Knowledge Organiser

Year 10

Cycle 2 - CORE

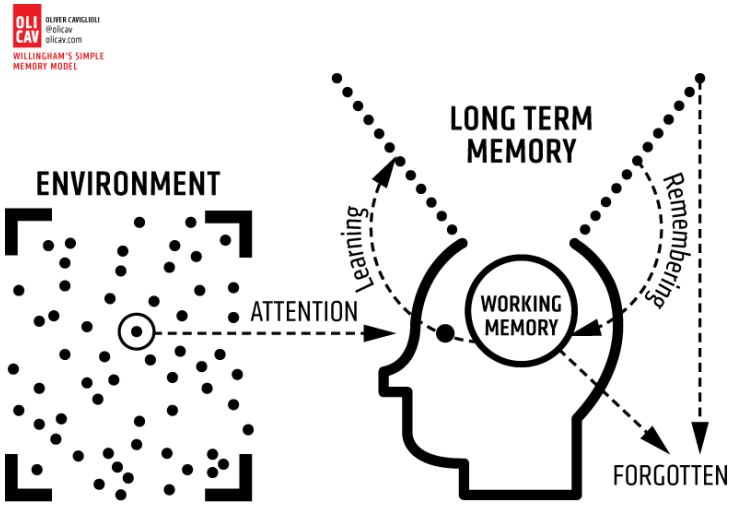
Name:

Inspiring Excellence

Using your Knowledge Organiser for homework

- Your Knowledge Organiser contains the essential knowledge that every student must know.
- Regular use of the Knowledge Organiser helps you to recap, revise and revisit what you have learnt in lessons.
- The aim is to help remember this knowledge in the long term and to help strengthen your memory
- You will use the Knowledge Organiser to help learn during homework.
- You will be assessed on the knowledge from your Knowledge Organiser; the more you revisit information the more likely it will be remembered for lessons, assessments and exams.

- For each homework you will be asked to look at a particular section of your Knowledge Organiser.
- Make sure you follow the homework timetable below so that you do the right homework for the right subjects each day.
- Each day (Monday to Friday) you will study 2 subjects for 30 minutes each.
- All Knowledge Organiser homework is completed in your blue Knowledge Workbooks
- All Maths and English homework is completed on SPARX and must be 100% completed each week.



Homework Timetable Year 10

	Monday	Tuesday	Wednesday	Thursday	Friday
Subject 1	Science	Geog/History	Maths	Option Block F	Maths
Subject 2	English	Option Block E	English	Science	Option Block G

How to use your Knowledge Organiser

In your blue knowledge book you will always write the date, subject heading and ensure that they are underlined with a ruler.

Task 1: Questions

Where a subject includes questions to answer, you must answer these in your blue book. This is the main task to do as a minimum. If you have additional time, or where there are no questions, then do the following Tasks 2-4

Task 2: The Cover – Write – Check method

1. Study the relevant section of your Knowledge Organiser for several minutes.
2. Cover the Knowledge Organiser.
3. In your blue book, write out what you can remember.
4. Check the Knowledge Organiser to see if you got it right.
5. Correct any mistakes in purple pen.
6. Repeat the process – even if you got it 100% correct.
7. Complete sections that you have previously studied using the same process.

Task 3: Free recall

1. Pick a section of the Knowledge Organiser you have studied recently.
2. Without looking at the Knowledge Organiser write down everything you can remember about the topic.
3. Check the Knowledge Organiser to see how much you got right.
4. Correct any mistakes and add any missing parts in purple pen.

Task 4: Elaboration

1. Once you have completed the Cover – Write – Check method, add any additional details you can to your notes.
2. Remember your Knowledge Organiser only contains the core knowledge, there is much to learn beyond it so practise adding more detail when you can.

Year 10 Core Cycle 2

Knowledge Organiser Contents Page

Start with Week 1. Each week, complete the next colour block. Write each word out 3 times and each definition once. Check it all with a purple pen. Tick what is correct, amend what is wrong.

Coombeshead Academy *Inspiring Excellence*		English Learning Area				*Macbeth* - William Shakespeare
wk	keyword	definition	example			
Week 1	**Tragedy**	The main character falls from greatness because of a fatal flaw in their personality.	*The tragedy of Macbeth* is the full title of the play.		Week 1	**Supernatural and Heroism** **Supernatural:** In Shakespeare's time, the powers of evil were thought to be absolutely real; to most people Hell was an actual place and the Devil a constant threat to their souls. In particular there was a fascination with witches and witchcraft. Hundreds of innocent people (mostly women) were executed as suspected witches. The interest came from the very top, led by King James I himself who published a book on the subject called *Demonology*. When Shakespeare came to write his play, he knew that his audience would find the theme of evil and the supernatural very interesting indeed. **Heroism: Macbeth** is a tragic **hero** because he started the play as a good man, but the manipulations of the Weird Sisters and his wife brought out his baser qualities. This leads to **Macbeth**'s moral corruption and downfall by the play's end. It is clear **Macbeth** begins the play as a loyal friend and decent man.
	Protagonist	The leading character in a text.	Shakespeare often uses the name of the protagonist in the title – they are then called the titular character. Examples: *Macbeth, Othello, Julius Caesar.*			
	Hamartia (ham/art/ee/aa)	The fatal flaw leading to the downfall of the leading character.	"no spur to prick the sides of my intent, but only vaulting ambition"			
	Hubris (huw/bris)	Excessive ambition/self-confidence (that is the fatal flaw of Macbeth)	"Then live, Macduff: what need I fear of thee?"			
	Paradox	A statement used that seems contradictory.	"Fair is foul, and foul is fair."			
Week2	**Aside**	A speech in a play that is intended to be heard by the audience but unheard by the other characters in the play.	"If good, why do I yield to that suggestion/Whose horrid image doth unfix my hair" Only the audience hear Macbeth's first thoughts of murder.		Week2	**Act I** On a bleak Scottish moorland, Macbeth and Banquo, two of King Duncan's generals, discover three strange women (witches). The witches prophesy that Macbeth will be promoted twice: to Thane of Cawdor (a rank of the aristocracy bestowed by grateful kings) and King of Scotland. Banquo's descendants will be kings, but Banquo isn't promised any kingdom himself. The generals want to hear more, but the "weird sisters" disappear.
	Echo	When a character uses the words/phrases used earlier by another character to create a link between them.	"So fair and foul a day I have not seen." Macbeth echoes the witches ("Fair is foul and fouls is fair") to create a link between him and the supernatural.			
	Masculine imagery	Metaphor/simile/personification associated with characteristics linked to men in a given time period.	"with his brandish'd steel, Which smoked with bloody execution"			
	Hero	A person who is admired for great or brave acts or fine qualities	"For brave Macbeth—well he deserves that name"			
	Traitor	A person who betrays someone or something, such as a friend, cause, or principle.	"That most disloyal traitor" (Duncan about the original Thane of Cawdor)			

						Soon afterwards, King Duncan names Macbeth Thane of Cawdor as a reward for his success in the recent battles. The promotion seems to support the prophecy. The King then proposes to make a brief visit that night to Macbeth's castle at Inverness. Lady Macbeth receives news from her husband about the prophecy and his new title. She vows to help him become king by whatever means are necessary 
Week 3	**Foil**	A character who is presented as a contrast to another.	Banquo throughout the play is seen as (almost) perfect and honest, compared to Macbeth who is seen as flawed and power-hungry.		Week 3	**Act II** Macbeth returns to his castle, followed almost immediately by King Duncan. The Macbeths plot together to kill Duncan and wait until everyone is asleep. At the appointed time, Lady Macbeth gives the guards drugged wine so Macbeth can enter and kill the King. He regrets this almost immediately, but his wife reassures him. She leaves the bloody daggers by the dead king just before Macduff, a nobleman, arrives. When Macduff discovers the murder, Macbeth kills the drunken guards in a show of rage and retribution. Duncan's sons, Malcolm and Donalbain, flee, fearing for their own lives; but they are, nevertheless, blamed for the murder. 
	Aural (or/ul)	Images or methods associated with sound.	Rhyming used by the witches, “When the hurlyburly's done, When the battle's lost and won”.			
	Gender expectations (challenged)	The **gender roles** during the **Jacobean** era were fairly similar to the **Elizabethan** ones. Men assumed a dominant position in the society.	Come, you spirits That tend on mortal thoughts! unsex me here, And fill me from the crown to the toe top full Of direst cruelty;			
	Regicide	The murder of a King	Macbeth can’t say it (because it is so bad). He says “this business” and “horrid deed” instead. These are called euphemisms.			

Week 4	**Symbolises**	When a writer uses something to stand for/represent something else.	“Come let me clutch thee” (Macbeth trying to hold the illusory dagger)		Week 4	 **Act III** Macbeth becomes King of Scotland but is plagued by feelings of insecurity. He remembers the prophecy that Banquo's descendants will inherit the throne and arranges for Banquo and his son Fleance to be killed. In the darkness, Banquo is murdered, but his son escapes the assassins. At his state banquet that night, Macbeth sees the ghost of Banquo and worries the courtiers with his mad response. Lady Macbeth dismisses the court and unsuccessfully tries to calm her husband. Lady Macbeth and Macbeth then discuss Banquo's murder but Macbeth begins to think about Macduff, the man he considers to be most dangerous to him.
	Conscience	A person’s sense of right and wrong that guides their actions	“We will proceed no further in this business”			
	Soliloquy (so/lil/o/kwey)	When a character speaks their innermost thoughts, heard only by the audience.	“Is this a dagger which I see before me?”			
	Comic Relief	A short comic scene in a play which is mostly a tragedy	“nose-painting, sleep and urine” (the porter talking about being drunk)			
	Tension	The sense that something is about to happen	“And yet I would not sleep” (Banquo unable to sleep on the night of the murder)			
Week 5	**Jacobean**	The time period relating to the rule of James I of England.	1603-1625. Macbeth was written in 1606		Week 5	**Act IV** Macbeth seeks out the witches who say that he will be safe until a local wood, Birnam Wood, marches into battle against him. He also need not fear anyone born of woman (that sounds secure, no loop-holes here).  “My secret is putting the toil in first and adding the trouble just as it comes to a boil.” They also prophesy that the Scottish succession will still come from Banquo's son. Macbeth embarks on a reign of terror, slaughtering many, including Macduff's family. Macduff had gone to seek Malcolm (one of Duncan's sons who fled) at the court of the English king. Malcolm is young and unsure of himself, but Macduff, pained with grief, persuades him to lead an army against Macbeth.
	Personification	Giving human qualities or emotions to something that is not human	“Bleed, bleed poor country!” (Macduff)			
	Euphemism (uu/fem/ism)	Replacing a harsh word/phrase with one that is milder	*“But Banquo’s safe?” (Macbeth –he can’t bear to say murdered or dead)*			
	Irony	Using language that is the opposite of what you mean	“But Banquo’s safe?” (Macbeth – he actually means is Banquo dead?)			
	Dramatic irony	When the audience know something that the characters do not	We can see Banquo’s ghost but none of the characters, except Macbeth, can. ”What is’t that moves your highness?”			

Week 6				
	Suspicious	Having or showing a cautious distrust of someone	“I fear thou played'st most foully for 't.”	
	Tyrannical	Using power in a cruel or oppressive way.	"Thou liest, abhorred tyrant"	
	Dynamic characters	Characters who change across the play.	Such as Macbeth and Lady Macbeth	
	Hallucination **Hh/aa/ll/oo/ss/in/ay/shun**	To see something that it not really there	"Thou canst not say I did it; never shake Thy gory locks at me." - *Macbeth*, 3.4	

Week 6

Act V

Macbeth feels safe in his remote castle at Dunsinane until he is told that Birnam Wood is moving towards him. Malcolm's army is carrying branches from the forest as camouflage for their assault on Macbeth's stronghold. Meanwhile, an overwrought and conscience-ridden Lady Macbeth walks in her sleep and tells her secrets to her doctor. She commits suicide. As the final battle commences, Macbeth hears of Lady Macbeth's suicide and mourns.

In the midst of a losing battle, Macduff challenges Macbeth. Macbeth learns Macduff is the child of a caesarean birth (loophole!), realises he is doomed, and submits to his enemy. Macduff triumphs and brings the head of the traitor Macbeth to Malcolm. Malcolm declares peace and goes to Scone to be crowned king.

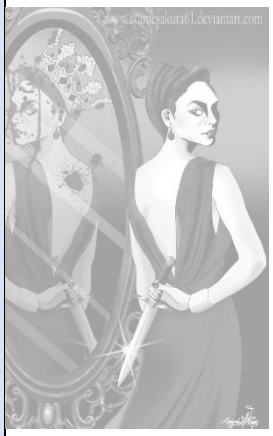
Week 7	**Imperative sentences**	Sentences that give an instruction or order.	"Beware the Thane of Fife"
	Exclamatory sentences	Sentences that show heightened emotion by having a ! at the end	"Fly good Fleance, fly, fly, fly!"
	Formal	A type of speech used in serious situations	"All our service In every point twice done and then done double" (Lady Macbeth welcoming Duncan)
	Methods	Anything the writer is doing to create a particular effect	Imagery, single word choice, lexical sets, repetition, sentence type, symbolism..and lots more
	Chivalry	Behaviour with high moral, and social codes.	Faith, charity, justice, prudence, resolution, truth, diligence, hope and valour "Valiant cousin"
Week 8	**Divine right of Kings**	Kings get their authority directly from God	"by the grace of Grace" (Malcolm about being King)
	Binary opposites	Set up as being directly opposite to each other	Lady Macduff and Lady Macbeth
	Domestic	Things related to the home (Lady Macduff cares primarily about this, not politics or battles)	"to leave his wife, to leave his babes, His mansion and his titles" (Lady Macduff)
	Kingship	The roles and responsibilities of being a King	"Hail, King of Scotland!" (rejoicing when Malcolm is crowned as he will be a good King)

Week 7

Ambition and Power in Macbeth

Shakespeare set Macbeth in the distant past and in a part of Britain that few of his audience would have been familiar with. Scotland is shown as a wild and savage place ruled over by a weak king (Duncan) who relies on his warrior thanes to keep control. However, through the character of Macbeth, Shakespeare goes on to show that having too much ambition and total control of power is just as bad. By the end of the play Malcolm has become King and it seems likely that he will be much fairer and treat his people justly.

Week 8



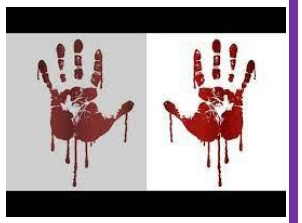
Appearances and Reality in Macbeth

In *Macbeth*, things are never quite what they seem. Characters say one thing yet mean something else and use euphemisms to hide reality. Wicked and violent acts such as murder are covered up or the blame is shifted onto someone else. The Witches mislead Macbeth, or they at least make suggestions which allow him to mislead himself. Ghosts, visions and apparitions occur regularly. All of these things contribute to the many contrasts which exist in the play; almost nothing is as it should be.

Week 9	**Shared Lines**	The witches appearance as one entity is emphasised by their shared lines.	"Fair is foul and foul is fair"	
	Iambic Pentameter	The pattern of stressed and unstressed syllables in a line. It is found frequently throughout the play.	"So foul and fair a day I have not seen"	
	Juxtaposition Jj/ux/ta/pp/o/zz/i/shun	Contrasting ideas presented near to each other.	Lady Macbeth is the juxtaposition of her former self in Act 5, Scene 1.	
	Oxymoron	Two contrasting words written next to each other.	"Fair is foul".	
Week 10	**Witchcraft**	The use of magic or supernatural powers, usually to harm others.	The witches practise this to lure Macbeth to his tragic downfall.	
	Antithesis	Where contrasting ideas are presented in quick succession.	Banquo and Macbeth's characters, Macbeth and Malcom's style of reign and Macbeth and his wife are all examples of contrasts.	
	James I	On the throne 1603-1625.	Intended victim of the Gunpowder plot. Direct descendant of Banquo.	
	Daemonologie	Book written by James I.	Details the King's fascination with withcraft. James I supported witch trials and was very superstitious himself.	

Week 9

Guilt in Macbeth



Initially, Macbeth is shown as reluctant to partake in his wife's plans. He cannot go through with the killing of Duncan and is frequently consumed by his own guilt, e.g. Banquo's ghost at the feast. However, he gradually becomes tyrannical and his need to kill shows this desperation. In contrast, Lady Macbeth is ruthless but is later driven mad by her guilt, e.g. her sleepwalking whilst trying to get imaginary blood off her hands.

Week 10

Violence in Macbeth

This is seen throughout the play. It begins with a battle, contains the murder of men, women and children and ends with the suicide of Lady Macbeth and beheading of Macbeth. Macbeth learns that violence breeds violence; with each violent act he commits, he opens the door for someone to challenge his kingship with more violence. He ends up with nothing but his violent tendencies and his life becomes a destructive cycle.

Make sure that you are confident with the AO2 Subject Terminology – You need to know the definition and be able to identify it in a passage of text.

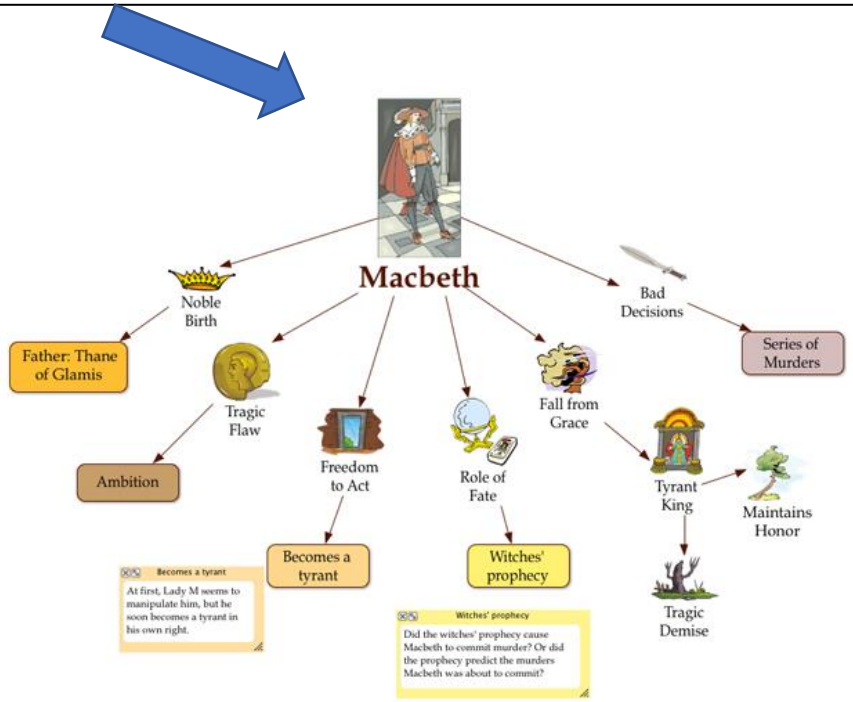
Learn quotes – You will need to memorise quotes for all your GCSE Literature exams. You also need to be able to analyse the quotes – comment on the Why it is significant, What it demonstrates about the character, How it affects the audience and How it develops the themes within the play.

Make sure you are confident with the plot and the characters. You should be able to explain how characters change in the text and their function.

Key Characters

(pick 1)
- ☐ Create a character sheet
- ☐ Create a mind map
- ☐ Plot their activities and actions
- ☐ Draw their picture using evidence from the play
- ☐ Write a letter home from their perspective
- ☐ Write a script between two characters
- ☐ Write what happens to a character after the play

Macbeth * Lady Macbeth * The Witches * MacDuff * Malcom



AO3 – Social Context – *(Influences on the book and author)*

Developing Cultural Capital - Themes

Read a newspaper article on a theme from the play that's linked to current events.

Tasks: (pick 1)
- ☐ Print them out and highlight literary techniques.
- ☐ Write a summary of the article
- ☐ Find two conflicting articles

Example:

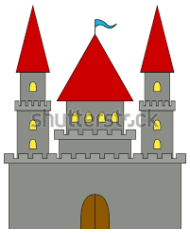
Supernatural – Modern witches. Representation of witches in literature (Harry Potter?)
Royalty – Any newspaper article about the Royal family
Scotland – Independence/ Laws/ identity
Goodness – Find an article about someone who was a hero (NHS workers)

PLACES IN THE PLAY:

Think about how Shakespeare use of places even though it's a play. Find descriptions, key chapters and events that link to the main places.

Battle Field Castle Witches' home Heath Banquet Hall

BIG WRITE: Write your own description of these locations



Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 1 – Tuesday 10th December 2024

Lesson 1 – What is urban?

Key Terms:

Urban: The characteristics of a town or city with a population of over 20,000 people.

Urbanisation: The increasing proportion of people living in cities.

Urban Sprawl: The growth of urban areas into the countryside.

Content:

Growth in urban population:

In 1800, only about 3% of the world's population lived in urban areas. By 1950 it was about 30%. In 2014 it reached 54%. By 2050, it is expected that 66% of the world's population will be living in urban areas.

Most large cities of Europe and parts of North America hit their current size by 1950 (HICs).

However, most of urban growth will be experienced in Sub-Saharan Africa, India and China and other Asian cities like Dhaka and Manila (LICs).

Urban growth examples:

Lagos (Nigeria): +85 people per hour
London (UK): +9 people per hour
Dhaka (Bangladesh): +74 people per hour
Tokyo (Japan): -1 person per hour
Manila (Philippines): +29 people per hour

Questions:

1. What is urbanisation?
2. What % of the world lived in urban areas in 2014?
3. Where is urban growth currently?
4. Calculate the difference between Lagos and London

Lesson 2 – Megacities

Key Terms:

Megacity: An urban area with a total population more than ten million people.

Content:

In 1990 there were 10 cities with more than 10 million inhabitants and these so-called "megacities" were home to 153 million people.

In 2017, the number of megacities has more than tripled to 37.

The world's biggest city by population is Tokyo (Japan), with a population of 37.4 million.

Recently, there has been a growth in megacities in Newly Emerging Economies (NEEs) and Low-Income Countries (LICs). Majority of these are found in Asia.

Examples of megacities:

Delhi (India) – 29.4 million
Shanghai (China) – 26.3 million
Dhaka (Bangladesh) – 20.3 million
Mumbai (India) – 20.2 million

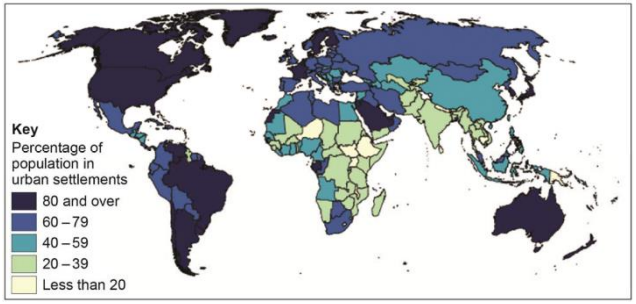
5. What is a megacity?
6. How many megacities were there in 2017?
7. What is the largest city by population in the world?
8. Where are most new megacities found?

Exam Question Practice

SENECA

AQA Geography: 4.1.1

Study the figure, a map showing the percentage of the population living in urban settlements in different parts of the world.



1. Describe **two** differences in the percentage of population living in urban settlements in Africa and South America (2 marks)

2. Suggest why an increasing number of megacities are located in lower income countries (LICs) or newly emerging countries (NEEs) (2 marks)

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 2 – Tuesday 17th December 2024		
Lesson 3 – Migration	**Lesson 4 – Natural Increase**	**Lesson 5 – Welcome to Lagos**
Key Terms: **Migration:** When people move from one area to another. **Rural to urban migration:** People moving from the countryside (rural) to the city (urban). **Push Factor:** Aspects of life that are negative and encourage or force people to move away. **Pull Factor:** Reasons that attract someone to somewhere.	**Key Terms:** **Birth rate:** Number of births per 1000 people. **Death rate:** Number of deaths per 1000 people. **Natural Increase:** The difference between the number of births and number of deaths. **Life Expectancy:** The average age someone is expected to live to in a certain area.	**Key Terms:** **Regional importance:** Significant within that specific city and surrounding areas. **National importance:** Significant to the nation/rest of the country. **International importance:** Significant to other nations/countries across the world.
Content: In many people in LICs/NEEs move from rural to urban. People have always moved whether it is to the next village or town (internal migration), or to a different country (international migration. **Examples of push factors:** • Lack of jobs • War • Poor schools and services • Poor environment **Examples of pull factors:** • Plenty of jobs • No war • Good schools and services • Good environment **Effects of migration on a city:** Positive – help the economy (fills jobs, more spending) Negative – puts a strain on resources (housing, healthcare)	**Content:** The rate of natural increase is given as a percentage, calculated by dividing the natural increase by 1000. For example, if the birth rate is 14 per 1,000 population, and the death rate is 8 per 1000 population, then the natural increase = 14 - 8 = 6. That is $^{6}/_{1000}$, which is equal to 0.6%. **Reason for natural increase:** Good healthcare – people live longer (increases life expectancy) increasing the proportion of people in urban areas, reducing death rate.	**Content:** In 1960 Nigeria gained independence from Britain and the capital was moved to Abuja. Lagos is Africa's biggest city. **Locations of Lagos:** • Coordinates – 6.5^{o} N, 3.3^{o} E • Southwest Nigeria • South from the UK (around 4000km) • Gulf of Guinea and Atlantic Ocean to the south of the city **Regional importance:** Good roads from Lagos connect it to other towns in the area, helping trade. **National importance:** Lagos contributes 30% to Nigeria's GDP and home to 80% of Nigeria's industry. **International importance:** Lagos is the main financial centre for the whole of the west of Africa. **Population growth in Lagos:** 1950 – 325,000 people. By 2020, increased to 16,170,000. Reasons are economic development (jobs/income), migration and natural increase.
Questions 1. What is migration? 2. What is the difference between push and pull factors? 3. Give 2 examples of push and 2 examples of pull factors 4. State a positive and negative effect of migration on a city	5. What is birth rate? 6. What is death rate? 7. What is natural increase? 8. Why does natural increase occur?	9. Where is Lagos? 10. How is Lagos important regionally? 11. How is Lagos important nationally? 12. How is Lagos important internationally?

k

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 3 – Tuesday 7th January 2025

Lesson 6 – Growth of Lagos

Key Terms:
Environmental: Relates to the natural world.

Cultural: Relates to ideas, customs, and social behaviour.

Political: Relates to Government and public affairs.

Social: Relates to people and their lives.

Content:
With the growth of Lagos' population, comes an increase in diversity, not only culturally, but politically, socially, and environmentally.
Cultural: Second largest film industry after India called "Nollywood"
Political: Free and fair elections since 2011 and has led to investment from China, USA, and South Africa
Social: Over 500 languages and hundreds of different ethnic groups such as Hausa, Yoruba and Lgbo.
Environmental: Nigeria spans several climatic regions, a tropical climate to the south and drier in the north.

People are moving from the rural north to Lagos. There are many factors that influence people wanting to move to Lagos.
Push factors (from rural north): poor education, poor healthcare and changing climate.
Pull factors (to Lagos): better economic opportunities (the choice of jobs and pay), better health care and better education.

Questions:
1. What does cultural mean?
2. State a cultural, political, social, and environmental feature about Lagos
3. State 2 push factors to from the rural north
4. State 2 pull factors to Lagos

Lesson 7 – Economic opportunities in Lagos

Key Terms:
Economic: Relates to money and business.

Formal employment: When workers receive a regular wage and pay tax.

Informal employment: When workers do not work regular hours and do not pay tax.

Content:
Economic benefits of Lagos' location:
Sheltered harbour for ships. Major international airport (Lagos Airport) – 80% of flights to West Africa with good road transport links into and out of the city.
Types of Industry in Lagos:
Primary: Extraction of raw materials e.g., farming, fishing, mining (3% in Lagos).
Secondary: Production and manufacturing of good from raw materials (78% in Lagos).
Tertiary: The service sector (19% in Lagos)
Quaternary: Research and development (0% in Lagos)

Lagos contributes approximately 30% of Nigeria's GDP. This is mostly through formal employment. There is a limit of formal jobs, so 40%, of Lagos' workforce are in the informal jobs, and 90% of new jobs are informal jobs (street sellers, shoe shining and car washing).
Olusosun Landfill: 500 people work here, picking out valuable items to sell. Some also live at the landfill site, building homes out of discarded materials.

5. What is the economic benefit of Lagos' location?
6. What % of different types of industry are in Lagos?
7. What is the difference between formal and informal employment?
8. State 2 facts about Olusosun Landfill

Exam Question Practice

SENECA **AQA Geography: 4.1.2**

Study the figure, a photograph of a rubbish dump in the Payatas slum in Manila, a city in the Philippines.

1. Suggest **one** opportunity for the people shown in the photograph (2 marks)

2. Outline **one** reason why rates of natural increase are high in many cities in LIC/NEEs (2 marks)

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 4 – Tuesday 14th January 2025		
Lesson 8 – Social opportunities in Lagos	**Lesson 9 – Challenges in Lagos (Urban Growth)**	**Lesson 10 – Challenges in Lagos (Environmental issues)**
Key Terms: **Social:** Relates to people and their lives. **Quality of Life:** The standard of health, comfort, and happiness experienced by an individual or group.	**Key Terms:** **Informal settlement:** An area of low-quality housing, lacking amenities such as a clean water, sewage systems and access to electricity. They often develop spontaneously and illegally. **Sanitation:** Measures designed to protect public health, including provision of clean water and the disposal of waste and sewage.	**Key Terms:** **Borehole:** A deep narrow hole made into the ground to locate and extract water. **Water table:** Level below which the ground is saturated (Filled with water). **Bus rapid transit system (BRT):** A high-quality bus-based transit system that delivers fast and efficient service. **Integrated transport system:** Road, rail and waterway networks link together to make journeys easier.
Content: **Education:** There are many more schools and universities in Lagos than you find outside the city. This means that the average number of years at school is currently around 9 years, a rise from 6 years in 1990. The more education means the greater chance of getting a better-quality job in growing industries such as finance, film, or fashion. **Health Care:** Health care is not always free; however, health care is available in Lagos. Life expectancy just below 47 in 2000 and risen to 55 in 2022. **Water Supply:** Some water supply is piped to homes and others use public taps, bore holes/wells, or buy it off a vender. **Energy:** 5 planned power stations to provide the city with electricity and street lighting. Generators used as backup.	**Content:** Mass migration into Lagos has created over population and a stress on housing, jobs, and sanitation. There is a severe lack of housing, and this has forced migrants to build homes on land and water. **Makoko - Floating informal settlement** Population around 250,000 people. Homes built on the edge of Lagos Lagoon and extended out onto the water, built on stilts, made from tin sheets and wooden planks. **Social challenges:** • 75% living in a one room home (5+ people per home) • 88% of people use a pit latrine • 38% of homes have no toilet, kitchen, or bathroom. • High crime levels – 'Area boys' control Makoko **Economic challenges:** • Many people work in the fishing industry, but the water is highly polluted. • Lack of education mean many have informal jobs.	**Content:** **Water supply in Lagos:** • Only 10% of the population have a piped/ tap water supply that has been treated and purified. • The rest of the population rely on water vendors or dig their own wells or sink boreholes to reach groundwater supplies that lie below the water table. • Sewage leaks into the water supply and diseases like cholera and dysentery. • 4% of the population drink the river water. **Transport in Lagos:** • BRT has dedicated bus lanes running from the suburbs to the city centre (CBD). • 200,000 people use the BRT service every day. • 'Danfos' large minibus taxis carry 20-30 people at a time. • Lagos Rail Mass Transit (LRMT) is a light railway service that carry 7 times more passengers than the BRT. • Waterway network of ferries around water areas. • A new airport on the Lekki Peninsula further away from the congested urban area.
Questions: 1. What is quality of life? 2. What is the benefit of more education? 3. How has healthcare impacted life expectancy? 4. How is water and electricity supplied in Lagos?	5. What is an informal settlement? 6. What is Makoko? 7. State 2 social challenges for those living in Makoko 8. State 2 economic challenges for those living in Makoko	9. What are bore holes and what is the water table? 10. How do most people in Lagos get water? 11. What is BRT? 12. How many people does the BRT transport each day?

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 5 – Tuesday 21st January 2025

Lesson 11 – Solution in Lagos (1)

Key Terms:
Urban Planning: The design of cities and other urban areas. It focuses on the management and use of land, infrastructure, architecture, and urbanisation.

Content:
Lagos is growing by about 600,000 people each year. This creates many challenges for how and where people live. Urban planning tries to solve these issues.

Makoko Floating school:
- Built in 2014
- Classrooms for up to 60 students
- Used as a community centre
- Unskilled workers were hired and trained to build the school
- Gives all residents a chance of education
- The school is designed to use renewable energy, recycle rainwater, and recycle waste

The design of the school could be used to help house the population of Makoko in the future.

Questions:
1. What is urban planning?
2. By how much is Lagos growing each year?
3. State 5 features of Makoko's floating school
4. How could the design of the school help the population of Makoko in the future?

Lesson 12 – Solutions in Lagos (2)

Key Terms:
Transnational Corporations: Companies that are controlled from their home country but has large operations in many different countries.

Multiplier effect: The 'snowballing' of economic activity. e.g. If new jobs are created, people who take them have money to spend in the shops, which means that more shop workers are needed.

Content:
Eko Atlantic is a new city being built outside of Lagos. Its aim is to be the new financial centre of West Africa. A 24 hour, green-conscious, world class city that attracts transnational corporations. It will consist of:
- 10 square kilometres reclaimed from the Atlantic Ocean.
- Home for 250,000 people and employ a further 150,000 people who will commute from Lagos.

Advantages:
- Offer new living space in an overcrowded city where space is rare.
- Stimulate the multiplier effect and attract more companies to Lagos.

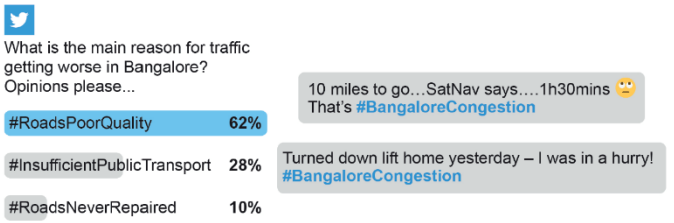
Disadvantages:
- Local fisherman in the Oni-Legi community will; have their livelihoods disturbed.
- Job created are not permanent and will not go to Lagos poorest.

5. What are transnational corporations?
6. What is Eko Atlantic?
7. State 2 advantages of Eko Atlantic
8. State 2 disadvantages of Eko Atlantic

Exam Question Practice

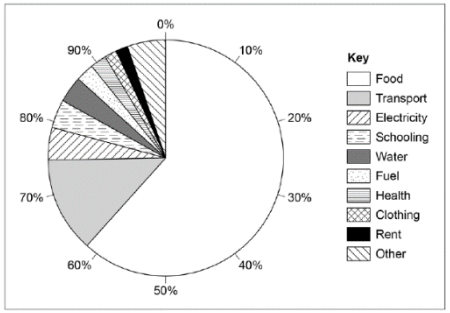
SENECA **AQA Geography: 4.1.2**

Study the figure, some social media comments about traffic in Bangalore, a city in India.



1. Using the figure, suggest **one** problem faced by people in Bangalore as a result of traffic congestion (2 marks)

Study the figure, a pie chart showing how a household in a lower income country (LIC) spends its money.



2. Describe the pattern of spending shown in the figure (2 marks)

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 6 – Tuesday 28th January 2025

Lesson 13 – UK Landscape

Key Terms:

Population distribution: How people are spread out. The population of the world is spread out very unevenly.

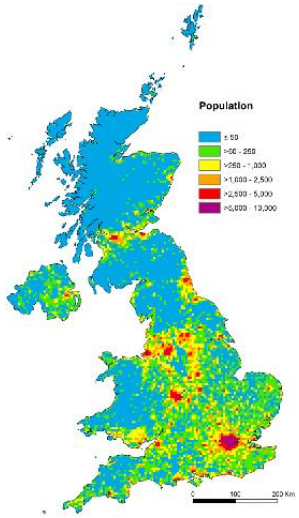
Densely populated: Areas have over 50 people per km^2.

Sparsely populated: Areas have less than 10 people per km^2.

Content:

Population distribution of the UK:

London: 8,907,918 people
Birmingham: 1,153,717 people
Glasgow: 612,040 people
Liverpool: 579,256
Manchester: 554,400
Bristol: 467,099



Changing UK population distribution

- General drift towards southeast England. London is one of the world's financial, business, and cultural centres.
- Immigrants generally settle in larger cities where there are more jobs.
- Movement from urban to rural areas. Increasing elderly population and people want to retire in the countryside.

Questions:

1. What is population distribution?
2. What is the difference between densely and sparsely populated?
3. Calculate the difference between London and Bristol
4. State 2 reasons the UK distribution is changing

Lesson 14 – Welcome to Bristol

Key Terms:

Region importance: Importance within that city area.

National importance: Importance of that city to the nation.

International importance: Importance of the city to other nations overseas.

Content:

Bristol has the largest population in the southwest at 440,500 and is expected to reach half a million by 2029.

Bristol importance:

Regionally:

- Several theatres and music venues.

Nationally:

- At least 45 religions practiced in the city including Christian, Sikh, Jewish, Buddhist and Hindu.
- UK's eighth most popular city for foreign visitors.

Internationally:

- High level of inward investment in manufacturing from Airbus and BMW.
- Two universities (University of Bristol and UWE) and students come to the city from all over the world.

Growth of Bristol:

Good connection to the rest of the UK (M5, M4, railway) and the rest of the world (airport and port).

5. Where is Bristol?
6. How is Bristol important regionally?
7. How is Bristol important nationally?
8. How is Bristol important internationally?

Lesson 15 – Migration Bristol

Key Terms:

Migration: When people move from one area to another.

International Migration: When people move from one country to another.

Economic migrant: When people move from one area to another to improve their standard of living.

Content:

People migrate from elsewhere in the UK and overseas to Bristol. In recent years international migration has accounted for about half of Bristol's population growth.

Most international migrants come from Poland and Somalia

Positive impacts of migration into Bristol:

- Improving workers skills, particularly where there were shortages, e.g. in health care.
- Migrants contribute to the local and national economy.
- Enriching cultural life in the city.
- Mainly young migrants help to balance an aging population.

Negative impacts of migration into Bristol:

- Pressures on housing and employment.
- Challenge of integration into the wider community.
- Providing education to children where English is not their first language.

9. What does economic migrant mean?
10. Where have most international migrants come from?
11. State 2 positive of migration on Bristol
12. State 2 negative of migration on Bristol

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 7 – Tuesday 4th February 2025

Lesson 16 – Socio-economic opportunities in Bristol

Key Terms:

Urban Change: Any change within an urban environment associated with growth or decline of an urban area.

Socio-economic: Relating or concerned with the interaction of social (people) and economic money) factors.

Content:

How is Bristol changing:

- Bristol's population is growing rapidly and ethnically diverse
- The network of motorways, road, rail, and air make it an accessible location
- Electrification of the rail line to London has reduced the journey time by 70 minutes
- There are more people under the age of 16 than pensionable age

Socio-economic opportunities in Bristol:

Shopping (Cabot Circus): New retail development has also provided offices, hotels, apartments, and a cinema.

Bristol Harbourside: Former workshops and warehouses have been converted into bars, nightclubs, and cultural venues.

Sport: 2 football teams (City & Rovers), rugby union team (Bears) and cricket ground. Stadiums provide a range of leisure and conference facilities.

Questions:

1. What is urban change?
2. State 3 ways that Bristol is changing
3. What is socio-economic?
4. State 3 socio-economic opportunities in Bristol

Lesson 17 – Environmental opportunities in Bristol

Key Terms:

Urban Greening: The increase the number of green spaces within a city.

Integrated Transport System: A transport system where all the different forms of transport can link to one another. Its transport network includes both private and public services.

Content:

In 2015 Bristol became the first UK city to be awarded a European Green Capital. This has involved:

- Increase use of renewable energy
- Increase use of brownfield sites for housing
- Create an Air Management Plan
- Improve energy efficiency

Urban Greening: More than third of Bristol is open space. 90% of the population live within 350m or some greenspace. There are 8 Nature Reserves and 300 parks. Green initiatives for the future include:

- 27% of city to be part of a wildlife network
- 30% of city to be covered with trees
- More wildlife in non-natural habitats (e.g. cemeteries)
- Areas of open water and meadows

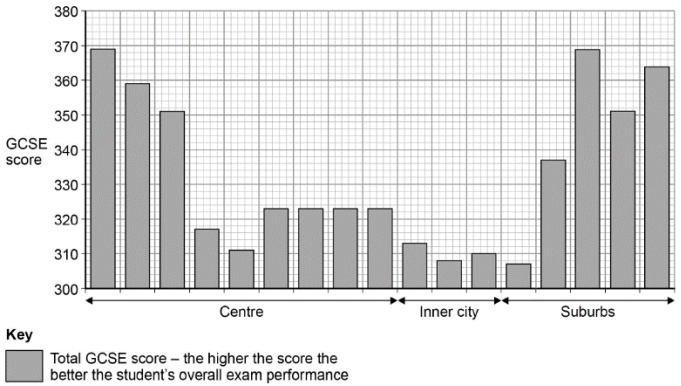
Integrated Transport System in Bristol: Rapid Transit Network (RTN) consists of 3 buses linking the main Temple Meads railway station with the city's park and ride. Will also link together the tram, metrobus and cycle network.

5. What is urban greening?
6. State 4 green initiatives for Bristol
7. What is an Integrated Transport System?
8. What Integrated transport system does Bristol have?

Exam Question Practice

SENECA **AQA Geography: 4.1.4 & 4.1.7**

Study the figure, a graph showing GCSE scores along a transect through a UK city.



1. Calculate the range in GCSE scores shown in the figure (1 mark)

2. Explain **one** economic problem caused by traffic congestion (2 marks)

3. Outline **one** way that international migration has led to change in the character of a named UK city (2 marks)

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 8 – Tuesday 11th February 2025		
Lesson 18 – Socio-economic challenges in Bristol	**Lesson 19 – Environmental challenges in Bristol**	**Lesson 20 – Urban sprawl in Bristol**
Key Terms: **Inequality:** Extreme differences between poverty and wealth. **Deprivation:** The degree to which an area is deprived of services and facilities. **Quality of life:** The standard of health, comfort, and happiness.	**Key Terms:** **Deindustrialisation:** A decline in the importance of industrial activity for a place. In practice, this means factories and warehouses close. **Dereliction:** A building or a piece of land is deserted or abandoned. **Waste disposal:** The management of garbage through a variety of methods.	**Key Terms:** **Urban sprawl:** The unplanned growth of urban areas into the surrounding countryside **Rural urban fringe:** Area where the city meets the countryside. **Greenfield:** An area of land in a rural location, or on the edge of an urban area that has nothing built on it. **Brownfield:** Land that has been used, abandoned, and now awaits a new use. Usually found in urban areas.
Content: There is great social variation in Bristol's population. Lack of investment within the city has led to many social inequalities between areas. Deprivation includes looking at variations in housing, education, and health. **Stoke Bishop (northwest of the city centre):** • Life expectancy – 78 years • Child poverty – 35.4% • Students achieving top GCSE grades – 34% • Unemployed – 33% • Satisfied with life – 66% **Filwood (southeast of the city centre):** • Life expectancy – 83 years • Child poverty – 5.7% • Students achieving top GCSE grades – 94% • Unemployed – 3% • Satisfied with life – 91%	**Content:** Changes in Bristol's economy and industry led to problems and challenges for the city's environment. Areas like, Stoke Croft have become derelict (abandoned) due to deindustrialisation. **Derelict (brownfield land) creates environmental challenges:** • Encourages anti-social behaviour (graffiti, litter, vandalism) • Areas become unsightly / ugly • Pollution can be a problem from previous activities **Waste disposal:** Bristol's population has grown by 9%, but amount of household waste reduced by 18% through: • Increased recycling to 50%. • Education in schools on benefits of recycling. • Technological improvements to recycling. 2004 – 87% landfill, 13% recycled and 0% energy recovered. 2012 – 23% landfill, 50% recycled and 27% energy recovered.	**Content:** The growing population in Bristol means more housing is needed. As a result, urban sprawl has started to take place on the rural-urban fringe. **Negative impacts of building on rural urban fringe**: • Increased congestion and road traffic • Reduction in open space areas, habitats, and ecology **Positives of this building on brownfield sites:** • Once run down (derelict) areas are improved • Crime rate decreases **Impacts of urban sprawl in North Bristol:** • Noise and air pollution increase during 20-year construction. • Areas of Bristol city centre left undeveloped (brownfield sites). • Pressure on local services (schools, doctors, dentists). • More people in the area will attract more businesses and employment.
Questions: 1. What does inequality and deprivation mean? 2. What has led to social inequalities in Bristol? 3. State 4 facts about Stoke Bishop 4. State 4 facts about Filwood	5. What is deindustrialisation and dereliction? 6. What environmental challenges does derelict areas create? 7. State 3 ways Bristol is reducing household waste 8. How has waste change between 2004 and 2012	9. What is urban sprawl? 10. State 2 negative impacts using the rural-urban fringe 11. State 2 positives of brownfield sites 12. State 3 impacts of urban sprawl in North Bristol

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 9 – Tuesday 25th February 2025

Lesson 21 – Bristol regeneration – Temple Quarter

Key Terms:
Regeneration: When an urban area is upgraded. The aim is to improve both the economic and social spaces within a city. This usually takes place when areas of dereliction, pollution or brown-field spaces are restored, or the area is used for new purposes.

Content:
Temple Quarter is located southeast of Bristol city centre.
Why was regeneration needed?
Industrial area in the 19th century. Decline in industry, became unused and rundown with derelict buildings.
Regeneration Process
- Just over 70 hectares (largest regeneration area in the UK)
- 17,000 jobs
- £100 million retained business rate growth
- £715 million contributed to the economy by 2032

What's there now?
Engine Shed: Home to hi-tech, create and low carbon industries. Used by over 44 companies.
Bristol Arena: Outdoor theatre & 40,000 people capacity with cafes, flats, and offices.
Temple Meads: Electrification of railway and shorter journey to London.
Temple Gateway: Green spaces along the river & parks.
Temple Gate: Direct road layout for various transport.

Questions:
1. What is regeneration?
2. Where is Temple Quarter and why did it need regeneration?
3. What was the process of regeneration in Temple Quarter?
4. What is there now in Temple Quarter?

Lesson 22 – Bristol regeneration – Harbourside

Key Terms:
Millennium Square: A paved area, occasionally used for community events and part of the @Bristol development.

Waterfront: Property or area of land which is immediately adjacent to the water and having direct access to a natural or man-made waterway such as a lake or river.

Content:
Harbourside is located to the southwest of Bristol city centre.
What happened to the harbour?
- Port 1800-1900s but ships got too big and couldn't fit
- Warehouses and storage facilities fell into disrepair
- Area closed off to the public
- Dereliction led to an increase in crime

Why did it the Harbourside need regenerating?
- Increasing crime
- Increase demand for housing
- Waste of usable space & prevent urban sprawl

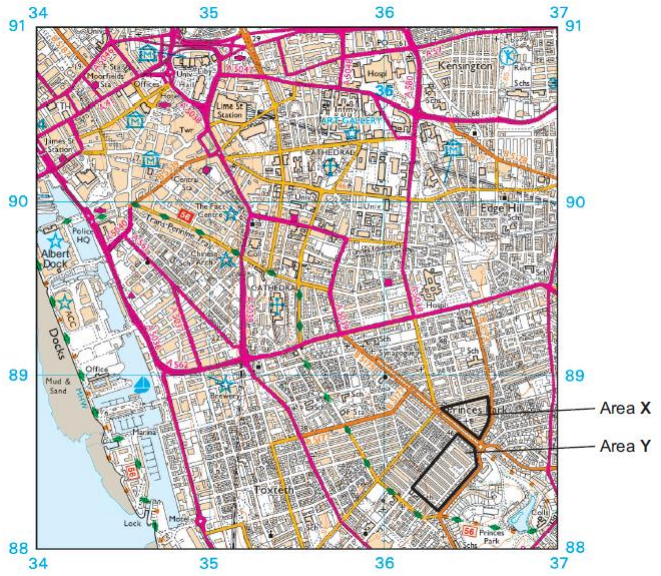
Features of regeneration of the Harbourside:
- £120 million over 15 years
- Millennium square
- Lloyds bank headquarters (3,000 jobs)
- Casino and leisure complex (restaurants and bars)
- High-specification apartments on the waterfront
- Social spaces for people

5. Where is the Harbourside in Bristol?
6. What happened to the harbour?
7. Why did the Harbourside need regenerating?
8. State 5 features of regeneration of the Harbourside

Exam Question Practice

SENECA **AQA Geography: 4.1.7 & 4.1.8**

Study the map below, a 1:25 000 Ordnance Survey map showing part of Liverpool, a city in the UK.



1. Give the four-figure grid reference for Albert Dock (1 mark)

2. Describe the location of Aera **X** (2 marks)

3. Outline **one** advantage of recycling waste (2 marks)

Year 10 Cycle 2 Geography Knowledge Organiser – Urban Issues and Challenges

Week 10 – Tuesday 4th March 2025		
Lesson 23 – Sustainable urban living – Masdar	**Lesson 24 – Sustainable urban living – Stratford**	**Lesson 25 – Sustainable transport – Curitiba**
Key Terms: **Sustainable:** Meeting the needs of today's population without compromising the needs of future generations. **Masdar:** A new sustainable city built 17km southeast of Abu Dhabi. **Pedestrianisation:** Areas of a city or town reserved for pedestrian (people)-only use and in which most or all traffic is banned.	**Key Terms:** **Stratford:** A town in east London and home to the Queen Elizabeth Olympic Park. **East Village:** Housing development in Stratford. Originally designed as the Olympic Village for the summer 2012 Olympics.	**Key Terms:** **Curitiba:** The capital city of the Parana state in Brazil, 1000km southwest from Rio De Janeiro. **Integrated Transport System:** A transport system where all the different forms of transport can link to one another. **Bus Rapid Transit (BRT) System:** A bus-based public transport system designed to have much more capacity, reliability, and other quality features than a conventional bus system.
Content: A sustainable city is one in which there is: • Minimal damage to the environment (Environment) • The economic base is sound with resources allocated fairly and jobs secure (Economic) • There is a strong sense of community, with local people involved in decisions made (Social) **Features of Masdar:** • Completely powered by renewable energy – a 54-acre field with 87,777 solar panels • Reducing waste to as close to zero as possible • Full pedestrianisation within the city and transport underground • Buildings designed to reduction in need for air conditioning by 55% • Motion sensors on lights cuts electricity consumption by 51% • Motion sensors on taps cuts water consumption by 55%	**Content:** **Features of East Village:** • **High density housing:** High standards of insulation and energy efficiency. • **Affordable and mixed size housing:** 1-bedroom apartments – four-bedroom town houses. • **Open space:** 27 hectares, 10 of which for parks and open space. Hundreds of planted trees and ponds. • **Shops and services:** 35 small independent shops, cafes, bars and restaurants, supermarkets, and a gym. • **Services:** New school (Chobham Academy) and a health centre. • **Transport:** Close to bus routes and a new local station. Good cycling and walking routes. • **Car parking:** Provided in each block but for a premium price. • **Green roofs:** On residential blocks – full of grass and small plants. • **Water recycling:** A system has reduced waste by 50%. • **Reduced energy:** Combined heat and power system reduce energy use by 30%.	**Content:** **Features of Curitiba's BRT System:** • Dedicated central bus lanes. • Buses coloured according to their function. For example, red is express with few stops. • 80% of travellers in Curitiba used the BRT. • Triple section bendy buses carry 2 million passengers a day. • Elevated glass boarding tube where people buy their ticket before getting on a bus – faster loading and unloading means less idling and cut bus travel times. • Peak times busses arrive every 60 seconds. • Bus fare is the same wherever you go. • No one lives more than 400 meters from a bus stop.  Boarding tubes with ticket machines inside Bus lanes separated from cars
Questions: 1. What does sustainable mean? 2. What are the 3 features of a sustainable city? 3. Where is Masdar? 4. State 4 features of Masdar?	5. Where is Stratford and what is the East Village? 6. State 2 social features of East Village 7. State 2 economic features of East Village 8. State 2 environmental features of East Village	9. Where is Curitiba? 10. What is an Integrated Transport System? 11. What is a BRT system? 12. State 6 features of Curitiba's BRT system

Knowledge Organiser – Topic 1: Crime and punishment 1000-1500 Anglo Saxon to Later Middle Ages

Key words

King's peace	Anglo-Saxons believed that it was the King's duty to take care of law and order, so people could go about their everyday lives knowing that the law would be upheld.
Treason	Betraying the king / plotting against the king
Collective responsibility	Being responsible for the actions of other members of your community. E.g. **Hue and cry and tithings.**
Wergild	Money paid to the relatives of a murder victim in compensation for loss and to prevent a blood feud.
Oath	A formal declaration of fact, calling on God to witness that what is said is true.
Maiming	A method of corporal punishment; a criminal could be punished by having an ear or hand cut off.
Retribution	A severe punishment that is meant to match the severity of the crime.
Deterrent	A punishment that is frightening or painful and designed to put other people off committing the same crime.
Poaching	Illegal hunting on land that belongs to someone else.
Brand	Make a mark on a criminal by burning their flesh with a hot iron. A long-term punishment by permanently marking the person as a criminal.
Clergy	People who work for the church.
Consecrated	Trial by consecrated bread was the same bread used in Holy Communions and was believed to be the body of Christ.
Sanctuary	In the Middle Ages some churches offered people accused of crimes protection from the law.

CASE STUDY – The Church

- **Benefit of the clergy** – Church tried people for moral crimes. Punishments from Church Courts were more lenient, as the Church wanted to give people the chance to reform.
- **Sanctuary** – Protection from the law was offered by some churches. Claim sanctuary in the church. Priest would report crime, but no one was allowed to arrest the accused. The accused would go to court or swear an oath agreeing to leave the country.
- **Trial by Ordeal** - Where the court couldn't decide….used GOD as judge. E.g. Trial by hot water, iron, bread. 1215 – Trial by Ordeal ended.

Key Events

1066	William I crowned king
1070	Murdrum fine introduced for killing Normans
1072	Forest Laws set aside land for royal hunting
1150-60s	Henry II tries to limit church's power over crime and punishment
1194	Richard I introduced coroners to investigate suspicious deaths
1215	Church forbids trial by ordeal
1327	Justices of the peace appointed for all areas
1476	First printing press set up
1494	Vagabonds and Beggars Act

Crimes	Law enforcement	Punishment
Against the person = murder, assault, public disorder, rape. **Crimes against property** = arson, theft, poaching. **Crimes against authority** = treason, rebellion. **NEW Crimes Normans** – Illegal to graze animals, kill wild animals, take wood.	**The King as law maker**. After **Henry II** became King in 1154, standard laws were written down- uniform legal system. Role of **community**. Tithings. Hue & Cry. Courts. Oaths. Trial by Ordeal. (Ended 1215) **Normans & Later Medieval** – Forest Laws. Murdrum fine. Trial by combat. Parish constables. JP's.	**Anglo Saxon** – Fines, compensation, Wergild. Corporal punishments. **Norman** – Capital & corporal punishments rose rapidly. Harsh punishments for breaking forest laws – castration, blinding, hanging. Wergild system – ended. Fines paid to the King. Minor crimes – whipping, fines, stocks. **Later medieval** – capital punishment decreased. Corporal punishments. Fines common.

Knowledge Organiser –Crime and punishment in early modern England 1500-1700

Key Words

Treason	The crime of plotting / acting to overthrow / harm the ruler / country.
Heresy	Having religious beliefs that were different to the official religion.
Poor Relief	Financial assistance for the poorest members of society.
Enclosed	Fenced off land for the use of landowners
Import duties	Taxes payable on goods imported into the country. Government began these at the beginning of the 17th century.
Capital crimes	A crime that is punished with the death penalty.
Transportation	Being sent away from England to serve a period of punishment in a colony abroad. E.g. America / Australia.
Colonies	New settlements in foreign lands.
Rehabilitate	Help someone return to normal life and society after they have committed a crime.
Superstition	Belief based on old ideas about magic rather than reason or science.
James I	Published his own book called Demonologie and saw the death penalty being given to anyone summoning spirits.
Night watchmen	Unpaid volunteers who take it in turns to patrol the local area between 10pm and dawn.
Town constable	Employed, have some powers to arrest and turn in serious criminals to the courts.

Key Dates

1534	Henry VIII declared himself Head of the Church of England
1542	Witchcraft Act makes witchcraft punishable by death
1559	Elizabeth's Act of Uniformity makes attending churches compulsory
1601	Poor Law
1601	Houses of correction set up in each country
1615	Transportation begin to North America
1642-51	English Civil War
1645-47	Matthew Hopkins and witch hunts
1688	Bloody Code: 50 crimes punishable by death

Crimes	Law enforcement	Punishment
Against the person & property =Vagabonds / vagrancy, petty thieves, poaching. **Crimes against authority** = Heresy & Treason. **NEW Crimes** – Vagabondage / Vagrancy, Smuggling, Witchcraft.	**Continuity** – Hue & Cry. No police force. **Watchmen** – Rang a bell to alert people. Volunteered. Patrolled streets between 10pm & dawn. **Town Constables** – Employed by authorities in towns. Could arrest suspects and take to JPs. In charge of watchmen. **Changes in the role of the Church** – Church becomes less powerful. Justice becomes more secular. All criminal acts tried in secular courts.	**Continuity** – retribution & deterrence . Fines, Pillory, stocks, flogging, maiming. Hanging. Burning – heresy. **THE BLOODY CODE (1688-1825)** – In 17thC number of crimes punishable by death increased. By 1688 – 50 capital offences. **NEW** = Transportation.

CASE STUDY – The Gunpowder Plot, 1605.

- Catholic plot to kill King James I. Publicly hanged, drawn, quartered.
- Received harsh punishments for treason.
- No police force – so harsh punishment to prevent crime.
- Period of political stability required harsh treatment as a deterrent.
- A harsh message to deter Catholics from rising up against the Protestant monarchy.

CASE STUDY – Matthew Hopkins & Witch-hunts 1645-47.

- During English Civil War – unstable.
- **REASONS FOR WITCH-HUNTS** – **Individuals** – James I obsessed with witches. **Social changes** – Civil War – many women widowed. **Lack of authority** – Civil War weakened control. **Economic problems** – poor harvests. **Religious change.**

MATTHEW HOPKINS – "Witchfinder General." Employed by a JP to find witches. Received money for each witch. 112 people hanged. Used torture to get confessions. Helped stir up mass panic.

Knowledge Organiser –Crime and punishment in early 18th and 19th century

Key Words

Decriminalisation of witchcraft	People no longer believed in witchcraft- this act had far less severe punishments.
Tolpuddle Martyrs	Formed an early form of trade union and were arrested and transported to Australia as a punishment for challenging authority.
Bow Street Runners	Established by Henry Fielding they introduced new methods of finding criminals and shared information on criminals.
Transportation	A method of punishment instead of execution; firstly to North America then to Australia.
Prison reform	Making prison conditions better to reduce reoffending by criminals.
Elizabeth Fry	A reformer who wanted to improve living conditions for prisoners, education for children in prisons and separate women and children from dangerous criminals.
John Howard	Wanted prisoners to change their ways by giving them better conditions in prisons. Wanted release fees to be abolished.
Robert Peel	Home Secretary and Prime Minister. Introduced Goal's Act and Metropolitan Police Act.
Pentonville Prison	Was built as a prototype prison where the 'separate system' could be implemented.
Highway Robbery	This developed during this time due to more opportunities.
Bloody Code	Abolished in the 1820s due to juries frequently being unwilling to find people guilty of minor crimes.
Poaching	A social crime that increased due to the Black Act. Many were poor, some made more money from poaching than they earnt in their day jobs and villagers often provided alibis and lied in court to protect poachers from conviction.

CASE STUDY – Pentonville Prison – built 1842.

- Built as a model for the separate prison system. Thick walls to prevent communication.
- The separate system encouraged isolation as a source of retribution, rehabilitation and deterrence.
- The separate system was an improvement, but led to mental illness and had limited effects on rehabilitation.

Key Dates

1719	Last known execution for witchcraft
1723	Black Act makes poaching game or damaging forest a capital crime
1736	George II passed decriminalisation of witchcraft Act
1778	Transportation to Australia introduced
1810	222 crimes are a capital offence
1823	Robert Peel's Gaols Act passed
1829	Robert Peel's Metropolitan Police
1850	Import taxes cut, large-scale smuggling reduced
1868	Capital Punishment Amendment Act ends public execution

Crimes	Law enforcement	Punishment
Increase in crimes e.g. street theft, burglary, disorderly behaviour. **Crimes against person** – Highway robbery. **Crimes against property** – Poaching, Smuggling. **Crimes against authority** – Tolpuddle Martyrs.	**Continuity** – **Watchmen & parish constables, Soldiers**. **Change** – **Bow Street Runners** 1749 by Henry Fielding. Paid by the government. First modern detectives. Mounted patrols. Shared information on crimes & suspects with others – network. **1829** – Metropolitan Police Act. **1842** – Detective department. **1856** – Police Act. **1878** – CID.	Imprisonment increased. Bloody Code was not working. **Transportation** to Australia. Ended 1868. **Prisons & Reformers** –John Howard. Elizabeth Fry. Robert Peel.

Knowledge Organiser - Crime and punishment in modern Britain 1900-present

Key Events

1	**1900**	Fingerprint branch set up at Met Police headquarters
2	**1900**	Borstals introduced
3	**1930s**	Police cars are quite common
4	**1965**	Death penalty abolished for most crimes
5	**1967**	Sexual Offences Act & Abortion Act passed
6	**1968**	Race Relations Act – illegal to discriminate due to colour
7	**1976**	Domestic Violence Act
8	**1980**	Police National Computer is capable of holding 25 million records of criminals
9	**1988**	First murder convictions based on DNA
10	**1991**	Law recognised rape within a marriage as a crime
11	**2000**	Terrorism act
12	**2006**	Racial and Religious Hatred Act

13. CASE STUDY – CO's

- A conscientious objector was a person who refused conscription for moral, religious or political reasons.
- The number of Cos increased from the First World War to the Second World War.
- Cos were treated better during the Second World War by the authorities, although public opinion was still negative.

14. CASE STUDY - Derek Bentley

- Derek Bentley was convicted of murder when, during a robbery, his accomplice shot and killed a police officer.
- Bentley was sentenced to death, despite not pulling the trigger and having severe learning disabilities.
- The public outcry led to a debate about whether the death penalty was a fair punishment.

Key Words

15	**Hate Crime**	Crime aimed at someone because of their gender, race or religion.
16	**Homophobic**	Crime against LBGT people because of their sexual orientation.
17	**Race Crime**	Crime against a person because of their colour.
18	**Domestic Violence**	Abuse in the home.
19	**Social crime**	Crime that is seen as acceptable; speeding, under age drinking.
20	**Terrorism**	Attacks on Britain by Al Qaeda/ISIS.
21	**People trafficking**	Form of smuggling, illegal immigrant or sexual working.
22	**Cyber Crime**	Committing a crime online.
23	**Fraud Squad**	Identity theft.
24	**Special Branch**	Deal with terrorism.
25	**Neighbourhood Watch**	Community policing.
26	**Derek Bentley**	Miscarriage of justice as he was falsely accused of murdering a police officer.
27	**Ruth Ellis**	Was hanged for murdering her abusive boyfriend.
28	**Borstals**	Strict boarding schools for young offenders.
29	**Conscription**	Had to fight in the war.
30	**Conscientious Objectors**	Refused to sign up for war; absolutist or an alternativist .

31. Crimes

Many crimes in modern Britain are updated versions of old crimes.

- Smuggling
- Cybercrime
- Terrorism
- Driving offences
- Drug crimes
- Hate crime

32. Law enforcement

Special police units – National crime agency, Economic Crime Unit, Special Branch.

Science & Technology – Radios, DNA, CCTV, computer networks, vehicles, fingerprinting.

Community policing – Neighbourhood Watch groups and Police Community Support Officers.

33. Punishment

Prison – open prisons / high security. Become more specialised & focus on rehabilitation rather than retribution.
New non-custodial punishments have developed as alternatives to prison.
The **death sentence** was last used in 1964, and completely abolished in 1998.

Whitechapel, c1870- c1900: Crime, policing and the inner city

Key Events

1875	Artisans' Dwelling Act
1878	CID established
1881	Peabody Estate opened
1887	Riots on Trafalgar Square. Called Bloody Sunday
1888	The Jack the Ripper murders, 31st August, 8th September, 30th September, 9th November
1890	Houses of the Working Classes Act
1890	Public Health Amendment Act

The Metropolitan Police	• The Metropolitan Police Force was set up to police the majority of London. A protest in Trafalgar square on 13 November 1887 led to a violent clash between protesters and police. • Attitudes towards the police varied. Many working-class people felt the police were against them.
The local context of Whitechapel	• People in Whitechapel lived in poor conditions and extreme poverty. • Jobs were scarce and the economy was in a depression. • Poor living conditions and discontent led to an increase in crime.
Tensions in Whitechapel	• Many Irish and Eastern European immigrants could only afford to live in Whitechapel. • An influx of different races and political ideologies caused tension within Whitechapel. • Tensions and differences often led to violence.
Organisation of policing in Whitechapel	• Professional criminals were often able to escape police. • The community generally did not cooperate with the police. • The Whitechapel Vigilance Committee of 1888 was a community police force set up in Whitechapel.
Investigative policing in Whitechapel	• The investigation of Jack the Ripper forced the police to develop new investigative methods. • Rivalries between police forces hindered the investigation. • The media helped the police obtain information, but much of the information was falsified.

Key terms/concepts

Criminal Investigation Department (CID)	CID developed new investigative techniques. E.g. House to house searches for evidence. Distributing leaflets and advertising in newspapers appealing for public information. Following up clues found at the crime scenes, postmortems and coroners' reports. Detailed annotated sketches of the crime scenes. Set up soup kitchens to encourage the poorest to come forward with information. Interviewed witnesses.
Commissioner Charles Warren	A former army general, was appointed Met Commissioner in 1886.
Bloody Sunday	A protest in Trafalgar square on 13 November 1887 led to a violent clash between protesters and police.
Rookeries	Most housing was located in these overcrowded slum areas.
Lodging Houses	Lodgers paid a nightly fee for a bed in squalid conditions.
Peabody Estate	18881 – in an attempt to improve housing, George Peabody built 11 blocks of flats with reasonable rents in a former slum.
Workhouses	Inmates had a bed and food in return for hard labour – most were elderly, ill, disabled, orphans or unmarried mothers.
Barnardo's homes	Cared for many young orphans, in better conditions than the workhouse.
Socialism	Socialism aimed to redistribute wealth and industry to the workers.
Anarchism	Anarchism opposed organized government.
H Division	Unit that policed Whitechapel.
Beat Constable	Constables that patrolled a set route of streets.
Brothel	A house where men visit prostitutes. By 1888, approximately 1200 prostitutes worked in brothels or on the streets.
The Vigilance Committee	The Vigilance Committee was set up due to the police's lack of progress catching Jack the Ripper. The committee offered a reward for information leading to the capture of the murderer. It patrolled the streets every night with torches and whistles. It disrupted the police investigation, but also hampered the police by sending false leads and encouraging criticism of the police in newspapers.
Bertillon System	A system used for identifying persons by means of a detailed record of body measurements, physical description, and photographs.

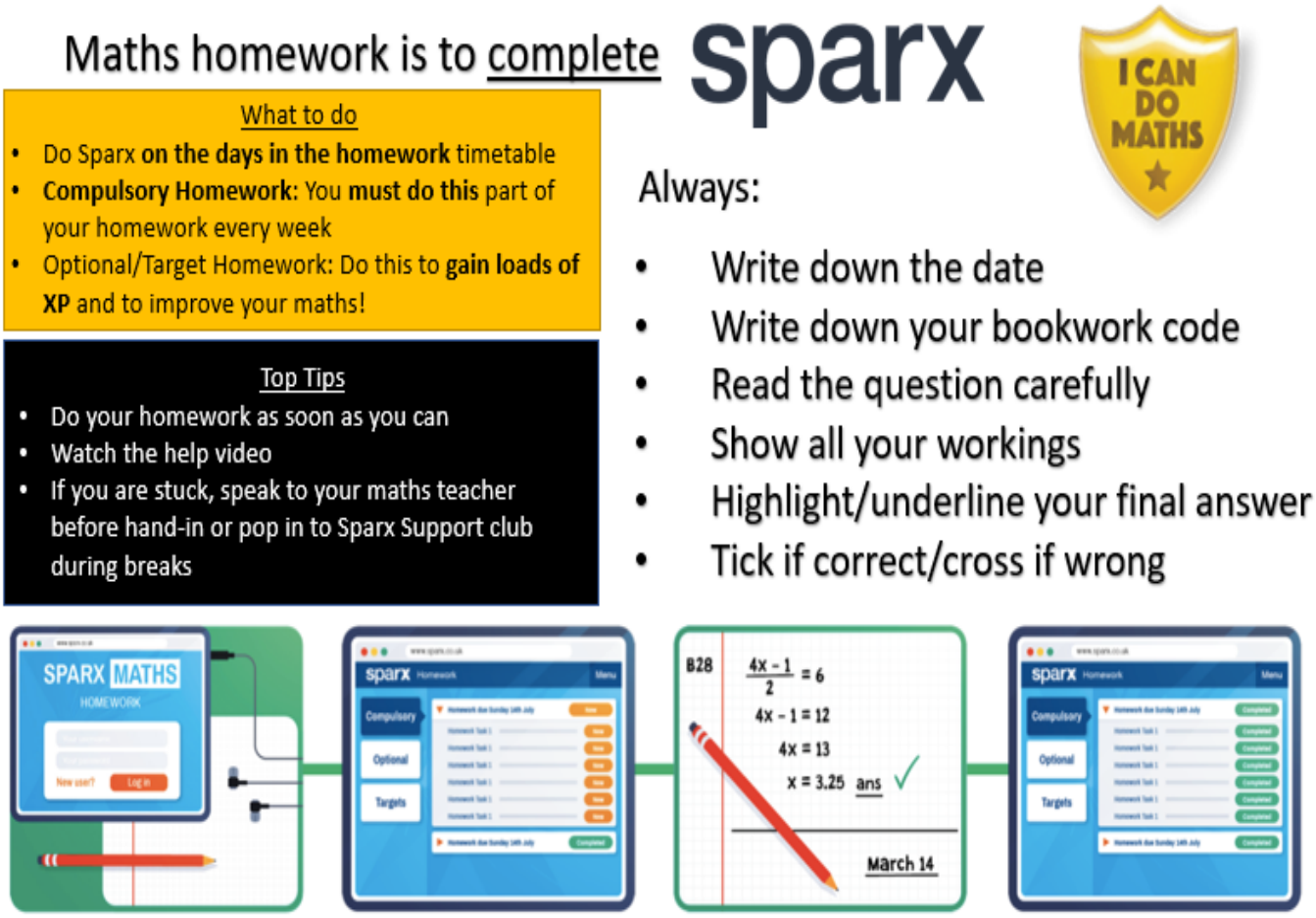
Year 10 Life Skills		
Lesson 1- Coping with change and building resilience	**Lesson 2- How our behaviour affects our mental health**	**Lesson 3- Intimate relationships**
Transition- the process or a period of changing from one state or condition to another. **Resilience-** the capacity to recover quickly from difficulties. **Anxiety**- a feeling of worry, nervousness, or unease about something with an uncertain outcome. **Building resilience:** - Staying connected to your friends and family, and talking about how you feel is a great way to help your emotional wellbeing - A healthy balanced diet can improve your mood and increase your energy levels. - Stay mentally active is also important; you can do this by completing any work set by your teachers and accessing online resources too - Exercise is important because your physical health has a big impact on how you are feeling - Getting enough sleep can help improve your mood **Websites:** Childline- Feelings and emotions YoungMinds- Feelings and symptoms Kooth https://www.healthforteens.co.uk/feelings/resilience/video-5-ways-to-build-resilience/	**Mental Health**- A person's condition with regard to their psychological and emotional well-being. **Stress**- A state of mental or emotional strain or tension resulting from adverse or demanding circumstances **Anxiety**- A feeling of worry, nervousness, or unease about something with an uncertain outcome. **Depression**- Depression is a constant feeling of sadness and loss of interest, which stops you doing your normal activities. Different types of depression exist, with symptoms ranging from relatively minor to severe. Generally, depression does not result from a single event, but from a mix of events and factors. **Emotional well-being** is the ability to produce positive emotions, moods, thoughts, and feelings, and adapt when confronted with adversity and stressful situations.	**Characteristics of a healthy one-to-one intimate relationship:** **Respect-** To feel admiration for someone/ something and to act in a way which shows that you are aware of someone's rights, wishes, etc. **Consent-** To give permission for something to happen or agreement to do something. **Loyalty-** The quality of being faithful to someone or something else. **Trust-** Trust is a feeling that somebody or something can be relied upon/ be truthful. **Shared interests-** Have the same tastes in hobbies/ interests/ sense of humour etc **Sex-** Sexual activity, including specifically sexual intercourse **Friendship-** People who are friends talk to each other and spend time together.

Lesson 4- Assertive Communication & Consent	Lesson 5- Changes and breakdown of relationships	Lesson 6-Sexual harassment and abuse
Peer Pressure- The pressure that you feel to behave in a certain way because your friends or people in your group expect it **Coercion**- The action or practice of persuading someone to do something they wouldn't normally do or something they don't want to do by using force or threats. **Assertiveness**- The quality of being confident and not frightened to say what you want or believe. **Sexual pressure** is when someone tries to make you feel like you should engage in sexual behaviour. **Sexual Consent- The giving of permission by a person to engage in any form of sexual activity including penetrative and oral sex.** **Sexting** is when someone sends or receives a sexually explicit text, image or video. This includes sending 'nude pics', 'rude pics', or 'nude selfies'. Taking, possessing or sharing a sexually explicit picture or video of someone under 18 is **against the law.**	**Emotions-** An emotion is a feeling such as happiness, love, fear, anger, or hatred, which can be caused by the situation that you are in or the people you are with. Your emotions are constantly changing all the time. You may feel different emotions at the start of a relationship, compared to at the end. **Grief-** Grief is a natural response to loss. The loss may be physical (such as a death), social (such as divorce), or occupational (such as a job). Emotional reactions of grief can include anger, guilt, anxiety, sadness, and despair. **Separation-** Separation means that you are living apart from your spouse but are still legally married until you get a judgment of divorce. Although a separation doesn't end your marriage, it does affect the financial responsibilities between you and your spouse before the divorce is final. **Divorce-** A divorce happens after a married couple decide not to live together anymore and that they no longer want to be married to each other. They agree to sign legal papers that make them each single again and allow them to marry other people if they want to.	**Sexual harassment-** Sexual harassment is any unwanted behaviour of a sexual nature that makes you feel distressed, intimidated or humiliated. **Sexual harassment can include:** - someone making sexually degrading comments or gestures your body being stared or leered at - being subjected to sexual jokes or propositions - e-mails or text messages with sexual content - physical behaviour, including unwelcome sexual advances and touching - someone displaying sexually explicit pictures in your space or a shared space, like at work - offers of rewards in return for sexual favours **Online harassment-** Internet harassment, also referred to as "cyberbullying", is the term used to describe the use of the Internet to bully, harass, threaten, or maliciously embarrass. **Challenging prejudice and discrimination:** The Equality Act (2010) provides a legal framework to protect the rights of individuals and advance equality of opportunity for all. It provides Britain with a discrimination law which protects individuals from unfair treatment and promotes a fair and more equal society. It makes all people equal in regard to sex, age, race, sexuality, religion, disability (this means the same laws apply to everyone).

Y10C2 Key Maths Knowledge

Your Maths Homework is to complete your sparx

Use this guide to make sure you know **what to do, when to do it and how to do it**:



We want you to do well with your maths and doing Sparx will help.

If you've tried something, watched the video and are still not sure how to do something make sure you ask for help!

You're expected to complete it every week and catch up if you haven't.

Your Maths Homework is to complete your sparx

Y10IC2 Key knowledge

Item	Description
Bivariate	Involving or depending on two variables. Eg. A data set containing height and weight for a group of people would be called bivariate data.
Correlation	A relationship or connection between two things.
Positive correlation	A pattern on a scatter graph that has a positive gradient.
Negative correlation	A pattern on a scatter graph that has a negative gradient.
Interpolation	Estimating a value that falls **within** the range of data on a scattergraph.
Extrapolation	Estimating a value that falls **beyond** the range of data on a scattergraph.
Sine rule	$\frac{a}{sin(A)} = \frac{b}{sin(B)} = \frac{c}{sin(C)}$
Cosine rule	$a^2 = b^2 + c^2 - 2bccos(A)$
Area of a triangle (1)	$Area = \frac{1}{2} \times base \times height$
Area of a triangle (2)	$Area = \frac{1}{2}absin(C)$
Difference	The difference between the terms in a sequence
Arithmetic or Linear sequence	A sequence of numbers formed by adding or subtracting. Eg. 2, 12, 22, 32…
Geometric sequence	A sequence of numbers formed by multiplying or dividing. Eg. 3, 6, 12, 24…
Speed (1)	$Average\ speed = \frac{Distance}{Time}$
Speed (2)	Speed is the gradient of a Distance-Time graph.

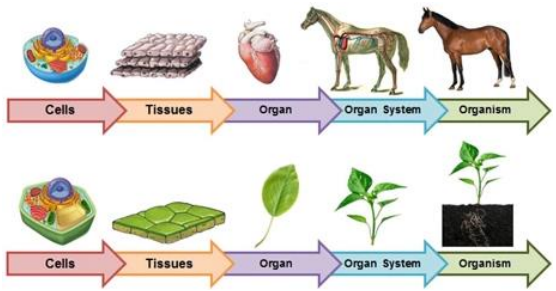
RPE– Unit 2 - Religion, Crime and Punishment

Key Words			
Community Service	Working in the community to pay back for a criminal act	**Hate Crime**	A crime motivated by hatred e.g. racism, homophobia
Corporal Punishment	Using physical pain as a punishment	**Poverty**	Not having enough money to be able to live a comfortable life
Crime	An action which is against the law and incurs a punishment	**Prison**	A place where criminals are sent to withdraw their freedom as punishment
Death Penalty	A form of punishment where the offender is killed for their crime	**Punishment**	Something negative done to criminals by the state
Deterrence	An aim of punishment – preventing future criminals by harsh treatment of offenders	**Reform**	An aim of punishment – to try and reform criminals
Forgiveness	To show mercy and pardon someone for what they've done wrong	**Retribution**	An aim of punishment – seeking a form of revenge on criminals

Key Ideas			
Christian Attitudes to Crime 	**Good and Evil Intentions** The Bible warns Christians against having **evil** thoughts which lead to evil actions. Avoiding sin and temptation steers Christians away from crime. Christians would be more willing to treat an offender who had good intentions with more **mercy** than one who acted out of evil intentions.	**Attitudes to Lawbreakers** Christians do not believe that people are evil, but that people can be **tempted** to do wrong and break the law. Christians are taught to "love the sinner, hate the sin" which means they should **forgive** and show mercy to people who have done wrong but admitted their mistakes and sought **atonement**.	
Reasons for Crime 	People are tempted to commit crime for a wide range of reasons including **poverty** (not having enough money or food), **upbringing** (where people are not taught right from wrong), **addiction** (some people commit crimes to feed an addiction), **greed** (committing crimes out of a desire for things they cannot afford), **hatred** or out of **opposition to unjust law** (breaking the law to oppose hateful or unjust laws)		
Three Aims of Punishment 	**Deterrence** This aim of punishment seeks to **use punishment as a message** to others considering committing crime. By giving one criminal a harsh punishment, others may be put off committing a similar crime.	**Reformation** This aim of punishment seeks to help criminals **change their behaviour for the better**. It may involve therapy, education or training. Many Christians support this as a form of 'love your neighbour' **mercy**.	**Retribution** This aim of punishment is society getting its own back on the offender. The Old Testament says **'an eye for an eye'** so some Christians would argue that this form of punishment is just according to the Bible.
Forgiveness 	**Forgiveness** is at the heart of Jesus' teaching. It means to show **mercy** and pardon someone for what they have done wrong but showing someone forgiveness does not mean they should be justly punished for their crimes. When Jesus was crucified, he forgave those who sentenced him to death and crucified him saying: **'Father forgive them, for they know not what they do'**. Forgiveness leads Christians to support **reformation** as an aim of punishment as it allows the criminal to be forgiven and to ask for forgiveness. They also use forgiveness as an argument against the death penalty.		
Christian Attitudes to Punishment 	**Prisons** Many Christians believe prisoners should be **treated well** when in prison as even though they have done wrong they do not believe in evil people as much as evil actions. Some Christians campaign for better prison conditions out of mercy.	**Corporal Punishment** Most Christians do not support using physical pain as a form of punishment as it is **harmful** and **negative**. It is currently illegal in the UK and many Christians would rather seek to reform a criminal than punish them in this way.	**Community Service** Many Christians argue in favour of community service where criminals work to **repay** their community as a punishment. It allows criminals to make up for what they have done and does not harm the offender in the process.
Death Penalty 	The **death penalty** means the state killing criminals who have committed the worst crimes. It has not been used in the UK since 1969 but is still a punishment elsewhere in the world. ☑ Some Christians argue that the death penalty is a just punishment for murder as the Bible says both 'you shall not kill' and **'an eye for an eye'**. ☑ They may also argue that it **deters** criminals from committing the worst crimes and keeps people safe. ☒ Other Christians argue that the death penalty goes against **sanctity of life**. Life is sacred and holy and only God can give and take life. ☒ They might also argue that the death penalty goes against the aim of **reformation** as a dead criminal cannot be reformed, forgiven or shown mercy to.		

Revision Guide: Foundation pages 24-41, Higher pages 24-42

Lesson 1 Organisational Hierarchy



Cell:
The smallest unit of an organism

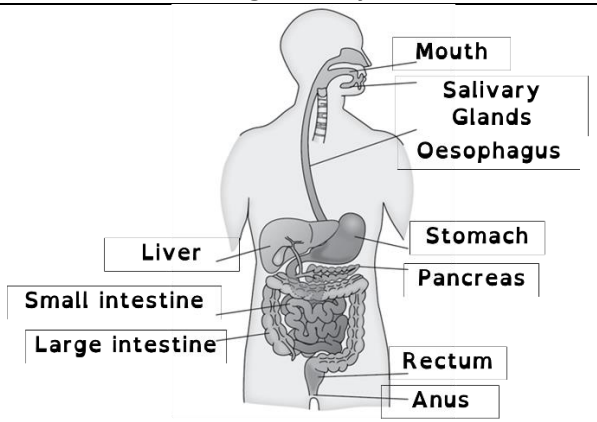
Tissue:
A group of cells with a similar structure and function, which all work together to do a particular job.

Organ:
Made from a group of different tissues, which all work together to do a particular job.

Organ system:
Made from a group of different organs, which all work together to do a particular job.

Organism:
An individual plant, animal, or single-celled organism.

Lessons 2 & 3 The Digestive System



Function:
Digestion: breaking down food so that it is small enough and soluble enough to pass through the wall of the small intestine.
Absorption: transporting digested food molecules from the lumen of the gut into the blood.

The small intestine is adapted to absorb food:

- Thousands of villi
- Large surface area – quicker absorption of food molecules
- Good blood supply

Lesson 4 Required Practical- Food Tests

1. Benedict's test for sugar

Add 10 drops of Benedict's solution to food sample.
Heat in a water bath at 80°C for 5 minutes.
Negative result – Blue
Positive result – Green/ orange/ brick red

2. Iodine test for starch

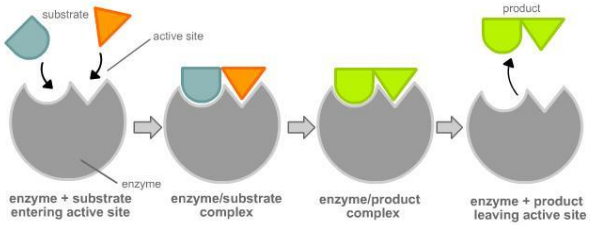
Add 5 drops of iodine solution to food sample.
Negative result – Orange
Positive result – Blue/black

3. Ethanol test for lipids (fats)

Add a few drops of distilled water and then a few drops of ethanol to food sample.
Positive result – white & cloudy emulsion forms

4. Biuret test for protein

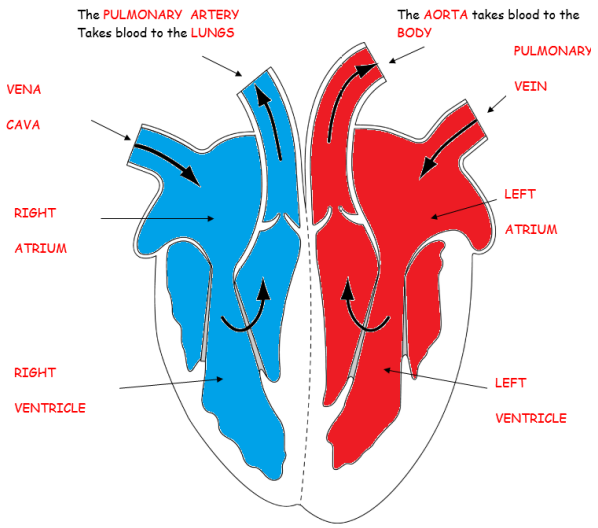
Add 5 drops of Biuret solution to food sample.
Negative result – Blue
Positive result – Purple

Lesson 5 Properties of Enzymes	Lesson 6 Required Practical - Enzymes	Lesson 7 Digestive Enzymes
Catalyst: A chemical which speeds up a reaction without being changed or used up. **Enzyme:** • A substance produced by a living organism that acts as a catalyst for chemical reactions. It is made up of amino acids. • Enzymes are **specific**, they can only catalyse one type of reaction. E.g. amylase in saliva only catalyses the reaction of breaking down starch. **Lock and Key Theory of Enzyme action:**  In the same way that a key fits into a lock, so a substrate is thought to fit into an enzyme's active site. The enzyme is the lock, and the substrate is the key.	**The effect of pH and temperature on enzymes:** • A low or high pH **denatures** enzymes. • At a low temperature enzyme and substrate molecules have low kinetic energy so rate of reaction is low. • At a high temperature the enzymes start to denature. **Denatured**: An enzyme's active site has changed shape, the substrate will no longer fit. The enzyme will no longer work. **Aim:** to find the optimum pH for the enzyme amylase to catalyse the reaction to break down starch. **Independent variable**: pH of the solution **Dependent variable**: time taken to break down starch in seconds **Control variables**: temperature, volume of starch solution, volume of buffer solution, time of intervals between testing, volume of amylase **Calculating rate of reaction:** Rate = $\frac{1000}{Time}$ Units = s^{-1}	Food molecules must be broken down before they can be absorbed into the blood because they are too **large** and **insoluble.** **Carbohydrate digestion** Carbohydrase enzymes e.g. amylase break down starch into sugar. **Protein digestion** Protease enzymes break down protein into amino acids. **Fat digestion** Bile emulsifies fats Lipase enzymes break down fat molecules into glycerol and fatty acid molecules.

Lesson 8
The Heart

- An organ that pumps blood around the body
- It is made of two pumps – **double circulation.**
- The walls of the heart are made up of **cardiac muscle**.
- The right side pumps blood to the lungs to pick up oxygen.
- The left side pumps blood around the rest of the body.

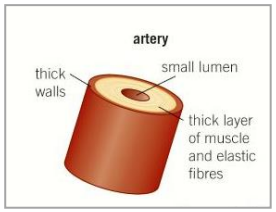
Oxygenated: Blood high in oxygen
Deoxygenated: Blood low in oxygen



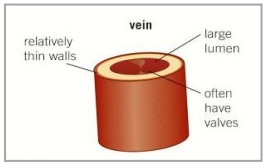
Lesson 9
Blood Vessels

There are 3 types of blood vessel:

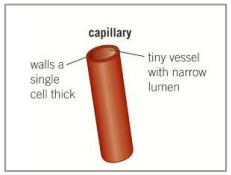
1. **Arteries**
   Carry blood away from the heart to the body.
   Usually hold oxygenated blood.
   Blood is under high pressure.
   Thick muscle walls and a small lumen.



2. **Veins**
   Carry blood back to the heart from the body.
   Carry deoxygenated blood.
   Blood is under low pressure.
   Thin muscle and elastic wall.
   Have valves to prevent back flow of blood.



3. **Capillaries**
   Carry blood to cells.
   Links arteries and veins
   Very thin walls – one cell thick
   Small vessel
   Narrow lumen



Lessons 10 & 11
Coronary Heart Disease (CHD)

Coronary arteries:
The blood vessels that supply oxygenated blood to the heart muscle.

Coronary heart disease (CHD):
When the heart's blood supply is blocked or interrupted by a build-up of fatty substances in the coronary arteries.

Stages of CHD:

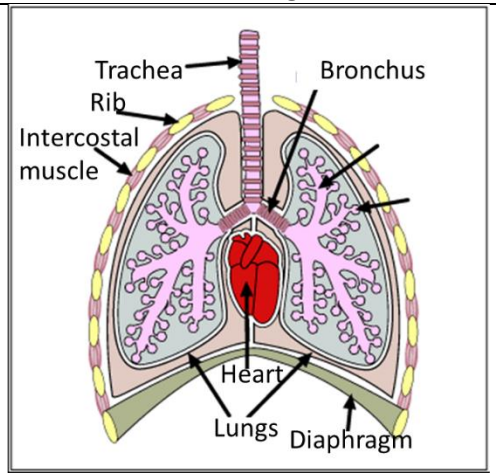
- Fatty cholesterol plaques develop over time
- Hard outer layer of plaque can crack
- Platelets form blood clots around the cracks
- Artery narrows even more
- Blood flow blocked – oxygen doesn't reach the heart muscle, so the muscle dies.

Treating CHD:

- **Stents** –a metal mesh placed in a blocked or partially blocked artery. They are used to open up the blood vessel by the inflation of a tiny balloon.
- **Statins** – drugs used to lower blood cholesterol levels and improve the balance of HDLs and LDLs in the blood.

Treating heart failure:

- Heart transplant
- Artificial heart
- Replacement valves

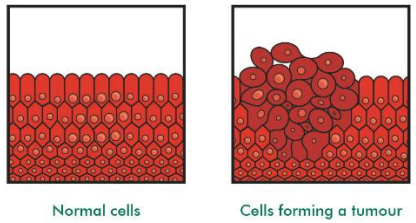
Lesson 12 Blood	Lesson 13 Lungs	Lesson 14 Non-Communicable Diseases
Functions of blood: • Transports oxygen and nutrients to cells • Transports carbon dioxide from cells back to lungs • Transports waste products from cells • Transports heat, water, slats, white blood cells and hormones around the body. **Components of blood:** **Red blood cells** • Carry oxygen. • Biconcave shape to absorb oxygen • No nucleus **White blood cells** • Fight disease • Some carry out phagocytosis • Some produce antibodies & anti-toxins **Platelet**s • Cell fragments • Stick cells together around cuts to clot blood. **Plasma** • Liquid part of blood • Substances dissolve into plasma such as carbon dioxide, glucose and proteins	 The job of the breathing system is to move air in and out of the lungs. • Breathing air into the lungs= inhalation • Breathing air out of the lungs = exhalation **Gas Exchange:** • Gas exchange occurs in the alveoli of the lungs. • Here oxygen passes into the blood by diffusion. • At the same time carbon dioxide passes from the blood into the alveoli to be breathed out. • Alveoli are adapted for efficient gas exchange by having: a large surface area, thin, moist membranes and a good blood supply.	**Health:** A state of mental physical wellbeing **Non-communicable disease:** • A medical condition or disease that is non-infectious (cannot be passed on from one person to the next) • E.g. Cardiovascular disease, diabetes, asthma **Causes of non-communicable disease:** Combination of genetic and environmental factors. Lifestyle factors such as smoking, alcohol abuse, unhealthy diets and physical inactivity. **Risk factors for non-communicable diseases:** • Cardiovascular disease – Obesity, poor diet, smoking, physical inactivity. • Type 2 diabetes – Obesity, poor diet, physical inactivity. • Lung disease – smoking • Cancer – Poor diet, obesity, smoking, alcohol abuse, UV exposure, physical inactivity **Correlation:** A correlation shows a link between two variables, for example one may increase whilst the other also increases. **Causal mechanism:** A causal mechanism proves the link between the two variables through a biological process. For example, there is a causal link between smoking and getting lung cancer.

Lesson 15
Cancer

Risk factors for cancer:

- Genetics
- Carcinogens e.g. asbestos, tar in tobacco smoke
- Ionising radiation e.g. UV light, X-rays, radioactive materials, nuclear disasters
- Viral infections e.g. HPV causing cervical cancer

Tumour:
A mass of cells caused by uncontrolled cell growth and division.
Most cancers are the result of mutations – changes in genetic material



Two types of tumour:

1. **Benign** – Not cancerous, the tumour stays in one place.
2. **Malignant** – Tumour grows and spreads to other tissues. Cells can break off and travel in the bloodstream to infect other tissues.

Lessons 1 & 2 Classification and Evolutionary trees	Lessons 3 & 4 Communities and Abiotic & Biotic factors	Lessons 5 & 6 Required practical lessons: Measuring distribution using a quadrat and a transect line
Classification: the organising of living organisms in to groups. 1st classification system, proposed by Carl Linnaeus, was based on structure and characteristics. Classification makes the **study** of organisms easier, provides information about **evolution** and a **common language**. Classification ladder: **Kingdom, phylum, class, order, family, genus and species** **Binominal name**: all organisms have unique binominal names, made up of its genus and species Developments in biochemistry, microscopy & genomic science, domain level added above kingdom by Carl Woese. There are 3 domains: **Bacteria, Eukarya and Archaea.** **Evolutionary tree**: diagrams which show how species are related to one another. They show common ancestors and relationships between species. Developing evolutionary trees: where organisms are living, evidence comes from DNA analysis and structural similarities. The fossil record is used for extinct organisms.	**Habitat**: where an organism lives **Population**: All the organisms of a certain species living in an area **Biotic**: Living things in an environment **Abiotic**: Non-living factors in an environment **Ecosystem**: The interaction of a community of living organisms (biotic) with the non- living parts (abiotic) of the environment. **Community**: The populations of different species living in a habitat. The survive a plant needs the following: Space, sunlight, carbon dioxide, water and minerals To survive an animal needs the following: Mates, prey/food, space, water and oxygen. Animals and plants have to compete with each other for limited resources. Those individuals that are the best adapted will win, survive and reproduce. **Interdependence**: Species depending on each other. **Stable community:** A community where all the species and environmental factors are balanced so that the population size remains constant.	**Distribution of organisms**: How organisms are spread out in an environment. **Quantitative data** on the distribution of organisms can be obtained by random sampling with quadrats or sample along a transect using a quadrat. **Quadrat**: Small frame which gives a snapshot of an area and the organisms that live there. **Transect line:** Used to investigate how the distribution of organisms change along a set direction e.g. with increasing distance from a tree. Allows the identification of patterns. Physical factors can affect the distribution of organisms including: Water, light, nutrients, oxygen, carbon dioxide, and temperature.

Lessons 7 & 8 **Adaptation and levels of organisation**	**Lessons 9 & 10** **The water and carbon cycle**	**Lessons 11** **Global Warming**
Animals and plants are <u>adapted</u> to the environment in which they live. Adaptations can be **Structural**: Features of the organism's body structure e.g. shape and colour **Behavioural**: Ways in which the organism behaves e.g. migration **Functional**: Things that go on inside the body of the organism that can be related to processes e.g. reproduction and metabolism. **Extremophile**: An organism that can survive in extreme environments, e.g. hot spring, high salt conditions and high pressure **Food chain:** A diagram which shows the feeding relationships of organisms **Herbivore**: An animal that only eats plants **Prey**: the name given to any animal that is eaten by another animal **Producer**: At the start of a food chain, makes it own food by photosynthesis **Food chain**: Diagram to show feeding relationships **Consumer**: An organism that gets food by eating other organisms **Carnivore**: An animal that eats other animals **Biomass**: The mass of all material in an organism, not including the water	**Water cycle:** The process of moving water through the environment **Precipitation**: Any form of water falling from the clouds **Condensation**: When water vapour cools and turns in to clouds **Evaporation**: When the sun heats up water from the sea and it goes in to the air. **Groundwater flow:** When water flows through rocks and soil underground **Surface run-off**: When the water run over the surface of the ground **Transpiration**: When the sun heats up water frim the leaves of trees **Infiltration**: The process of water soaking in to the ground **Carbon cycle:** The process of moving carbon through the environment <u>Key steps of the carbon cycle</u> **Respiration**: The process animals and plants use glucose and oxygen to release energy, carbon dioxide and water **Photosynthesis**: The process by which plants use carbon dioxide and water and make glucose and water. **Combustion**: The process of burning which releases carbon dioxide and water **Decomposition/decay**: The process of rotting and releasing mineral ions and carbon dioxide.	**Global warming**: The increase in the average temperature of Earth **Greenhouse effect:** Gases in the atmosphere naturally act like an insulating layer, absorbing heat energy that would be reflected back in to space. **Enhanced greenhouse effect**: The result of increased greenhouse gases, more heat energy is trapped, which warms the surface of the earth. **Greenhouse gases**: Carbon dioxide, methane, water vapour **Consequences of global warming**: Ice caps melt, sea level rise, flooding, extreme weather, changes to animal and plant distribution, changes to migration patterns and decreases biodiversity.

Revision Guide: Foundation pages 128-133, Higher pages

Lessons 1 & 2
Reactions of metals & Displacement

The **reactivity series** of metals is a **list** showing metals in order of decreasing **reactivity**.

Metal	Reaction with cold water	Reaction with dilute acids	Reactivity
Potassium	Violent	Violent	Most reactive
Sodium			
Lithium			
Calcium	Fast	Rapid	
Magnesium	Very slow		
(Carbon)			
Zinc	Usually no reaction	Slow	
Iron	Rusts slowly		
(Hydrogen)			
Copper	No reaction	No reaction	
Gold			Least reactive

When metals react, they lose electrons to form positive ions , (cations).

When a metal reacts with water, a metal hydroxide and hydrogen are formed. For example, sodium reacts rapidly with cold water:

$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

When a metal reacts with a dilute **acid**, a **salt** and hydrogen are formed. For example, magnesium reacts rapidly with dilute hydrochloric acid:

$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$

Many **metals** react with oxygen to make metal oxides. For example, magnesium burns rapidly in air:

$\mathbf{2Mg(s) + O_2(g) \rightarrow 2MgO(s)}$

The reactions are **oxidation** reactions because the metal gains oxygen.

Displacement: Moving a something from its place or position and occupying the space with something else.

A more **reactive** element can **displace , (take the place)** of a less reactive element from its **compounds**.

Lessons 3 (higher)
Ionic Equations

First: write the balanced symbol equation.

$Mg(s) + CuSO_4(aq) \rightarrow MgSO_4(aq) + Cu(s)$

Second: write the equation in terms of the ions

$Mg(s) + Cu^{2+}(aq) + SO_4^{2-}(aq) \rightarrow Mg^{2+}(aq) + SO_4^{2-}(aq) + Cu(s)$

Third: Remove the **Spectator** Ions, (these are the ions that have not changed). SO_4^{2-} is the Spectator ion.

Ionic Equation: $Mg(s) + Cu^{2+}(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$

This equation is an example of a balanced **ionic equation**. It can be split into two **half equations** :

$Mg(s) - 2e^- \rightarrow Mg^{2+}(aq)$ (Oxidation)

$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$ (Reduction)

•

Lessons 4
Extraction of Metals

An ore is a rock that contains enough of a metal or a metal compound to make extracting the metal worthwhile.

Some **unreactive** metals can be found as **elements**. They are called **native** metals.

If a metal is less **reactive** than carbon, it can be extracted from its compounds by heating with carbon, (**reduction with carbon**).

If the metal is more reactive than carbon, **electrolysis** is used. This uses electricity to separate the metal form its ore.

If a metal is less **reactive** than carbon, it can be extracted from its compounds by heating with carbon.

Copper is an example of this:

$2CuO(s) + C(s) \rightarrow 2Cu(l) + CO_2(g)$

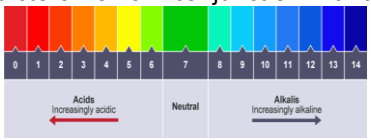
Copper oxide is **reduced** as carbon is **oxidised**, so this is an example of a **redox** reaction.

Iron(III) oxide is reduced to molten iron when it reacts with carbon. One of the products is carbon monoxide:

iron(III) oxide + carbon → iron + carbon monoxide

$Fe_2O_3(s) + 3C(s) \rightarrow 2Fe(l) + 3CO(g)$

Aluminium is more **reactive** than carbon so it must be extracted from its **compounds** using **electrolysis**.

Lesson 5, 6&7 Acids and Alkalis & Neutralisation	Lessons 8&9 Metals + acid & Metal carbonates + acid	Lesson 10 Required practical – making a salt
Acids form **acidic solutions** in water. Acids produce hydrogen **ions**, H^+ in aqueous solution. $HCl(aq) \rightarrow \mathbf{H^+}(aq) + Cl^-(aq)$ In a **dilute** acid there is less $\mathbf{H^+}$ and more water, this makes the acid safer to use, but its still an **Irritant**. In a **concentrated** acid there are more $\mathbf{H^+}$ and less water, this makes the acid more dangerous and **Corrosive**. **Alkalis** form **alkaline** solutions in water. Alkalis produce hydroxide ions, OH^- in aqueous solution. A **neutral** solution is neither acidic, nor alkaline. A neutral solution has a pH value of 7. A chemical indicator is a substance that undergoes a distinct observable colour change when conditions in its solution change. Litmus paper or solution is a simple indicator that changes colour in acidic or alkaline solutions. Universal indictors works in conjunction with the pH scale.  A **BASE** is any substance that reacts with an **ACID** to form a **SALT** and WATER only. Bases that are **soluble** in water are called **alkalis** and they **dissolve** in water to form **alkaline solutions**. A **neutralisation** reaction is a reaction between an acid and a base. Acid + Base -> Salt + Water	When acids react with **metals**, the products are a salt and hydrogen. In general: Acid + metal → salt + hydrogen **Naming the Salt:** We need two things, the name of the metal and the name of the acid. **Different acids make different Salts** Hydrochloric acid makes **CHLORIDE** salts **Chloride Cl^-** Sulfuric acid Makes **SULFATE** salts **Sulfate SO_4^{2-}** Nitric acid makes **NITRATE** salts **Nitrate NO_3^-** Calcium Carbonate is a good example of a metal carbonate. Its the compound found in chalk , Limestone and crustacean shells, (crabs + Lobster). **Calcium carbonate has the formula $CaCO_3$** A salt, water and carbon dioxide are produced when acids react with carbonates. In general: Acid + carbonate → salt + water + carbon dioxide Metal carbonates reacting with acids are neutralisation reactions	**Method: what you need to do!** 1. Measure 40 cm^3 sulfuric acid and put it into the 100 cm^3 beaker. 2. Put the beaker onto a gauze and heat the acid gently until it is almost boiling. Turn off the Bunsen burner. 3. Use a spatula to add a small amount of copper (II) oxide powder to the hot acid. Stir with the glass rod. The copper (II) oxide will disappear and the solution will turn clear blue. 4. Add some more copper (II) oxide and stir again. 5. Keep adding the copper (II) oxide until some of it remains after stirring, (excess). 6. Set up the funnel and filter paper over a conical flask and filter the contents of the beaker. 7. Pour the filtrate from the conical flask into the evaporating basin. 8. Set up a water bath using the 250 cm^3 beaker on the tripod and gauze. 9. Evaporate the filtrate gently using the water bath, (until 1/3 remains). 10. When crystals start to form, stop heating the water bath and pour the remaining solution into the crystallising dish. 11. Leave the crystallising dish in a cool place for at least 24 hour

Lesson 11 ,(higher) Strong and weak acids

Acids form **acidic solutions** in water. Acids produce hydrogen **ions**, H^+ in aqueous solution. For example:

$HCl(aq) \rightarrow \mathbf{H^+(aq)} + Cl^-(aq)$

The amount of H^+ ions determines acidity. The amount of H^+ can be defined as concentration of H^+.

It makes sense, that if there are more H^+ ions in solution then the acid will be stronger . Therefore, if there is a high concentration of H^+ ions there is more acidity and the pH will be Lower.

pH	H^+ concentration ,(mol/dm³)	H^+ concentration written in standard form , (mol/dm³)
1	0.1	$1X10^{-1}$
2	0.01	$1X10^{-2}$
3	0.001	$1X10^{-3}$
4	0.0001	$1X10^{-4}$
5	0.00001	$1X10^{-5}$
6	0.000001	$1X10^{-6}$

Acids in solution are a source of hydrogen **ions**, H^+. The hydrogen ions are produced when the acid **dissociates** or breaks down to form ions, (**ionises**).

Strong acids completely dissociate into ions in solution.

Weak acids only partially dissociate in solution.

Lesson 12 &13 Electrolysis of pure substances

An **ionic compound** is a giant structure of ions. The ions have a regular, repeating arrangement called an **ionic lattice**.

An ionic lattice is held together by strong **electrostatic forces** of attraction between the oppositely charged ions. **This is called ionic bonding**.

An ionic compound can conduct electricity only when:
it has **melted** to form a liquid, or
it has dissolved in water to form an **aqueous** solution

Electrolytes are **ionic compounds** that are:
in the **molten** state (heated so they become liquids),
or **dissolved** in water

Electrolysis separates the ions in an electrolyte using electricity.

The negatively charged electrode in electrolysis is called the **cathode**. Positively charged ions , (**cations**) move towards the **cathode**.

The positively charged electrode in electrolysis is called the **anode**. Negatively charged ions, (anions) move towards the anode.

Lesson 14 Electrolysis of solutions

An **electrolyte** formed by dissolving an **ionic compound** contains:

hydrogen ions from the water, and positive ions from the compound.

hydroxide ions from the water, and negative ions from the compound.

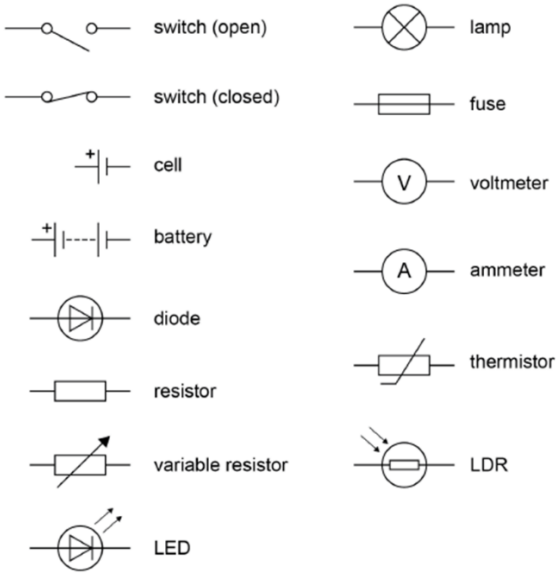
the metal is produced at the cathode if it is less **reactive** than hydrogen

hydrogen is produced at the cathode if the metal is more reactive than hydrogen

Oxygen is produced (from hydroxide ions), unless **halide** ions (chloride, bromide or iodide ions) are present.

Lesson 15 Required Practical – electrolysis	Lesson 16 Electrolysis of aluminium	
Method: 1. Pour approximately 50cm^3 copper (II) chloride solution into a beaker. 2. Add the petri dish lid and insert the carbon rods through the holes. **The rods must not touch each other.** 3. Attach crocodile leads to the rods. Connect the rods to a low voltage (4v) power supply. 4. Look at both electrodes and record your initial observations in a table. 5. Use forceps to hold a piece of blue litmus paper in the solution next to the anode (positive electrode) and identify the element? 6. Write all your observations in a table. 7. Rinse the electrochemical cell apparatus and collect a new set of electrodes. 8. Repeat steps 1–7 using the remaining solutions.	Aluminum is the most **abundant** metal on Earth. Its found in the earths crust as an Ore called **bauxite**. Within Bauxite, aluminum is found as a compound called **Aluminum Oxide**. Aluminium is quite a reactive metal, so **Carbon** is not reactive enough to extract the metal using **displacement**, (remember the reactivity series). Electrolysis must be used to extract Aluminium , which is expensive as it uses a lot of electricity. Aluminium oxide melts at 2050°c This would need a lot of heat energy and would be expensive. Scientists have found a way to overcome the high temperature needed to make the aluminium molten. They dissolve it in liquid Cryolite. Cryolite is another ionic compound which melts at 850°c. Aluminium is produced at the cathode Oxygen is produced at the anode , but its so hot that it reacts with the carbon electrode to make **Carbon Dioxide, (CO_2).**	

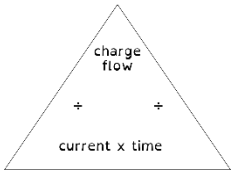
Lesson 1 Introduction to circuits



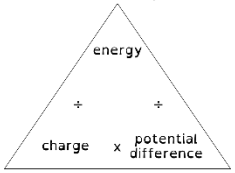
- **Charge** is a property of materials.
- It can be positive or negative and is measured in coulombs. Electrons have a negative charge.
- Metals have a "sea" of delocalised/free "conduction electrons".
- These electrons can move through the material, causing a current.
- **Insulators** do not have free electrons.

Lessons 2 & 3 Current, p.d. and resistance

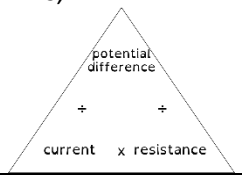
charge flow = current x time
Charge in Coulombs, C
Current in Amperes, A
Time in seconds, s



energy transferred = charge x potential difference
Energy transferred in Joules, J
Charge in Coulombs, C
Potential difference in Volts, V



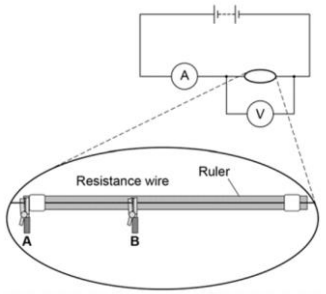
potential difference = current × resistance
Potential difference in Volts, V
Current in Amperes, A
Resistance in Ohms, Ω



Lesson 4 Required Practical – Resistance and the length of a wire

- **Resistance** is a measure of how hard or easy it is for a current to flow.
- The more resistance:
  - The lower the current will be for a given p.d.
  - The higher the p.d. will be needed for a particular current to flow.

- You will investigate **the relationship between the length of a wire and its resistance.**



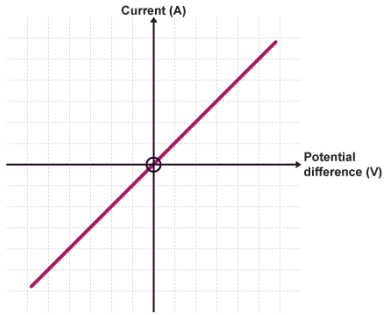
- **Independent variable**: Length of wire in metres
- **Dependent variable**: Resistance of wire in Ω
- **Control variable**: Current, temperature, material of wire

Revision Guide: Foundation pages 180-192, Higher pages 179-190

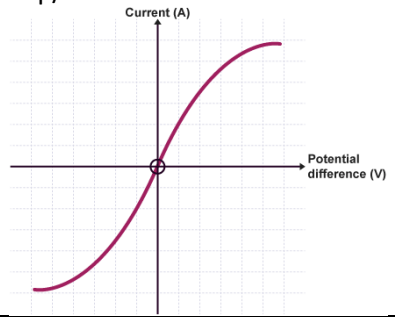
Lessons 5 & 6
Required Practical – I-V Characteristics

- You will investigate **the relationship between current and potential difference for circuit components**
- **Ohm's law** states that the current through a resistor is directly proportional to the potential difference across it, at constant temperature.
- A graph is **directly proportional** if a line of best fit is a straight line through the origin.

Resistor:

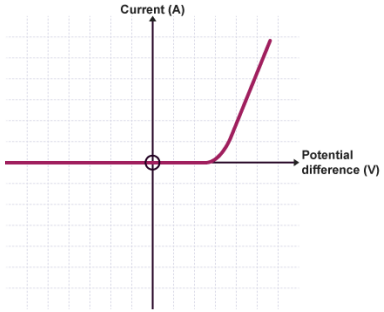


Filament lamp/bulb:



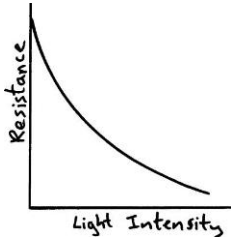
Lesson 7
Non-ohmic components

Diode/LED:

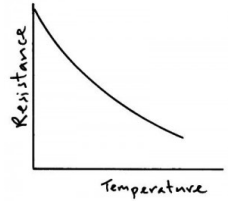


- Some components have a resistance that depends on an environmental factor.

LDR:

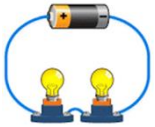


Thermistor:

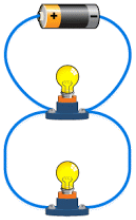


Lessons 8 & 9
Series and Parallel circuits

- In a series circuit, you have one component after another. All of the components are connected together by the same 'loop' of wire.



- A parallel circuit is one where components are connected in separate loops – sometimes called branches.
- Each component is placed along a different path.

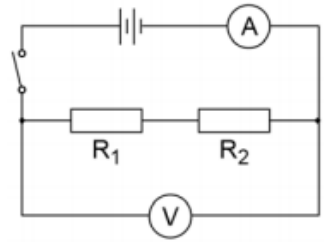


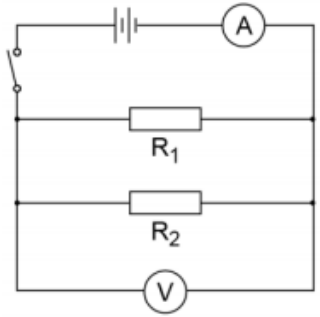
	Series	**Parallel**
Current	Same everywhere	Shared between branches
P.d.	Shared between components	Same in each branch (and equal to p.d. of the supply)
Resistance	Sum of individual resistances	Less than the resistance of any one resistance

Revision Guide: Foundation pages 180-192, Higher pages 179-190

Lesson 10
Required Practical – Resistance in series and parallel

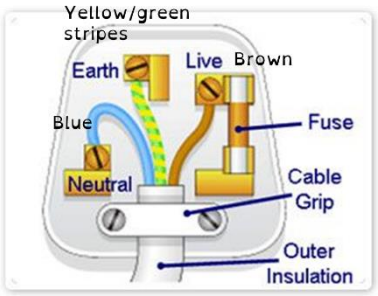
- You will investigate how **combinations of resistors in series and parallel behave**





- In series, current must flow through both resistors. It is harder to flow through both than to flow through either resistor individually, so the resistance increases.
- **In series**: $R_{total} = R_1 + R_2$
- In parallel, current can flow through both resistors at the same time. More current flows in the circuit than if only one of the resistors was there. As the p.d. remains constant, this means the total resistance must have decreased.

Lessons 11 & 12
The 3-pin plug and mains electricity

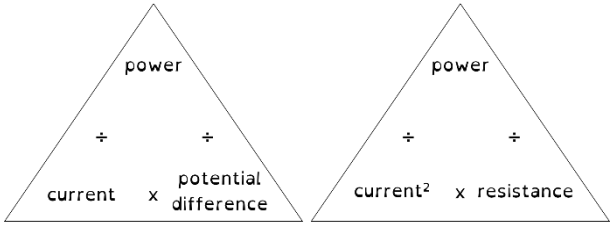


Name of wire	Colour	Job
Live	Brown	Supplies the alternating potential difference
Neutral	Blue	Completes the circuit
Earth	Green/Yellow stripes	Safety (can prevent shocks or fires)

- **A fuse** is a thin wire in a glass tube designed to melt at a specific current.
- **Earthing** means connecting the metal case of an appliance directly to the earth using a low resistance cable.
- The **UK mains supply** is an **alternating current** supplied at a p.d. of **230 V** and a frequency of **50 Hz**.

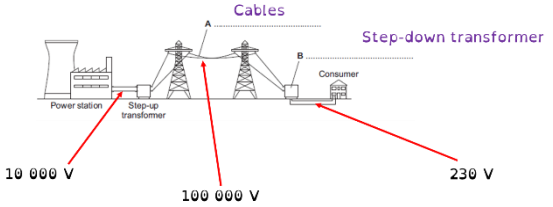
Lessons 13 & 14
Electrical power and The National Grid

power = potential difference x current
power = current2 x resistance

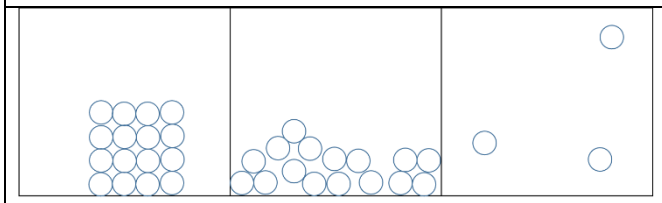
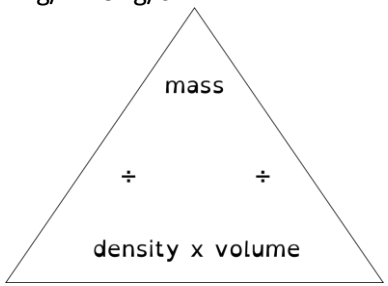


Power in Watts, W

- The National Grid is the system of cables and transformers that bring electricity to homes and businesses.

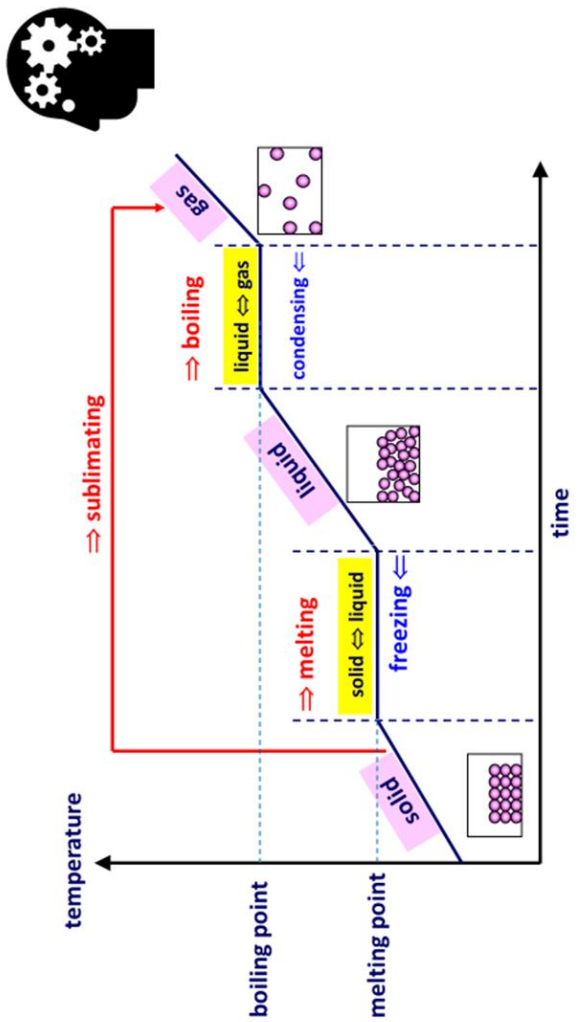


- Transformers increase (step up) or decrease (step down) the potential difference of the electricity supply.
- If the potential difference goes up the current goes down. (As power = current x p.d.)
- If the current goes down, less energy is lost as heat in the wires.
- (As power = current^2 x resistance, half the current means ¼ the energy lost!)

Lesson 1 The Particle Model	Lesson 2 Required Practical – Density	Lesson 3 Explaining Density
 Particles in a solid • Fixed and regular arrangement • Strong forces • Held close together • Vibrate about fixed positions • Low energy Particles in a liquid • Irregular arrangement • Fill bottom of container • Moderate forces • Some gaps between particles • Groups of particles move past each other • More energy than solids, less than gases Particles in a gas • Random arrangement • Fill container • Negligible forces • Far apart • Move randomly • High energy	Density = mass ÷ volume Mass in kg or g Volume in m^3 or cm^3 Density in kg/m^3 or g/cm^3  • You will investigate **the density of solids and liquids.** • • Mass is measured with a balance. • For **regular solids**, you can calculate the volume if you measure the length of the sides. • For **irregular solids** you can measure the volume of water displaced using a displacement can and a measuring cylinder. • For **liquids**, you measure volume with a measuring cylinder.	• How does the particle model explain why solids are denser than liquids and why liquids are denser than gases? • The short answer: there are **more particles in a given volume.** • The long answer: • The particles in a solid have **strong forces** between them. • This means they are **close together**. • 1 kg of a solid will **take up less space** than 1 kg of a liquid or gas. Therefore the solid will have a higher density. • Materials float if their density is less than that of the liquid they are in. (Water has a density of around 1.0 g/cm^3). • Ice must be less dense than water, even though the particle model says it should be more dense. (This is due to the shape of water molecules). This is a limitation of the particle model.

Revision Guide: Foundation pages 193-196, Higher pages 191-194

Lesson 4 Changes of state



Lesson 5 Internal Energy

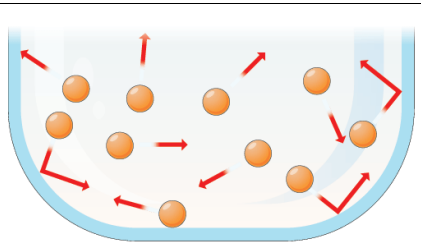
- **Temperature** is a measure of the **average kinetic** energy of the particles in an object.
- The hotter an object is, the more energy the particles have (on average) and the higher the temperature. This energy is called heat.
- **Internal energy** is the **total kinetic** energy and **potential** energy of all the particles (atoms and molecules) that make up a system.
- **Heating** changes the energy stored within the system by **increasing the energy** of the particles that make up the system.
- **Either**, the kinetic energy will increase **or** the potential energy will increase, **but not both**.
- **Either the temperature of the system increases, or changes of state happen**.
- When the material changes state, the potential energy is changing because the particles are moving further apart.
- **The amount of energy required to change state will depend on the strength of the bonds between particles.**
-

Lesson 6 Specific Heat Capacity

- **Specific heat capacity** is a measure of how much energy a material can store. It is the energy needed to change the temperature of 1kg of a material by 1°C. It is measured in **J/kg°C**.
- Specific heat capacities tend to have values from a few hundred to a few thousand J/kg°C.
- **Liquids** tend to have higher specific capacities than solids.
- **Non-metals** tend to have higher specific capacities than metals.

Energy = mass x specific heat capacity x temperature change
Energy is the change in thermal energy in joules, J
Mass of the substance in kg
Specific heat capacity in J / kg °C
Temperature change in degrees Celsius, °C

Reminder: this is also covered in the Required Practical on Specific Heat Capacity in the Energy topic.

Lesson 7 Specific Latent Heat	Lesson 8 Brownian Motion	Lesson 9 Pressure in gases
• The **specific latent heat** of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature: • **Specific latent heat of fusion** – change of state from solid to liquid. • **Specific latent heat of vaporisation** – change of state from liquid to vapour *Thermal energy for a change of state = mass x specific latent heat* energy in joules , J mass in kilograms, kg specific latent heat in joules per kilogram, J/kg • The larger the value of specific latent heat, the more energy is needed for the change of state. • The specific latent heat of vaporisation of water is nearly 100 times larger than the specific latent heat of fusion of water.	• The motion of particles within a gas is **random**. They have a range of speeds and directions. • As the temperature of a gas increases, the internal energy of the gas increases. • As a gas is heated, the average kinetic energy of the particles within it increases. This means that the average speed of the particles increases. • Larger particles within a fluid (e.g., dust in air) move randomly and seem to "jiggle" about. This is because they are constantly being hit by the particles of the fluid, which move randomly. This is called **Brownian motion**.	 • Pressure in gases is caused because some of the particles collide with the sides of the container. • They change direction, which means (as their velocity changes) they are accelerating. • This means there is a force from the container on the particles. • Newton's 3rd law states that there is a force from the particles on the container. • This force gives rise to pressure. • Gas cylinders can explode in fires, even if they don't contain flammable gases, because the pressure inside the cylinder can rise dramatically.