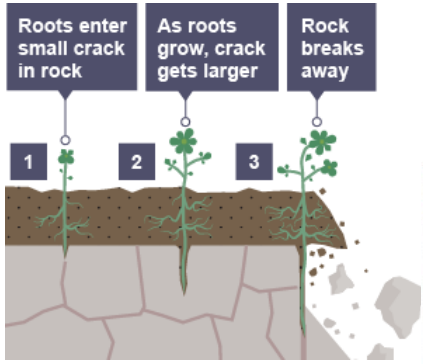
Weathering and Erosion

Types of erosion

- **Hydraulic action:** air may become trapped in joints and cracks on a rock face. When a wave breaks, the trapped air is compressed which weakens the cliff and causes erosion.
- **Abrasion:** Pieces of rock carried by waves grind and scrape against cliff surfaces like sandpaper.
- **Attrition:** Waves smash rocks and pebbles on the shore into each other. They break and become smaller, smoother and rounder.
- **Solution:** Acids contained in sea water will dissolve some types of rock such as chalk or limestone.



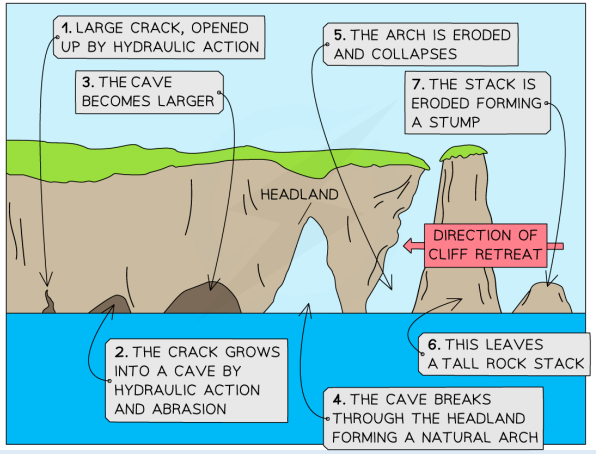


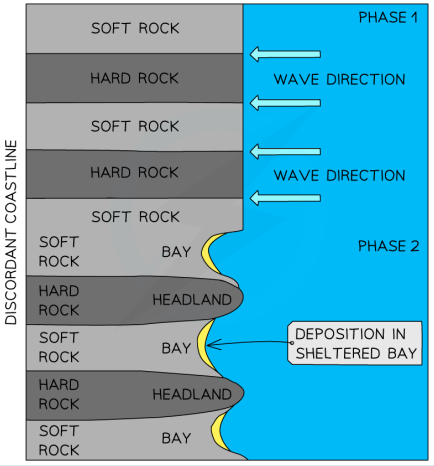


Types of weathering

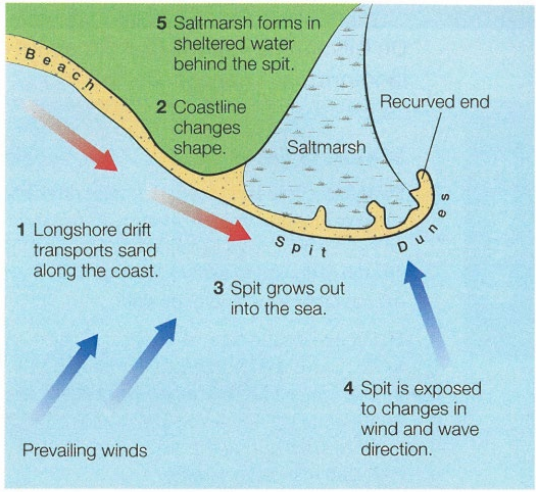
- **Freeze-thaw weathering** – As rainwater freezes and melts repeatedly over time, cracks in the rocks are widened.
- **Biological weathering** – plant roots can grow into cracks in the rock and widen them.
- **Chemical weathe**ring - Rainwater and seawater can be a weak acid. Over time a coastline made up of rocks such as limestone or chalk can become dissolved by the acid in the water.

Landforms of Erosion





A discordant coastline occurs where bands of **hard and soft rock** types run **perpendicular** to the coast. The differing resistance to erosion leads to the formation of headlands and bays. A hard rock type is resistant to erosion and creates a **headland** whilst a softer rock type is easily eroded creating a **bay**. Headlands are eroded over time to form cracks, caves, arches, stacks and stumps.



E The formation of a spit

Longshore drift

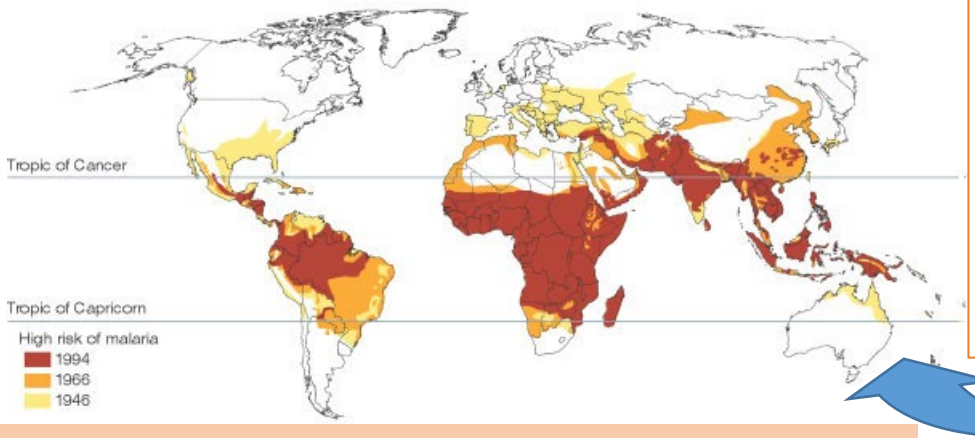
Longshore drift is the movement of material along the shore by wave action. It happens when waves approach the beach at an angle.
The swash (waves moving up the beach) carries material up and along the beach.
The backwash (waves moving back down the beach) carries material back down the beach at right angles. This is the result of gravity. This process slowly moves material along the beach

Case Study: Norfolk Coastal Erosion

Norfolk and Suffolk have some of the fastest eroding coasts in Europe, with over 2.500 homes at direct coastal risk and thousands more properties and businesses directly and indirectly affected by loss of property, infrastructure and utilities.
The North Norfolk cliffs are comprised of a mix of silts, sands, clays and gravels that were deposited during the glacial and interglacial periods of the last 2 million years. The cliffs provide little resistance to the aggressive action of North Sea waves, which erode the base of the cliffs.

Geography Knowledge Organiser: *Modern Challenges*

Disease



Example – The pattern of global malaria risk is directly linked to the climate conditions needed for mosquitoes to thrive.

Patterns of disease can exist for multiple reasons:

- Social – access to healthcare - regions with limited access to healthcare services often experience higher rates of diseases and higher mortality rates.
- Economic – Poverty affects access to food, clean water, housing, and healthcare services, all of which are essential for maintaining good health. Access to clean water and proper sanitation facilities, such as toilets and sewage systems, is essential for reducing the transmission of waterborne diseases like cholera.
- Environmental – climate - Changes in climate patterns can alter the geographic range and seasonality of infectious diseases, including vector-borne diseases like malaria. Rising temperatures and changes in rainfall patterns can create conditions which are easier for disease vectors to thrive, leading to increased transmission rates.

How are diseases spread?

Person to person	Any contact with another person, such as shaking hands, can spread pathogens.
Water	Drinking dirty water can transmit many diseases, such as cholera.
Air	When a person who is infected by the common cold sneezes, they can spray thousands of tiny droplets containing virus particles to infect others.
Vector	Any organism that can spread a disease is called a vector. For example, mosquitoes spread malaria when they bite people.

Malaria in Uganda

Uganda has one of the highest global burden of malaria cases, with over 90% of the population at risk, malaria is Uganda's leading cause of death, especially in children. The average economic loss in Uganda due to malaria each year is over $500 million. The diseases stops adults from working and children from going to school. In 2022, WHO reported that there were an estimated of 12.7 million malaria cases and over 17,556 estimated deaths in the country.

Conflict

What causes conflict?

1.Resource Scarcity: Competition for limited resources such as water, land, and minerals can lead to conflicts between communities, regions, or nations.
2.Ethnic and Religious Tensions: Differences in ethnicity, religion, or culture can fuel conflicts.
3.Political Instability and Governance Issues: Populations that feel they are not represented by their government can result in social unrest and conflict.
4.Economic Inequality: Inequalities in wealth, lack of economic opportunities, and marginalization of certain groups can lead to social unrest and conflict.
5.Territorial Disputes: Conflicts over which countries own land can escalate into armed conflict.
6.Ideological Differences: Conflicts driven by disagreements over religion or extremism can cause dangerous conflicts.

Case study: Darfur, Western Sudan, Africa.

The conflict in Darfur is known as the 'first climate change' conflict as one of the causes of the war in Darfur was a conflict over control of water resources between nomadic livestock herders and permanently settled farmers who farmed the land.
Climate change has led to an increase in drought and desertification meaning that these supplies were becoming more scarce. An estimated 480,000 people died in the conflict and 2.8 million people became refugees.

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

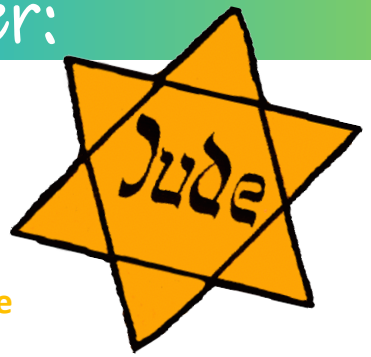
•Jews were ordered to register all wealth and property.

•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

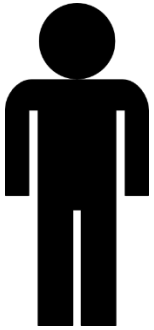
Anne Frank was a German girl and Jewish victim of the Holocaust who is famous for keeping a diary of her experiences. Anne and her family went into hiding for two years to avoid Nazi persecution

History Knowledge Organiser: *Holocaust and Genocide*

Death camps

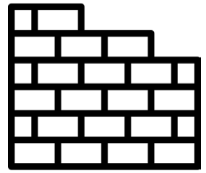
All over the world, Auschwitz has become a symbol of terror, genocide, and the Holocaust
The Germans isolated all the camps and sub-camps from the outside world and surrounded them with barbed wire fencing. All contact with the outside world was forbidden.

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



Ghettos – Jewish people were rounded up and put into walled off areas of cities. The conditions here were poor. Houses were cramped with multiple families, there was little sanitation and food. Many died of starvation and disease spread easily. It was from these Ghettos that Jewish people were taken to the concentration camps. The Warsaw Ghetto is an example.

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.

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 .

History Knowledge Organiser: *Civil Rights Movement*

Key words:

Civil Rights Act – 1964 law passed in America that made segregation illegal.

Institutionalised Racism – a form of racism that is embedded within organisations or society.

The roots of the Notting Hill Riots are found in the migration of people from the Caribbean to London right after World War II. With the population influx, Notting Hill became a more international district. Claudia Jones was a key figure.

The Bristol Bus Boycott of 1963 came from the refusal of the Bristol Omnibus Company to employ black or Asian bus crews in the city of Bristol, England.

In British cities, there was widespread racial discrimination in housing and employment at that time. The boycott was led by Paul Stephenson. The boycott of the company's buses by Bristolians lasted for four months until the company backed down and overturned the colour rule.

Martin Luther King

- **Dignified, intelligent, peaceful: helped win support not only of black Americans but also many white Americans**
- Made it clear that the protestors were the victims of police brutality
- Outrage at the use of Water Cannons on protestors during the Birmingham Campaign in 1963
- **Peaceful protests** - without this message, the protests could have spilled into violence, which some white Americans could have twisted to support their views that African-Americans were brutal thugs who did not deserve the same rights as they did not follow the law
- **1964 The Civil Rights Act desegregated many states and improved the lives of millions of black Americans. MLK played a key role in getting this act passed.**

Scan the QR code to watch this clip to learn more about MLKs March on Washington

Scan the QR code to learn more about Malcom X

Malcolm X

- **Believed peaceful protest was not bringing change fast enough and violence was needed in some cases**
- Used his speeches to inspire people, more to remind people that they have a voice and should use it.
- **Inspired young African Americans who were unhappy with their treatment and felt that the civil rights movement was not improving their lives**
- **Key role in the development of the Black Power Movement and the idea that being black was something to be proud of rather than to be made to feel ashamed of**
- **Gained publicity for black civil rights campaigns**

Emmett Till

- **14 year old African American boy from the Northern states of America.**
- **In 1955 he was murdered by two white men for allegedly flirting with a white woman in a southern state of America were segregation was still practiced alongside Jim Crow laws.**
- He had been beaten and shot
- His mother requested an open casket as his funeral to show the barbarity and severity of his murder.
- **The American people were horrified by this case and Emmett Tills murder is seen as the catalyst for the Civil Rights Movement**

Scan the QR code to learn more about Emmett Till

Religion and Ethics Knowledge Organiser

Keywords

Trinity – three persons of God: the Father, Son and Holy Spirit.

Incarnation – God made flesh, Christianity teaches that Jesus is God in human form.

Messiah – 'anointed one' a title given to a saviour king. A title given to Jesus.

Salvation – freed from sin and punishment through Jesus' sacrifice.

Grace – A gift from God that you did not earn and do not deserve.

Denomination – a recognised branch of the Christian Church.

Catholic – The largest Christian denomination: Catholics follow the Authority of the Pope.

Protestant – a type of Christianity that originated in the protest of Martin Luther.

Parable – a simple story with a moral message.

Miracle – something that cannot be explained by science.

Resurrection – rise again after death.

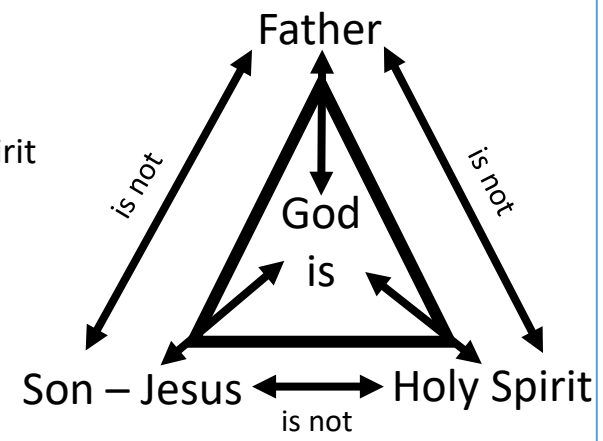
Sacrament - an outward sign of inward grace.

Jesus

Incarnation Christianity teaches that Jesus was the human form of God. In this way Jesus is both fully human and fully divine.

Trinity Christianity teaches that there are three persons of God:

1. The Father
2. The Son
3. The Holy Spirit



Sacraments

There are seven sacraments: Baptism, Confirmation, Eucharist, Reconciliation, Sacrament of the Sick, Marriage and Holy Orders.

Sacraments are an outward sign of inward grace, taking place at key times in a person's life they include receiving the gift of grace.

Parables

Jesus often taught in Parables these are short stories with a moral message. Jesus used parables to teach bold messages to those who believed in him but also conceal his message from those who were against him.

Denominations

Catholic the **Pope** is the head of the Catholic Church, through Apostolic Succession. Bishops and Priests lead the Church.

Protestant There are thousands of Branches of Protestant Christianity. The **Church of England** is the official religion of the United Kingdom, but we live in a diverse society with many different faiths represented. The King is the official head of the Church of England but the **Arch Bishop of Canterbury** is the most senior religious official.

YEAR 9 SUMMER 1 – What is Christianity?

Miracles

Miracles are things which cannot be explained or seem to defy the laws of science.

The Wedding at Cana The first miracle Jesus performed was turning water into wine at the wedding at Cana.

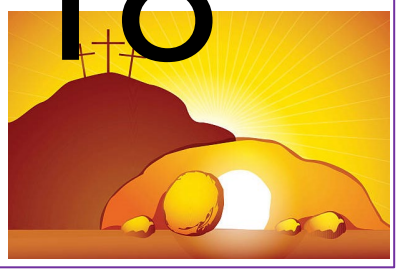
The Resurrection The most important of Jesus' miracles is the resurrection. Three days after his death Jesus followers go to his tomb and he has risen from the dead.

Christianity teaches that through Jesus' resurrection he:

Defeated Death

Secures our Salvation

gives us **Hope for Heaven**



Maths Knowledge Organiser

INDICES AND ROOTS

Key Concepts

$a^m \times a^n = a^{m+n}$

$a^m \div a^n = a^{m-n}$

$(a^m)^n = a^{mn}$

$a^{\frac{1}{n}} = \sqrt[n]{a}$

$a^{-m} = \frac{1}{a^m}$

Examples

Simplify each of the following:

1) $a^6 \times a^4 = a^{6+4}$
$= a^{10}$

2) $a^6 \div a^4 = a^{6-4}$
$= a^2$

3) $(a^6)^4 = a^{6\times4}$
$= a^{24}$

4) $(3a^4)^3 = 3^3a^{4\times3}$
$= 27a^{12}$

5) $\frac{5^2 \times 5^6}{5^4} = \frac{5^8}{5^4}$
$= 5^{8-4}$
$= 5^4$

6) $a^{\frac{1}{2}} = \sqrt{a}$

7) $9^{\frac{1}{2}} = \sqrt{9}$
$= 3 \text{ or } -3$

8) $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

Y9

Key Words
Powers
Roots
Indices
Reciprocal

Simplify:

1) $a^3 \times a^2$ 2) $b^4 \times b$ 3) $d^{-5} \times d^{-1}$ 4) $m^4 \div m^2$ 5) $n^4 \div n^4$

6) $\frac{8^4 \times 8^5}{8^6}$ 7) $\frac{4^9 \times 4}{4^3}$ 8) $(3^2)^5$ 9) $81^{\frac{1}{2}}$ 10) 5^{-2}

19

ANSWERS: 1) a^5 2) b^5 3) d^{-6} 4) m^4 5) 1 6) 8^3 7) 4^7 8) 3^{10} 9) 9 or −9 10) $\frac{1}{25}$

Maths Knowledge Organiser

DISTANCE-TIME GRAPHS

Key Concepts

A **distance-time** graph, plots time against the distance away from a starting point.

Speed can be calculated from these graphs by finding the gradient of the graph.

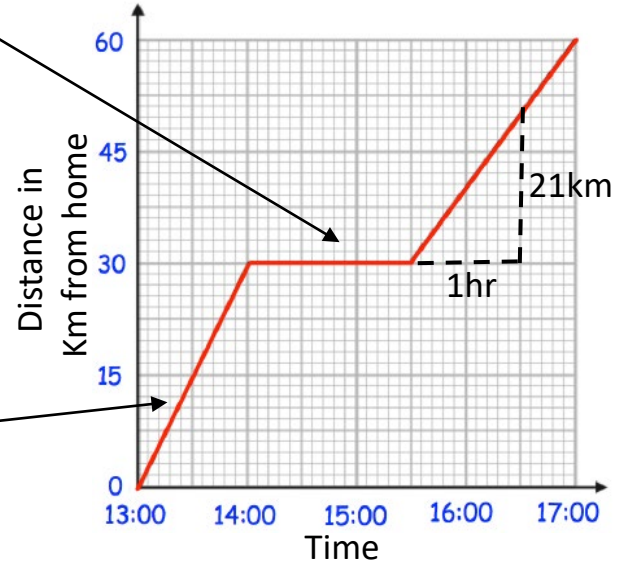
Horizontal lines are sections where the object is stationary.

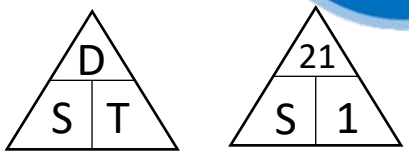
Y9

Examples

Horizontal sections are where the object is stationary

Diagonal lines show the object moving away from home or moving closer to home





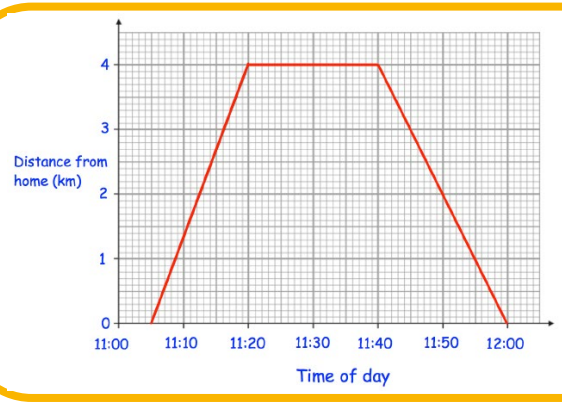
$$Speed = \frac{distance}{time}$$

$$Speed = \frac{21}{1}$$

$$Speed = 21km/h$$

Key Words

Distance
Time
Speed
Gradient
Stationary



A distance-time graph shows the journey of someone from home to the shop and back again.

1) How long were they at the shop for?
2) How far away from home is the shop?
3) How far did they travel in total?
4) What speed did they travel on the way to the shop in km/h?

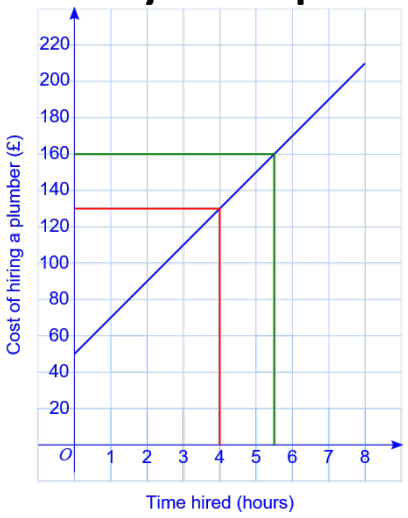
20

ANSWERS: 1) 20 minutes 2) 4km 3) 8km 4) 16km/h

Maths Knowledge Organiser

CONVERSION GRAPH

Key Concept

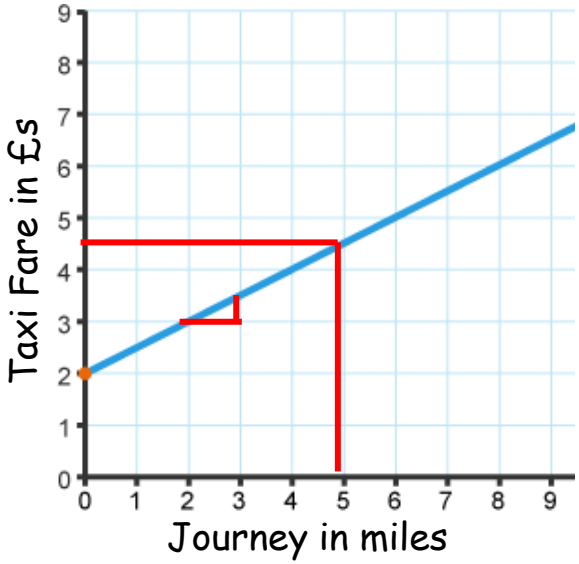


Gradient – The extra cost incurred for every extra hour.
y-intercept – The minimum payment to the plumber.

Key Words

Conversion graph: A graph which converts between two variables.
Intercept: Where two graphs cross.
y-intercept: Where a graph crosses the y-axis.
Gradient: The rate of change of one variable with respect to another. This can be seen by the steepness.
Simultaneous: At the same time.

Examples



What is the minimum taxi fair?
£2, this is the y-intercept.

What is the charge per mile?
50p, every extra mile adds on 50p.

How much would a journey of 5 miles cost?
£4.50, See line drawn up from 5 miles to the graph, then drawn across to find the cost.

Y9

Tip

The solution to two linear equations with two unknowns is the coordinates of the intercept (where they cross).

Questions

1) For the graph above a) A journey is 8 miles, what is its cost?
b) A journey cost just £3, how far was the journey?
2) Draw a graph to show the exchange rate £1 = $1.4.

ANSWERS: 1) a) £6 b) 2 miles

Maths Knowledge Organiser

PYTHAGORAS

Key Concepts

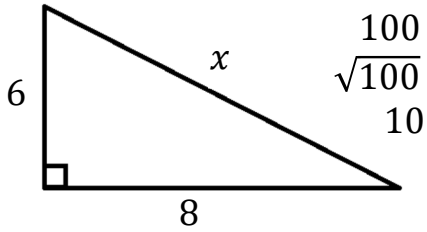
Pythagoras' theorem and basic trigonometry both only work with **right angled triangles**.

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

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

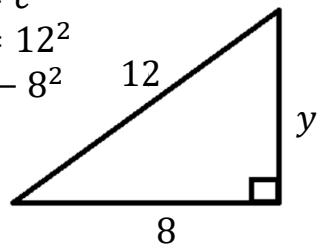
c is always the hypotenuse (longest side)

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

Y9

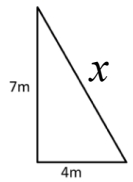
Key Words

Right angled triangle
Hypotenuse
Length
Shorter-side
Square
Square-root

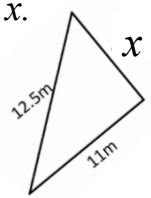
Questions

Find the value of x.

a)



b)



22

ANSWERS: a) 8.06m b) 5.94m

Maths Knowledge Organiser

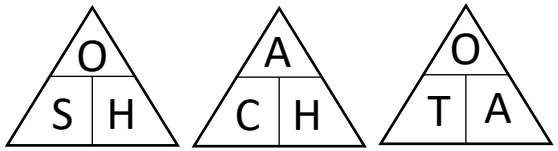
TRIGONOMETRY

Key Concepts

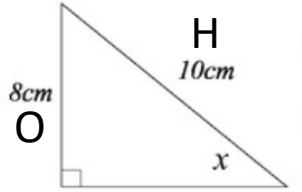
Basic trigonometry SOHCAHTOA –
used to find a missing side or an angle in a right-angle triangle

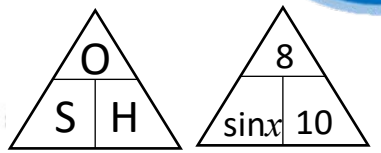
Special angles:

- Sine $30^0 = 0.5$
- Sine $0^0 = 0$
- Sine $90^0 = 1$
- Cosine $60^0 = 0.5$
- Cosine $0^0 = 1$
- Cosine $90^0 = 0$



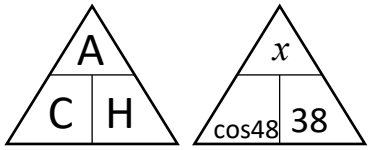
Examples





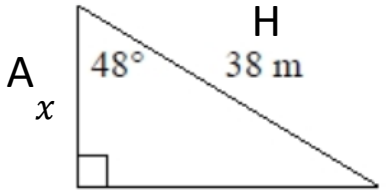
$$\sin x = \frac{8}{10}$$

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



$$\cos 48 = \frac{x}{38}$$

$$x = 38 \times \cos 48 = 25.4m$$



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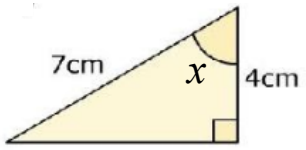
Key Words

Right angled triangle
Hypotenuse
Opposite
Adjacent
Sine
Cosine
Tangent

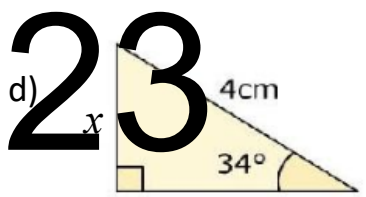
Questions

Find the value of x.

c)



d)



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

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) $\frac{294}{25} = £11.76$

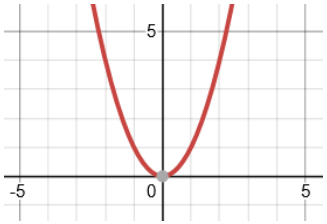
Maths Knowledge Organiser

QUADRATIC GRAPHS

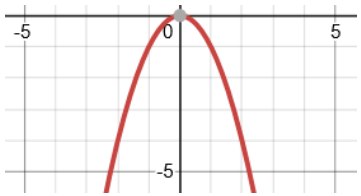
Key Concepts

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

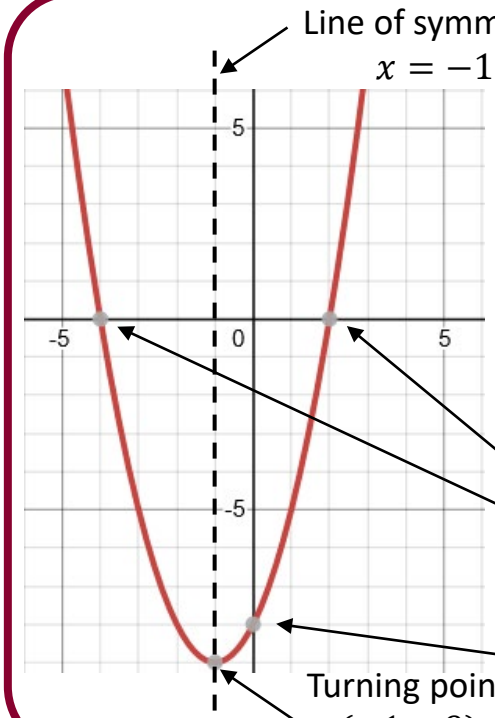
$y = x^2$



$y = -x^2$



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



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

y intercept = -8

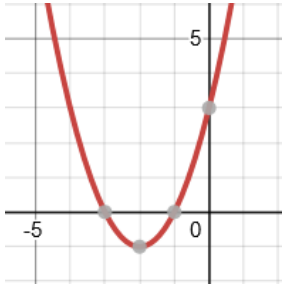
Examples

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

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

Y9

Key Words
Quadratic
Roots
Intercept
Turning point
Line of symmetry



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

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

25

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

Maths Knowledge Organiser

EXPAND AND SIMPLIFY BRACKETS

Key Concepts

Expanding brackets
Multiply the number outside the brackets with EVERY term inside the brackets

Factoring expressions
Take the highest common factor outside the bracket.

Examples

Expand and simplify where appropriate

1) $7(3 + a) = 21 + 7a$

2) $2(5 + a) + 3(2 + a) = 10 + 2a + 6 + 3a$
$= 5a + 16$

3) Factorise $9x + 18 = 9(x + 2)$

4) Factorise $6e^2 - 3e = 3e(2e - 1)$

Factorise fully:

1) $16at^2 + 12at = 4at(4t + 3)$

2) $x^2 - 2x - 3 = (x - 3)(x + 1)$

1) $4(m + 5) + 3$
$= 4m + 20 + 3$
$= 4m + 23$

2) $(p + 2)(2p - 1)$
$= p^2 + 4p - p - 2$
$= p^2 + 3p - 2$

Y9

Key Words
Expand
Factorise
Simplify

Questions

1) Expand and simplify
(a) 3(2 – 7f) (b) 5(m – 2) + 6 (c) 3(4 + t) + 2(5 – t)

2) Factorise
(a) 6m + 12t (b) 9t – 3p (c) $4d^2 - 2d$

26

ANSWERS: 1) (a) 6 – 21f (b) 5m – 4 (c) 22 + 5t 2) (a) 6(m +2t) (b) 3(3t – p) (c) 2d(2d – 1)

MFL Knowledge Organiser Sum 1 & 2 El cuerpo yLa Salud

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

FUTURE Saying what you are going to do

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

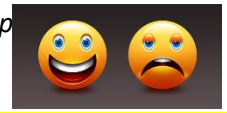
PAST preterit	AR	ER/ IR	IR-to go
I (yo)	é	í	Fui *I went*
You (tú)	aste	iste	Fuiste
He/she (él /ella)	ó	ió	Fue
We (nosotros)	amos	imos	Fuimos
You (pl) vosotros	asteis	isteis	Fuisteis
They (ellos/ellas)	aron	ieron	fueron

Opinions & Pronouns

Me chifla

Me alegra

(it makes me happ



Me enfada (angers)

Me duele(n)

Me irrita(n)

Indirect object pronouns

Me te le nos os les

Connectives

SEQUENCING

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

Adjectives

Doloroso(a)	painful
Cansado(a)	tiring
Peligroso(a)	dangerous
Sano(a)	healthy
saludable	healthy
Intenso(a)	intense
Agotador(a)	exhausting
Estimulante	exhilerating

Complexity

Se debe/ hay que + inf - one has got to…
Suelo + inf =I tend to

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

KO. Yr9 L2mod 6 La Salud TOPIC VOCABULARY TRANSLATED

A

El **Cuerpo**	**body**
a. la cabeza	head
b. la garganta	throat
c. la espalda	back
d. la mano	hand
e. la pierna	leg
f. la rodilla	knee
g. las muelas/los dientes	back teeth
h. el estómago	stomach
i. el brazo	arm
j. el pie	foot
k. el dedo (del pie)	finger (toe)
l. los oídos	the (inner)ears
m. La cara	face
n. Las orejas	ears
o. La boca	mouth
p. La nariz	nose
q. El tobillo	ankle
r. El codo	elbow
s. Los hombros	shoulders
t. Los ojos	eyes
u. El pecho	chest

B

Me siento mal	**I don't feel well**
a. ¿Qué te pasa?	What's wrong?
b. ¿Qué te duele?	What hurts?
c. ¿Qué le duele?	What hurts him/her?
d. Me duele(n)	…My … hurts.
e. Le duele(n)	his/her … hurts.
f. Tengo dolor de cabeza.	I have a headache.
g. Tengo una insolación.	I have sunstroke.
h. Tengo la pierna rota.	I have a broken leg.
i. Tengo tos.	I have a cough.
j. Tengo fiebre.	I have a temperature.
k. Tengo una picadura.	I've been bitten.
l. Tengo catarro.	I have a cold.
m. Tengo gripe.	I have the flu.
n. Estoy enfermo/a.	I'm ill.
o. Estoy mareado/a.	I feel sick/dizzy.
p. Estoy constipado/a.	I've got a cold.

C

Se debe + INF - one must
Hay que + INF - one has to
Tienes que + INF - you have to

Los verbos

a.	montar en bicicleta	go cycling
b.	correr	run
c.	beber mucha agua	drink a lot of water
d.	comer frutas	eat fruit
e.	descansar	relax
f.	levantarme temprano	get up early
g.	levantarme tarde	get up late
h.	entrenar muchas horas	train for hours
i.	tener tiempo libre	have free time
j.	hacer deporte	do sports
k.	dormir ocho horas al día	sleep eight hours day
l.	cenar muy tarde	have dinner very late
m.	comer cinco raciones de fruta y verduraso	to eat 5aday
n.	lavarte los dientes	clean your teeth

MFL Knowledge Organiser Sum 1 & 2 El cuerpo yLa Salud

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

FUTURE Saying what you are going to do

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

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

Expressing agreement and disagreement

Estoy de acuerdo con – I agree with
Estoy a favor de – I'm in favour of
Estoy en contra de – I am against
Tienes razón – You are right
Estás equivocado – you're wrong
Es cierto – it's true
Es verdad – it's true

Adjectives

Cansado(a)	tiring
Peligroso(a)	dangerous
Sano(a)	healthy
saludable	healthy
Sanamente	healthily
Malsano	unhealthy
Estresante	stressful
Agotador(a)	exhausting
Estimulante	exhilerating

Connectives

Synonyms

También –además – encima
Porque – dado- que – ya que
Pero – no obstante – sin embargo – aunque
Por un lado – on one hand
Por otra parte – on the other hand

Complexity

Se debe/ hay que + inf - one has got to…
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Pude + inf = I could

KO. Yr9 L2mod 6 La Salud
TOPIC VOCABULARY TRANSLATED

A

Key vocab

El alcohol
El consumo – the consumption
Bebidas alcohólicas alcoholic drinks
El cannabis
El tabaco
Drogas blandas – soft drugs
Drogas duras – hard drugs
Bebidas azucaradas / refrescos – sugary/fizzy drinks
Comida basura/rápida – junk/fast food
Borracho - drunk
Un porro – a joint
Peligroso – dangerous

B

Negative words

Fumo – No fumo - No goes before the VERB
Nada – nothing
nadie -nobody
nunca – never
Ninguno – none , not….any

In Spanish we use a double negative.
No fumo **nunca**
No como nada la comida rápida
No había **nadie**
No comí ninguno

Also **tampoco** – neither
demasiado – too
poco – Little or few

C

Se debe + INF - one must
Hay que + INF - one has to
Tienes que + INF - you have to

Los verbos

Advertir – to warn
Fumar – to smoke
Drogarse –to take drugs
Emborracharse – to get drunk
Prohibir – to forbid/prohibit
Mantenerse en forma – to stay in shape
Estar a dieta – to be on a diet
Pasar hambre – to starve
Llevar una dieta sana – to have (wear) a healthy diet
Acostarse tarde - to go to bed late
Intentar comer bien – to try to eat well
Dormir ocho horas – to sleep 8 hours
Evitar el estrés – to avoid stress
Hacer ejercicio físico – to do physical exercise

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.

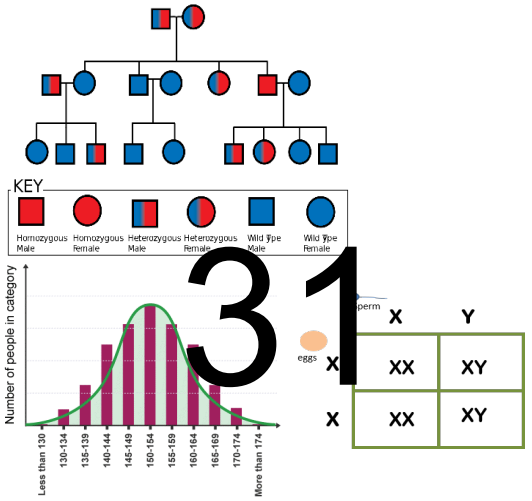
3. DNA extraction	
***DNA extraction: Mix water, salt and detergent.**	Salt makes DNA clump together, detergent breaks down cell membranes to release DNA
***DNA extraction: Mash fruit/veg and add the solution**	Increases the surface area
***DNA extraction: Leave in water bath at 60^{O}C**	Heat makes 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.



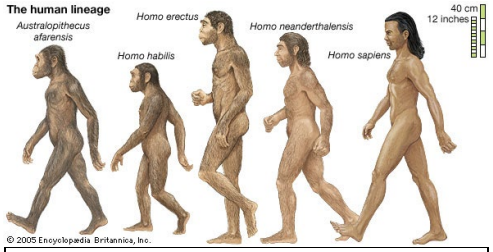
B4: Evolution

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.

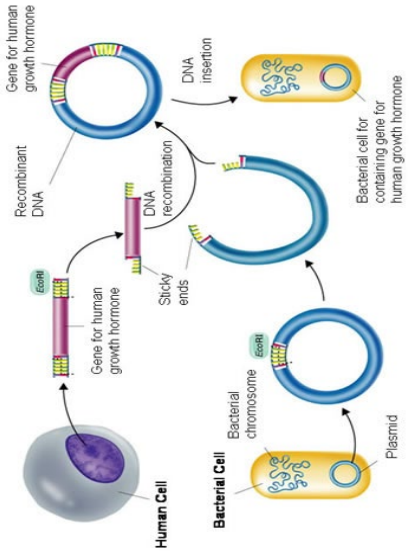
4. Classification	
***Carl Linnaeus**	Developed the modern system of classification.
***How to classify**	Based on similarities, group things into smaller and smaller groups with fewer and fewer similarities.
***Problems with classification**	Sometimes organisms that look similar are not actually related.
***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.



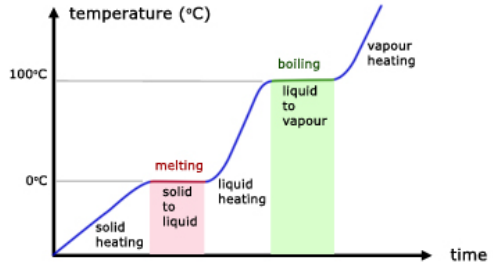
C1 & 2: States of matter and separating substances

Lesson sequence

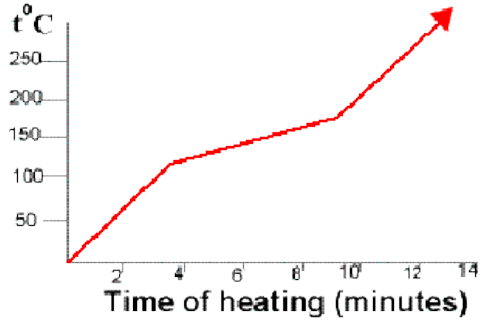
1. States of matter
2. Mixtures
3. Filtration and crystallisation
4. Paper chromatography
5. Distillation
6. Core practical – investigating inks (CP7)
7. Drinking water

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

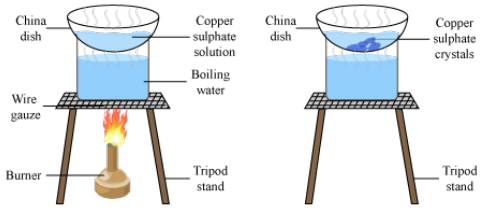
****Heating curve for a pure substance**	Temperature rises as you heat a solid, levels out as it melts, continues rising once fully liquid, levels out whilst boiling and rises again once fully gas.



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.

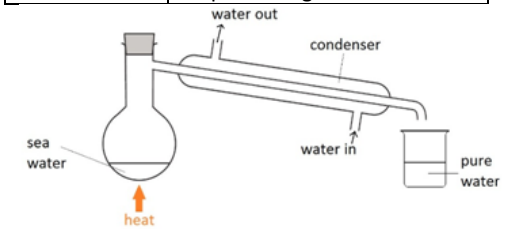


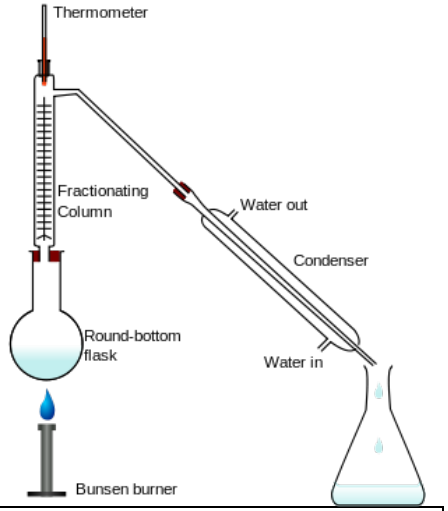
3. Filtration and crystallisation	
***Dissolve**	When a substance mixes with a liquid by breaking down into individual particles (atoms or molecules).
***Soluble**	When a substance can be dissolved by a liquid.
***Insoluble**	When a substance can't be dissolved by a liquid.
***Filtration**	A method of 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.

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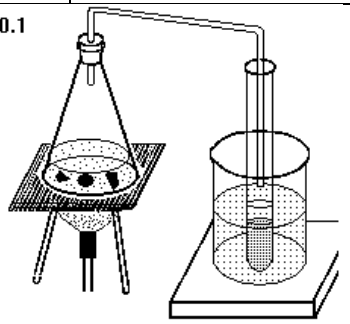


7. Drinking water	
***Potable water**	Water that is safe to drink.
***Desalination**	Producing pure water from seawater.
****Purifying seawater**	The seawater is distilled: heating the water to produce water vapour and condensing it back to liquid. Uses lots of energy.
****Uses of pure water**	Pure water 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.

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

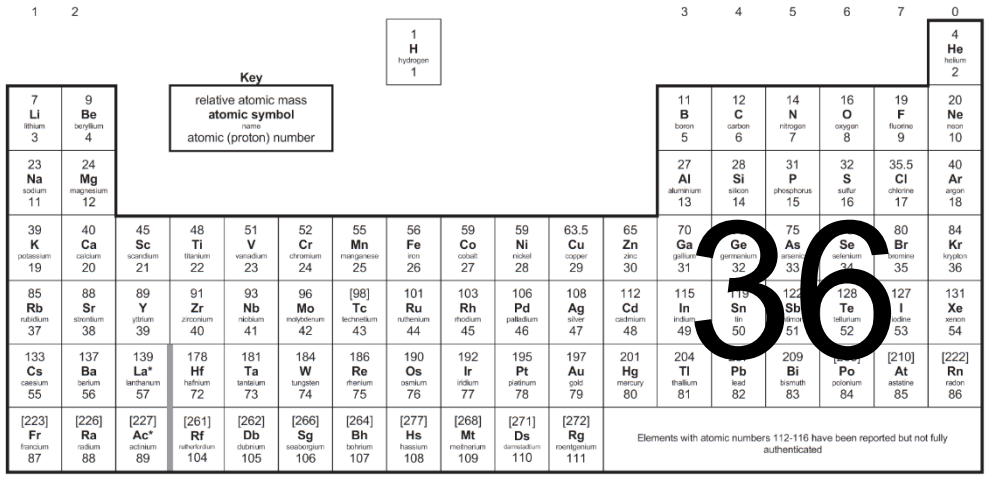
2. Detailed structure of atoms	
****Alpha particle**	Small positively charged particle made of two protons and two neutrons.
****Scattering**	When particles bounce back or change direction.
****Rutherford's experiment**	Fired alpha particles at gold leaf, used a phosphor-coated screen to track where 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.



P1: Motion

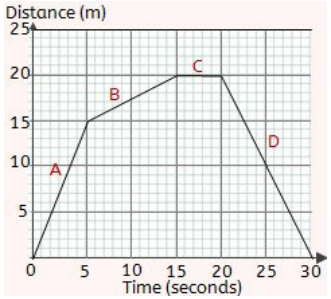
Lesson sequence

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/s^2 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.

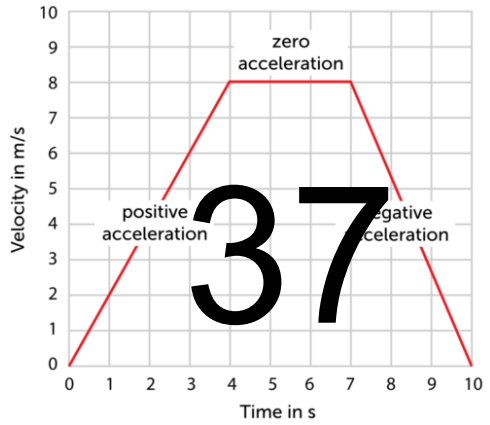
2. Speed	
Units of speed	Metres per second, m/s.
Speed – word equation	Speed = distance / time Speed = m/s Distance = m Time = s
Speed – symbol equation	v = x/t v = speed x = distance t = time
Instantaneous speed	Speed at a particular point in time.
Average speed	The average speed across the whole of 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/s^2
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/s^2 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 = (v^2 – u^2) / 2a x = Velocity travelled a = acceleration v = final speed u = initial speed
Acceleration during free fall	10 m/s^2

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.



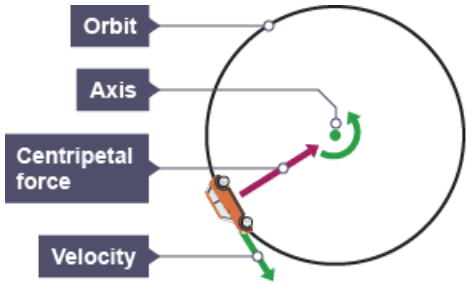
P2: Forces and motion

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

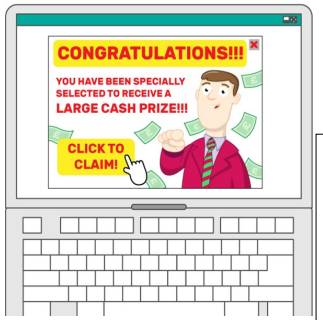
9. Crash hazards	
****Crash danger**	Crashes involve large decelerations, creating large forces which can injure you.
****Car safety features**	Increase the time a collision takes, reducing deceleration and forces.

Computer Science Knowledge Organiser

CYBERSECURITY

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

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



It is the law

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

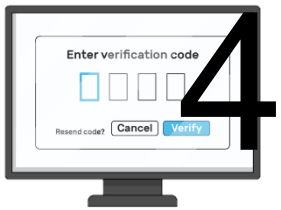
Computer Misuse Act 1990: It is an offence to:
1. have unauthorised access to computer material
2. have unauthorised access with intent to commit or facilitate the commission of further offences
3. commit unauthorised acts with intent to impair, or with recklessness as to impairing, the operation of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

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

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

Network and System **security measures** include:

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



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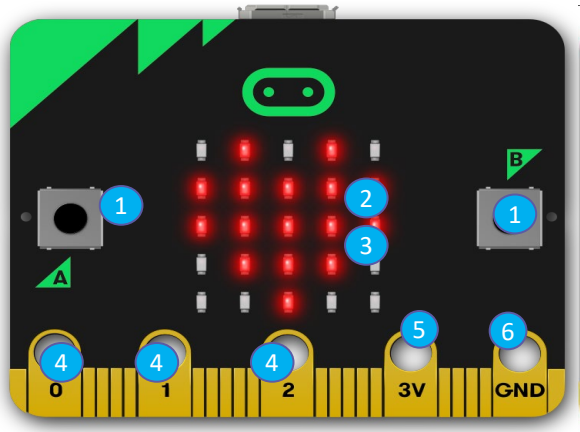
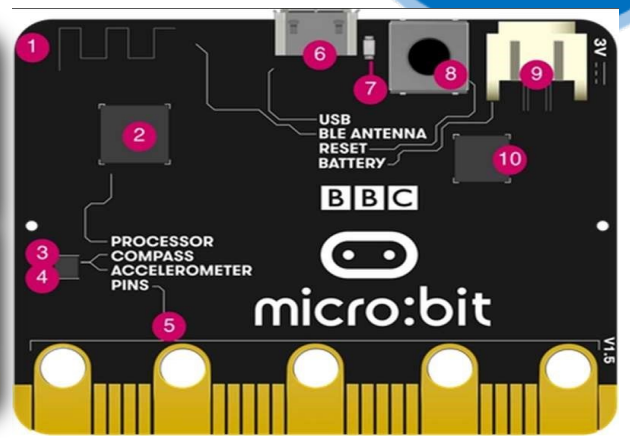
MICRO-BITS

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

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



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



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

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

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

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

Python with data

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IT AND THE WORLD OF WORK

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

Accessibility tools

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

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

Reader pen

The impact of Technology

Positive

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

Negative

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

Traditional vs modern workplace

Traditional

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

Modern

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

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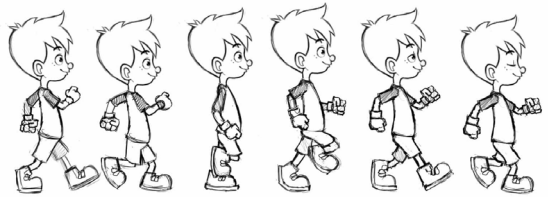
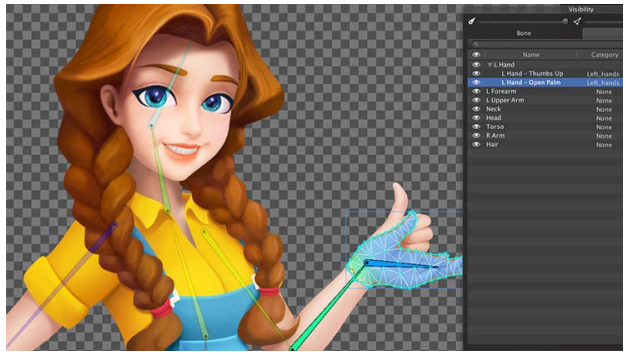
BLENDER - MEDIA ANIMATIONS



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



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

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

Smart Materials

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

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

How to reduce our impact on the environment?

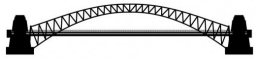
.

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

DT

Y9

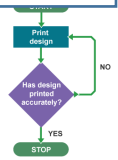
Modern Materials

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

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

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

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



Manufacturing Methods

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

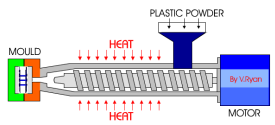
Scales of Production

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

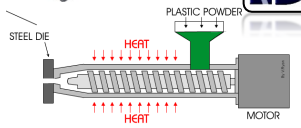
6Rs

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?

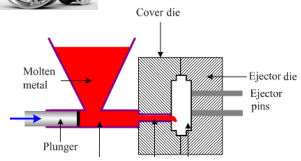
Injection



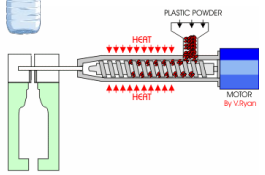
Extrusion



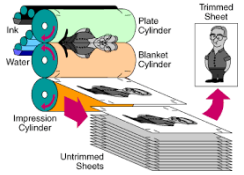
Die Casting



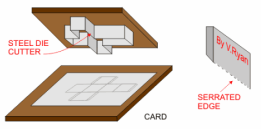
Blow Moulding



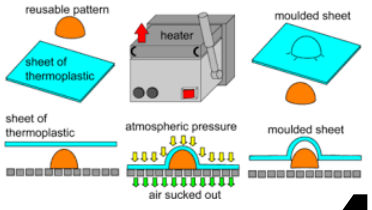
Lithography



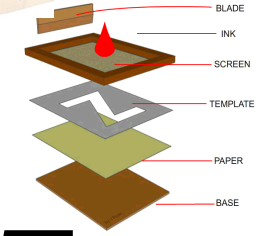
Die Cutter



Vacuum forming



Screen Printing



Computer Aided Design
Computer Aided Manufacture

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

Ergonomics and Anthropometrics

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

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

Market Pull and Technology Push

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

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

Life Cycle Analysis

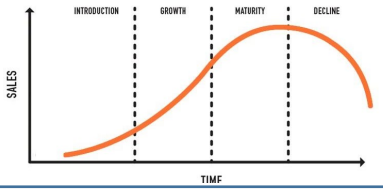
A Life Cycle Analysis is carried out to assess the environmental impact of a product during its entire life, from cradle-to-grave. It looks at use of materials, use of energy, impact of transporting the materials and the parts of the product at various points in its life.

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

Product Life Cycle

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

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



James Dyson

Key Facts

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



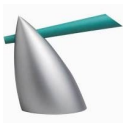


Philippe Starck

Key Facts

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





Design Process

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

Key Words and Definitions

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

Food Technology Knowledge Organiser

FOOD CHOICES
What makes us choose?

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

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

Types of vegetarians

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

Vegetarian alternatives to meat

Quorn- cultured fungus

Soya- soya bean

TVP- Textured vegetable protein

Tofu-soya bean curd

Key words

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

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

Nutrient Needs of Teens

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

Food Technology Knowledge Organiser

Diet related health conditions

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

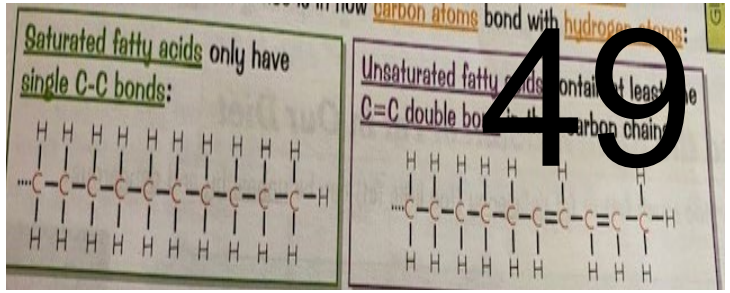
To reduce the outcome of CVD it is important to follow dietary guidelines and eat a diet that is low in saturated fat and instead eat foods higher in unsaturated fat such as oily fish, nuts and seeds, olive oil and the recommended 5-a-day of fruit and vegetables.

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

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

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

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



Food Technology Knowledge Organiser

Making a Roux Sauce

Food Science Topics

Keywords

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

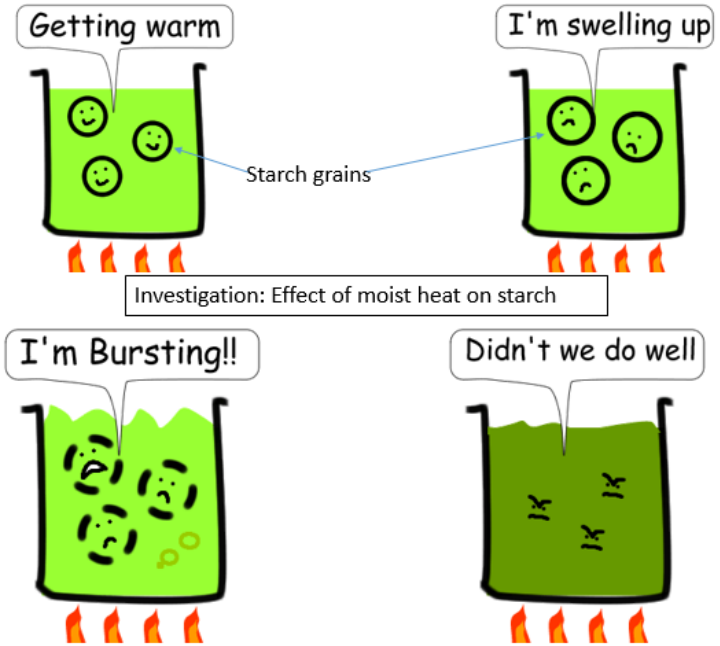
LOVE FOOD LOVE SCIENCE

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)

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

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

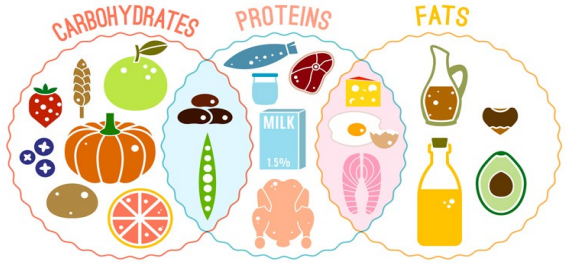


Investigation: Effect of moist heat on starch

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

Carbohydrates

Starch
Sugars
Dietary fibre



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

50

Sugars : Monosaccharide
Disaccharide
Polysaccharide

Food Technology Knowledge Organiser

Key Words

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

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

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

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

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

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

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

Sources:

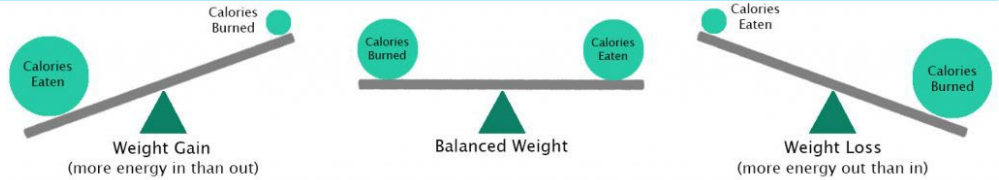
Carbohydrate: foods containing sugar and starch (1g of carbohydrates = 3.75 /4 kcals of energy)

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

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

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

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



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

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

The recommended physical activity needed daily is suggested to be:

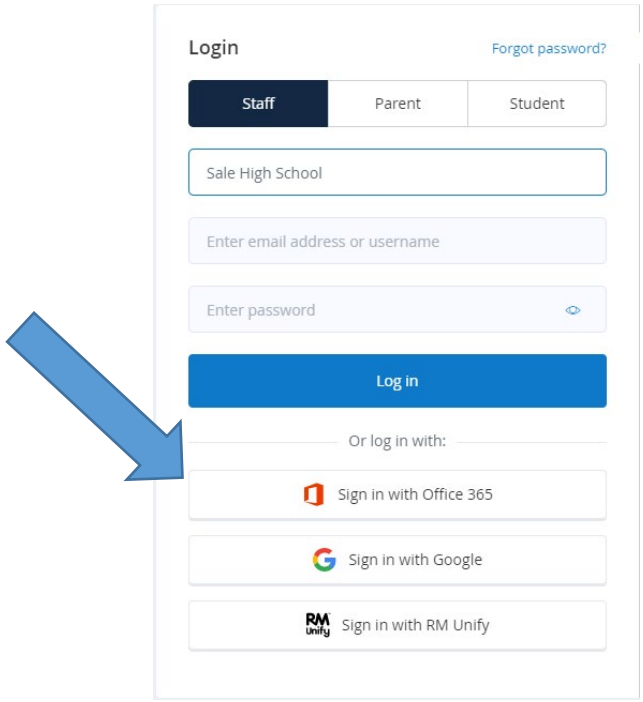
- 5—18 years: aim for an average of at least 60 minutes of moderate intensity physical activity a day across the week
- 19-64years: aim to do at least 150 minutes of moderate intensity activity a week or 75 minutes of vigorous intensity activity a week.

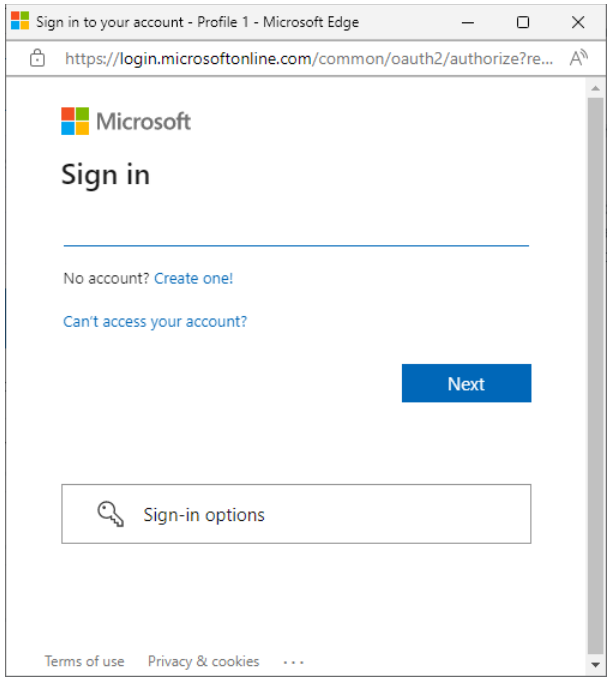
Amount of energy needed daily by each nutrient: Carbohydrate: 50%. Most of which should come from starch, intrinsic and milk sugars.
No more than 5% of the energy from carbohydrate should come from free sugars, intrinsic sugar found in fruit and vegetables.
Fat: 35% or less eat less saturated fats.
Protein: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

Satchel:one log in guide

How to Log into satchel:one

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





2. Type in your school email address.

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

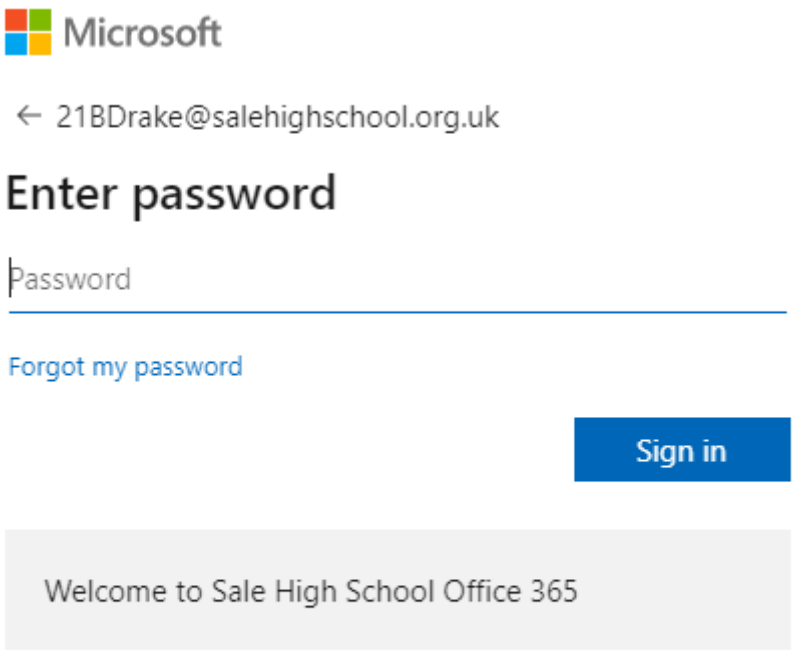
Year Started	School Year
23	7
22	8
21	9
20	10
19	11

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

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

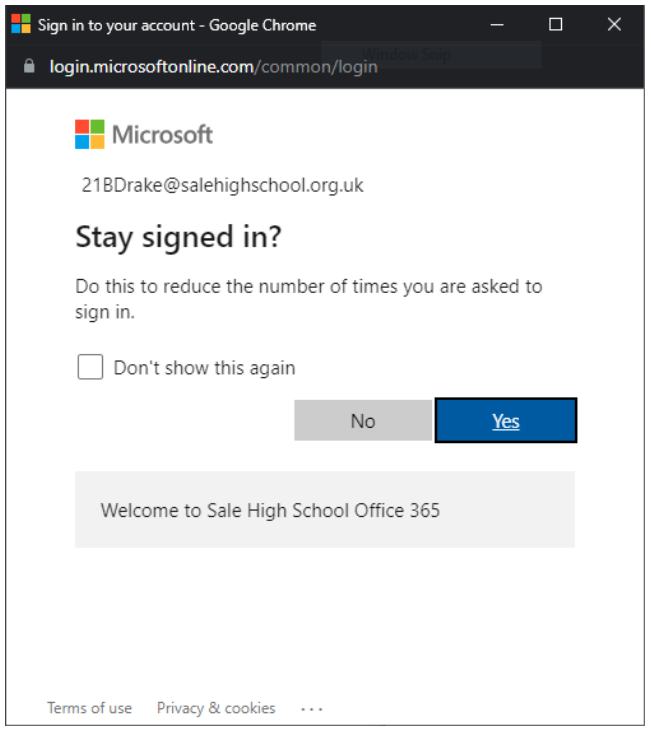
Satchel:one log in guide

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

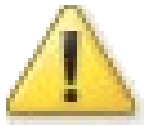


4. Finally, Office 365 asks about signing in.

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



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



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