Knowledge Organiser

Year 11

Cycle 1

CORE SUBJECTS

Name:

Tutor Group:

What is a Knowledge Organiser and why are they important?

A knowledge organiser is designed to summarise the key information, concepts, and vocabulary for a specific topic or unit of work in each subject. Its purpose is to help students:

- o Understand what they are expected to learn.
- o Make connections between ideas.
- o Retain and recall essential knowledge more effectively.
- o Support independent study and revision

Your Knowledge Organiser contains the essential knowledge that we expect every student to know. Regular use of the Knowledge Organiser helps you to recap, revise and revisit what you have learnt in lessons. This can be part of your homework in some subjects or as independent revision The aim is to help remember this knowledge in the long term and to help strengthen your memory.

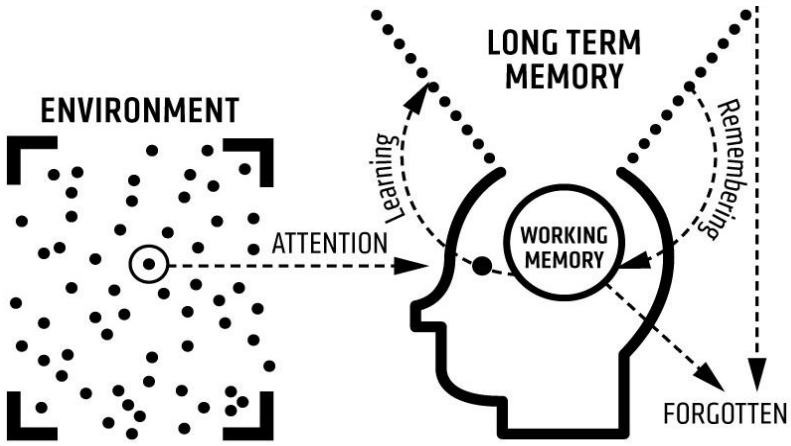
Each cycle there is an assessment in every subject and you will be assessed on the knowledge from your Knowledge Organiser; the more you revisit information the more likely it will be remembered for lessons, assessments and exams.

How we learn anything

We learn by focusing our attention on something. If we are distracted by other things in our environment (eg mobile phones, listening to music) it will affect how much/what we learn.

Information we pay attention to goes into our working memory, but our working memory is not very good and we quickly and easily forget things.

Learning happens when we think about, process or practise doing something so that it is stored in our long-term memory. Even then it can still be forgotten if we do not regularly think about it and go over it. *We remember what we think about*. Using your Knowledge Organiser outside of lessons helps you to remember things in the long-term.



Homework in Year 10-11

The purpose of homework

Homework plays a crucial role in reinforcing what you learn in the classroom, helping you to develop a deeper understanding of the material. It encourages independent learning, time management, and responsibility: skills that are essential for success both in school and in life.

Homework fosters a strong work ethic and a sense of discipline, preparing you for future academic and professional challenges. Homework is not just about completing tasks, it is about building lifelong learning habits. Learning is defined as a change in the long-term memory. You attend 5 hours of lessons per day, which is a lot of new information being taken in. Without additional opportunities to practise remembering, much of that information would be quickly forgotten.

Homework expectations

In Years 10-11 we expect every student to complete around 1 hour of homework a day, 5 days a week. English, Maths and Science will set around 1 per week each and the other GCSE subjects will be around 30 minutes each using the following timetable:

	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

Maths and Science homework will be completed on Sparx. All other subjects may be a mixture of Seneca, Knowledge Organiser work and worksheets/tasks. Homework will be recorded on Class Charts to help students and parents keep track of what to do.

Year 11 Core Cycle 1

Knowledge Organiser Contents Page

Start with Week 1. Each week, complete the colour block. Write each word out 3 times and each definition once. Check it all with a purple pen. Tick what is correct, fix what is wrong. Then complete the weekly SPaG (spelling, punctuation and grammar) task.

Coombeshead Academy *Inspiring Excellence* English Learning Area

wk	keyword	definition	example
Week 1	**Context**	The wider circumstances in which something exists.	Taking a comment out of context can impact its true meaning.
	Fiction	A text that is based upon events that are not real.	The book she had chosen to read was from the fiction section.
	Commentary	An expression of opinions about an event.	The teacher gave a commentary as to why the model answer was so good.
	Reasoning	Thinking about something in a logical, sensible way.	What is the reasoning behind your behaviour?
	Logical	Something that is according to the rules or expected.	Her reaction to her friend's betrayal was logical.
Week2	Explicit	Information that is clearly stated.	The teacher explicitly told us to wear our blazers.
	Inference	Using evidence to 'figure out' what is being said.	**He inferred she'd had a good day from the smile on her face.**
	Statement	A definite or clear expression of something in speech or writing	What statement is your writing making?
	Compare	To note the similarity or dissimilarity between things.	He compared his homework to his friend's, which was far better.

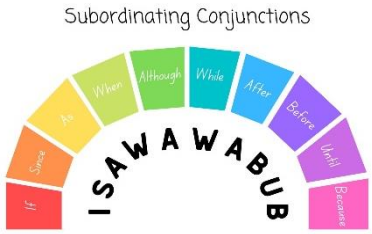
Week 1

Week 1 SPaG task

For each of the following sentences, identify the main clause and the subordinate clause.

1. Outside the window, rain began to fall.
2. He shared his sweets with his friend as it was their birthday.
3. She went to bed after brushing her teeth.
4. Before going home, Ben went to the park.
5. After we went to the cinema, we went out for dinner.

Subordinate clauses begin with subordinating conjunctions. Use this to help you!



Week2

Week 2 SPaG task

Apostrophes are used to show omission (when words are contracted and letters removed e.g. do not becomes don't) or possession (to show when something belongs to someone). Put apostrophes in the correct places in the sentences below.

1. **My dogs new toy is broken already!**
2. **I cant wait to go to the park later.**

	Implicit	When something is suggested, not directly expressed.	The implicit negativity between the friends made him uncomfortable.			3. Its over there. 4. Dans haircut looks really cool. 5. Im excited to go to my friends house.

Week 3	**Analyse**	Examine how a writer uses language and structure to create a particular effect.	After analysing the text, I learnt how the narrator feels.		**Week 3**	**Week 3 SPaG Task** **A comma splice is when two sentences are incorrectly joined by a comma. The below passage contains 3 comma splices. Identify them and correct the commas into the required punctuation marks.** **At the weekend I went out with my family, we went to the zoo. We saw monkeys, crocodiles and lots of insects, they were all so interesting to see and learn about. However my favourite animal was the elephant, he was so majestic and intelligent.**  **"He's in a comma."**
	Effect	How the reader thinks/feels as a result of the writer's use of language or structure.	The effect of the simile is a sense of comfort.			
	Methods	The things a writer purposely uses to achieve a particular effect.	The writer uses methods such as metaphors in their story.			
	Declarative	A sentence that provides a statement in the form of a declaration.	1. The sky was blue. 2. I am hungry.			
	Exclamative	A word or phrase that implies a sudden or strong emotion. It ends with an exclamation mark.	I am so frustrated with you!			

Week 4	**Critically**	To analyse the merits and faults of a piece of work.	She thought critically about his proposal.		Week 4	**Week 4 SPaG Task** **Correct the spelling errors in the following words.** 1. proberly 2. allways 3. beutiful 4. intresting 5. definately 6. permenently 7. diffrent 8. wierd 9. suprise 10. seperate 
	Evaluate	To assess something, such as its effectiveness.	After evaluating the evidence, he deemed it unnecessary.			
	Examine	Inspect something thoroughly.	Examination allowed them to figure out what was wrong with the animal.			
	Explore	Discuss in detail.	He explored the writer's use of repetition in the text.			
	Describe	Give a detailed account of.	The writer describes his characters in full detail.			

Week 5	**Perceptive**	Showing insight.	He was very perceptive to his friend's moods.
	Cohesion	Forming a united whole.	The conclusion of the story added to the cohesion of it.
	Coherent	Logical and consistent.	Her argument on why the legal driving age should be made higher was very coherent.
	Structure	The arrangement of ideas within a text.	The structure of the text emphasises the tension within it.
	Symbolic	Where an image or concept is used to represent something else.	Marley's chains in 'A Christmas Carol' symbolise his regrets.
Week 6	**Tone**	The mood of the text.	The language choices made by the writer created a serious tone.
	Semantic field	A group of words related by their meanings.	The words "blood", "battle" and "bullets" form a semantic field of war.
	List	Connected items written consecutively.	The writer used a list to give the impression that they had a long day.
	Alliteration	Words beginning with the same letter or letter sound close together in a text.	Alliteration of the 'b' sound creates a powerful, aggressive sound.
	Repetition	Purposely repeating a word or phrase for effect.	Repetition of the word 'unfair' made her point clear.

Week 5

Week 5 SPaG Task

Identify the word classes of the highlighted words in the sentences below.

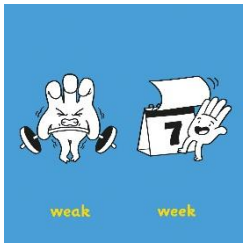
1. He quickly ran to the bus stop; he didn't want to miss the bus.
2. The wind rattled the old shutters.
3. The classroom was missing some tables and chairs.
4. I played football yesterday.
5. I don't like eating sweets; they are too sugary.

Week 6

Week 6 SPaG Task

Add in the correct homophone into these sentences – there, their or they're.

1. _____ was no one else at the bus stop this morning.
2. _____ new shoes are really cool.
3. _____ going to visit their grandparent's this weekend.
4. _____ was no one at _____ house when I knocked earlier.
5. _____ going to regret not coming out with us; we had so much fun.



Week 7	**Extended metaphor**	A metaphor that is introduced then further developed throughout the text.	The extended metaphor of the sea being compared to an angry dog was effective.
	Juxtaposition	Placing two opposing items/images together in a text to highlight the contrast between them.	His actions were in juxtaposition to his thoughts.
	Oxymoron	Where two words with opposite meanings are placed next to each other.	Deafening silence Pretty ugly
	Personification	Where a non-human object is given human qualities.	The chair danced as the room shook.
	Anecdote	A short story about a real person or incident.	She shared a relatable anecdote about growing up with siblings.
Week 8	**Analogy**	A comparison between one thing and another, for the purpose of explanation.	A popular analogy is 'like finding a needle in a haystack' to describe something difficult.
	Hyperbole	Exaggerates statements not meant to be taken literally.	Her use of hyperbole added a comedic tone but was very convincing.
	Allusion	An indirect or passing reference to something.	'Into the mouth of hell' is an allusion to the bible.
	Accent	A distinct way of pronouncing words that indicate regional or social identity.	His accent suggests he is from the North of England.

Week 7

Week 7 SPaG Task

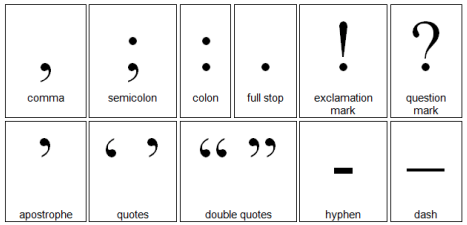
Add a subordinate clause to the beginning, middle or end of these main clauses to create complex sentences.

1. The rain fell
2. He walked home
3. The night darkened
4. She won the race
5. We waited for the bus

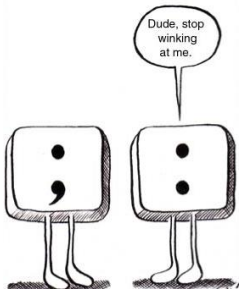
Week 8

Week 8 SPaG Task

Accurately punctuate the following text.



A few miles south of Soledad the Salinas River drops in close to the hillside bank and runs deep and green The water is warm too for it has slipped twinkling over the yellow sands in the sunlight before reaching the narrow pool On one side of the river the golden foothill slopes curve up to the strong and rocky Gabilan mountains but on the valley side the water is lined with trees willows fresh and green with every spring carrying in their lower leaf junctures the debris of the winter's flooding and sycamores with mottled white recumbent limbs and branches that arch over the pool

	Adverb	A word or phrase that tells us how the verb is being done.	The man ran **quickly.**			
Week 9	**Register**	The level of formality required, depending on context.	Ensure your register matches the type of text you are writing.		Week 9	Week 9 SPaG Task Identify the adverbial phrases in the following sentences. 1. I ate my breakfast in the morning. 2. I played netball with my friends. 3. When we played football, we lost the ball behind the shed. 4. Everywhere we looked there were signs of Spring. 5. We stayed at home due to the rain. 
	Formal	Using more sophisticated, grammatically correct language.	You must use formal language in any non-fiction writing.			
	Informal	Using more casual, everyday language.	Informal language is widely used when conversing with friends.			
	Dialogue	A language interaction between two or more participants.	The length of turns in the dialogue tell us about the character's status.			
	Length of turn	How long each character speaks for in a dialogue.	Birling has long length of turns- this implies he is arrogant.			
Week 10	**Narrator**	The person recounting the events in a narrative.	The book has a third-person narrator.		Week 10	Week 10 SPaG Task Semi-colons can be used in place of a full stop to join two main clauses that are closely linked. Put a semi-colon in the correct place in the following: 1. Dad is looking old his hair is getting thinner. 2. I was late for school today there was traffic. 3. I can't wait for break I am so hungry. 4. I need to go shopping I have run out of food. 5. Someone needs to help me I am carrying too much. 
	Allegory	A text that can be revealed to have a hidden meaning.	'Animal Farm' is an allegory for the Russian Revolution.			
	Ambiguity	Where something is left open to interpretation.	The books ended on a cliff-hanger- it was ambiguous.			
	Foreshadowing	Where an event is hinted at earlier in the text.	The stormy weather is used to foreshadow the tragedy later in the book.			
	Cliche	An idea or expression that has been overused.	They were enemies at the start of the book and now they're in love- such a cliché.			

Inspiring Excellence- Developing Revision Skill

1. Use the image below to come up with as many different narrative ideas that you can.

2. Create a mind map of each paragraph for one of the structures you plan above.

3. Number your paragraph ideas in the order you wish to include them in your writing.

4. Alter your orders- see what different effects you can create by swapping events around.

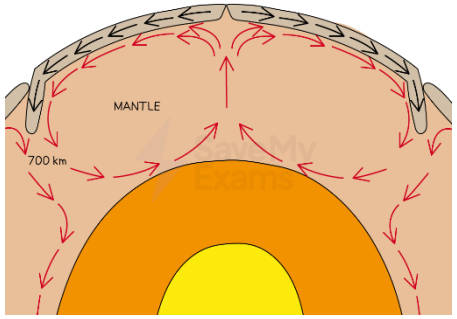
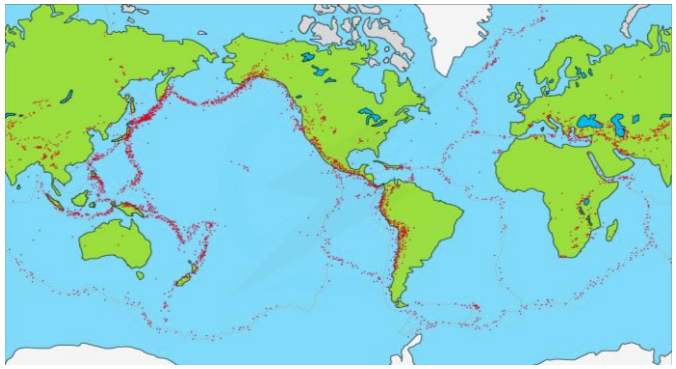
Practise your **SPaG**! by doing the following:

- Practise your **spellings**.
- Think of **synonyms** for words you use a lot.
- List all types of **punctuation** and know when to use them (EG: semi-colon; brackets; speech marks; colon; dash; etc…)
- Vary your **sentence types** (simple, compound, complex, and minor!)
- Use **connectives** to link paragraphs.
- Use TiP ToP to **paragraph** correctly!

<u>Research:</u>

AQA GCSE English Language Paper 1 past papers and mark schemes.

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 1 – Tuesday 8th September		
Lesson 1 – Natural hazards	**Lesson 2 – Earth structure and plate movement**	**Lesson 3 – Location of hazards**
Key Terms: **Natural hazard:** Extreme natural event that threatens people and/or property. **Hazard risk:** The probability or chance that a natural hazard may take place.	**Key Terms:** **Tectonic plate:** A rigid segment of the Earth's crust which moves across the heavier, semi-molten rock below. **Plate margin:** The margin (or boundary) between two tectonic plates.	**Key Terms:** **Tectonic hazards:** A natural hazard caused by movement of tectonic plates. **Earthquake:** A sudden or violent movement within the Earth's crust followed by a series of shocks. **Volcano:** An opening in the Earth's crust.
Content: Natural hazards become disasters when they cause high levels of death, injury, damage or disruption. **Types of hazards:** • **Hydro-meteorological** – Droughts, Tornadoes, Heatwaves, Wildfires, floods, storms • **Geophysical** – Landslides, earthquakes, volcanic eruptions, tsunamis **What affects hazard risk?** • **Population growth** – a growing population increases the number of people at risk. • **Wealth (level of development)** - LICs are particularly at risk as they do not have the money to protect themselves e.g. earthquake-proof buildings. • **Global climate change** – evidence suggests that this is increasing the intensity of rotating tropical storms and exposing new areas to their dangers. • **Deforestation** – this contributes to climate change and increases the risk of flooding.	**Content:** **Structure of the Earth:** The Earth has 4 main layers: **Crust:** Rocky surface between 10-100km thick. **Mantle:** Largest layer. Solid but flows like a liquid. **Outer Core:** This part is liquid (3000^{0}c). **Inner Core:** Solid and made of iron. Reaches 5000^{0}c There are 2 types of crust: **Oceanic** (thin and younger but dense) **Continental** (old and thicker but less dense). These plates move due to **convection currents**: Core heats the magma; it becomes lighter and rises. It cools at the curst, becomes heavy and sinks.  	**Content:** **Distribution of tectonic activity (how it is spread out over Earth's surface)** • Majority of earthquakes are in linear belts along plate margins. • Some linear belts are sparsely distributed along constructive plate margin, and some are densely distributed along destructive plate margin. • Volcanoes also occur in linear belts around the margins of tectonic plates. 
Questions: 1. How many types of hazards are there? 2. Name the different types of hazards 3. How does wealth affect hazard risk? 4. How does global climate change affect risk?	5. How many layers of the Earth are there? 6. Describe the different layers of the Earth 7. Describe the two types of crust 8. Describe the process of convection currents	9. What does distribution of tectonic activity mean? 10. Where are most earthquakes located? 11. Which plate margins are most earthquakes located along? 12. Where are volcanoes located?

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 2 – Tuesday 15th September

Lesson 4 – Plate tectonics (1)

Key Terms:

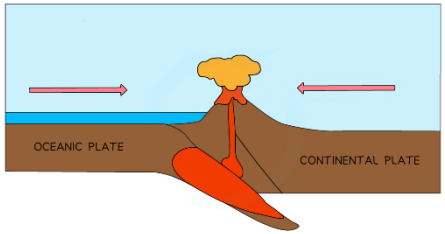
Destructive plate margin: Tectonic plate margin where two plates are coming together and oceanic plate is subducted.

Constructive plate margin: Tectonic plate margin where rising magma adds new material to plates that are diverging or moving apart.

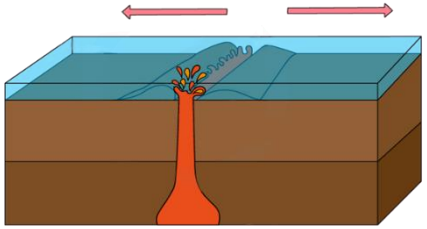
Content:

Tectonic plates either move **towards** each other, **away** from each other or **past** each other.

Destructive plate margin: An oceanic plate subducts under a continental plate. Friction causes oceanic plate to melt and pressure forces magma up to form volcanoes. Also creates violent earthquakes as pressure builds and is then released.



Constructive plate margin: Usually small earthquakes as plates pull apart. Magma rises between the plates and creates volcanoes.



Questions:

1. Describe what happens at a destructive plate margin
2. Draw a destructive plate margin
3. Describe what happens at a constructive margin
4. Draw a constructive plate margin

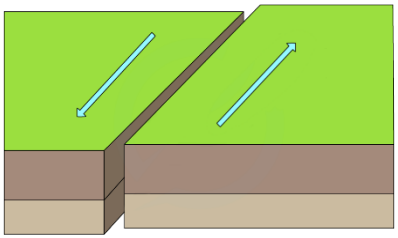
Lesson 5 – Plate tectonics (2)

Key Terms:

Conservative plate margin: Tectonic plate margin where two tectonic plates slide past each other.

Content:

Conservative plate margin: Plates slide past each other. They catch and then as pressure builds it is released. No volcanoes.



Cause of an earthquake:

1. Two plates begin to move and slide past each other
2. As they move, they become locked
3. Tension starts to build up
4. Tension is suddenly released as one plate gives in
5. Tension is released as waves of energy (seismic waves)
6. Seismic waves travel in all directs
7. Rocks slowly settle in their new positions

Questions:

5. Describe what happens at a conservative plate margin
6. Draw a
7. Which tectonic hazard is not created at a conservative plate margin
8. Describe the cause of an earthquake

Specification terminology

1. **Natural hazard**
2. **Hazard risk**
3. **Plate tectonic**
4. **Plate margin**
5. **Tectonic hazard**
6. **Earthquake**
7. **Volcano**
8. **Destructive plate margin**
9. **Constructive plate margin**
10. **Conservative plate margin**

9. Use lessons 1-5 to write out the definition for each key term above.

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 3 – Tuesday 22nd September		
Lesson 6 – Turkey/Syria earthquake 2023 (1)	**Lesson 7 – Turkey/Syria earthquake 2023 (2)**	**Lesson 8 – Noto, Japan earthquake (1)**
Key Terms: **Primary effects:** The initial impact of a natural event on people and property caused directly by it. **Secondary effects:** The after-effects that occur as indirect impacts of a natural event, sometimes on a longer timescale.	**Key Terms:** **Immediate response:** The reaction of people as the disaster happens and in the immediate aftermath. **Long-term response:** Later reactions that occur in the weeks, months and years after the event.	**Key Terms:** **Richter scale:** A logarithmic scale used to measure the magnitude (total strength or size) of an earthquake. **Tsunami:** A series of large, fast-moving sea waves caused by the sudden displacement of a massive volume of water.
Content: **Turkey/Syria (LIC) 6th February 2023 3:17am** **7.8 on Richter scale** Conservative plate margin. **Primary effects:** • 55,000 deaths • 130,000 injured • 26 million affected in Syria and Turkey • 164,000 buildings destroyed or severely damaged **Secondary effects:** • Psychological impacts from experiencing the event • Estimated that 2.7 million people made homeless • One in three children who lost their homes in the Turkey earthquakes a year ago still living in temporary shelters	**Content:** **Immediate responses:** • Around 95 countries offered aid, including search-and-rescue teams, medical staff and equipment. • Thousands of survivors were rescued from the rubble in the first few days. • Offers of specialist equipment and experts. • Use of diggers and sniffer dogs to search for survivors • Temporary shelters, tents and emergency camps were set up for displaced people. • Food, clean water, blankets and medical supplies were distributed. • Rescue teams working at night - Rescue workers – the 'White Helmets'. **Long-term responses:** • Education of earthquake preparedness • Financing of $1 billion from the World Bank to help rebuild • Building design includes using rubber shock absorbers	**Content:** **Noto, Japan (HIC) 1st January 2024 4:10pm** **7.6 on Richter scale** Destructive plate margin. **Primary effects:** • 208 deaths, collapsed buildings • 600 people injured • Extensive damage to buildings • Damage to 15 fishing ports **Secondary effects:** • 1-6m Tsunami • Extensive coastal flooding caused by tsunamis generated by the earthquake • Sporadic fires
Questions: 1. When was the Turkey/Syria earthquake? 2. What plate margin did the earthquake occur? 3. Give 3 primary effects 4. Give 3 secondary effects	5. How many countries offered aid and what did they offer? 6. What was set up for displaced people? 7. How much money did the World Bank give? 8. What do building designs now include?	9. When was the Noto, Japan earthquake? 10. What plate margin did the earthquake occur? 11. Give 3 primary effects 12. Give 3 secondary effects

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

<table>
<tr><th colspan="3">Homework 4 – Tuesday 29th September</th></tr>
<tr><th>Lesson 9 – Noto, Japan earthquake (2)</th><th>Lesson 10 – Earthquake management</th><th>Specification terminology</th></tr>
<tr><td>Key Terms:
Seismographs: An instrument used to detect, measure, and record the vibrations of the Earth's crust caused by seismic waves.

Seismic waves: Shockwaves and vibrations that travel through the Earth or along its surface.</td><td>Key Terms:
Prediction: Attempts to forecast when and where a natural hazard will strike, based on current knowledge.

Protection: Actions taken before a hazard strikes to reduce its impact.

Planning: Actions taken to enable communities to respond to and recover from natural disasters.</td><td rowspan="2">1. Primary effects

2. Secondary effects

3. Immediate response

4. Long-term response

5. Richter scale

6. Seismographs

7. Seismic waves

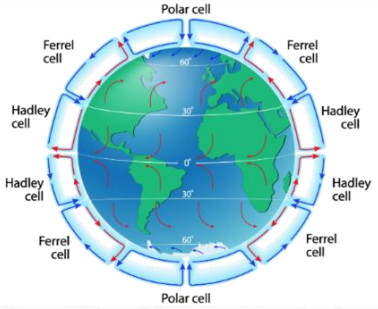
8. Prediction

9. Protection

10. Planning</td></tr>
<tr><td>Content:
Immediate responses – short-term measures to help the survivors
• Every person receives a text message warning
• Emergency co-ordination centre established
• 2,000 troops sent to help with the disaster
• 62,000 people evacuated due to tsunami warnings
• $28m government disaster fund

Long-term responses – longer-term reconstruction work
• K-NET - a network of seismographs installed at approximately 1,000 locations nationwide. Stop all trains and other infrastructure
• September 1st - Disaster Preparedness Day
• Anti-seismic Design Standard to buildings</td><td>Content:
Monitoring:
• Seismometers measure earth movement.
• Volcanoes monitored by remote sensing to detect heat and changes in the shape of the ground.
Prediction:
• Observing data can allow accurate prediction and evacuation before event
• Historical records of earthquakes can help determine probability and so help plan.
Protection:
• Earthquake resistant construction of buildings.
• Earth embankments or explosives can be used to divert lava flows.
Planning
• Avoid building in at risk areas.
• Training for emergency services and planned evacuation routes and drills.
• TV adverts to improve people's preparedness for these events</td></tr>
<tr><td>Questions:
1. How many troops were sent in?
2. How much money was in the disaster fund?
3. What is the K-NET and what does it do?
4. What is the 1st of September now called?</td><td>5. Give 2 ways earthquakes are monitored
6. Give 2 ways earthquakes are predicted
7. Give 2 ways people can protect themselves from an earthquake
8. Give 2 ways people can plan for an earthquake</td><td>9. Use lessons 6-10 to write out the definition for each key term above.</td></tr>
</table>

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 5 – Tuesday 6th October		
Lesson 11 – Living in areas at risk	**Lesson 12 – Global atmospheric circulation**	**Lesson 13 – Tropical storms: Location and formation**
Key Terms: **Geothermal Energy:** Made from the heat of the Earth. Water is filtered down through cracks in the Earth's Crust and becomes heated by the rocks. **Perceived Safety:** When people feel safe due to design of buildings, evacuation plans or general low chance of injury or loss.	**Key Terms:** **Global atmospheric circulation:** The worldwide system of winds which transports heat from tropical to polar latitudes. **High Pressure:** Air falling from the atmosphere to the Earth's surface. **Low Pressure:** Air rising from the Earth's surface to the atmosphere.	**Key Terms:** **Tropical storm (hurricane, typhoon, cyclone):** An area of low pressure with winds moving in a spiral around the calm central point called the eye of the storm. Winds are powerful and rainfall is heavy.
Content: **Why do people live in areas at risk?** • Poorer people have no choice (poverty) • Hazards are rare so not seen as a threat • Some people have no experience or knowledge of the risks • Volcanoes can bring benefits such as fertile soils and rich minerals • Plate margins sometimes coincide with favourable areas for trade e.g. coastal areas **Living on a plate margin: Iceland** • Iceland is located on a constructive plate margin • Geothermal energy generates 25% of Iceland's electricity. Most of the rest is HEP. • Iceland's landscape supports a huge tourism industry. • Naturally occurring hot water provides heating for 90% of all buildings.	**Content:** At the equator, the sun's rays are most concentrated – highest levels of **solar insolation**. This means that temperatures are high there. **Hadley Cell:** Warm moist air rises at 0°, travels north and south to 30°, becomes cool and dry then sinks. **Ferrel Cell:** Between 30° and 60° north and south of the equator. Warm moist air rises at 60°, travels towards 30°, becomes cool and dry and sinks. **Polar Cell:** Between 60° and 90° north and south of the equator. Warm moist air rises at 60°, then travels towards 90°, becomes cool and dry and then sinks at 90°.  	**Content:** Occur in low latitudes between 5° and 30° north and south of the equator (in the tropics). Ocean temperature needs to be above 27° C. Happen between summer and autumn when the ocean temperature is high enough. • Atlantic Ocean – Hurricanes • Indian Ocean – Cyclones • Pacific Ocean- Typhoons **Sequence of formation of a tropical storm:** 1. Air is heated above warm tropical oceans. 2. Air rises under low pressure conditions. 3. Strong winds form as rising air draws in more air and moisture causing torrential rain. 4. Air spins, due to Coriolis effect, around a calm eye of the storm. 5. Cold air sinks in the eye so it is clear and dry. 6. On meeting land, it loses its source of heat and moisture so loses power.
Questions: 1. Why do poorer people have no choice? 2. What benefits can volcanoes bring? 3. Which plate margin is Iceland on? 4. How does geothermal energy benefit Iceland?	5. Where are high levels of solar insolation? 6. Describe the Hadley Cell 7. Describe the Ferrel Cell 8. Describe the Polar Cell	9. Where do tropical storms occur? 10. What temperature do oceans need to be over? 11. What are tropical storms called in different oceans? 12. Describe the sequence of formation of a tropical storm

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 6 – Tuesday 13th October

Lesson 14 – Tropical storms: Structures and features

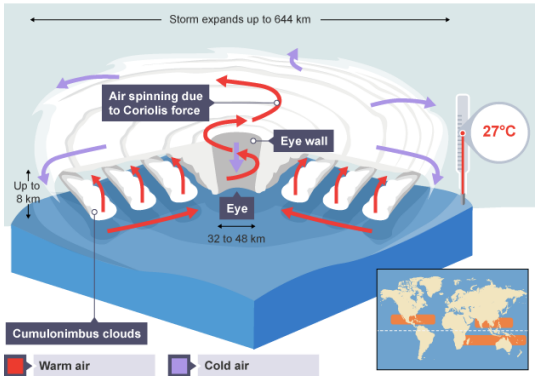
Key Terms:

Eye: A region of mostly calm weather in the centre of a tropical storm. Usually between 32-48km wide.

Eyewall: A ring of tall thunderstorms that produce the most intense rainfall and the strongest most damaging winds.

Content:

There is a **common structure** to all rotating tropical storms:



- **Eye:** clear sky, calm weather, descending air
- **Eye wall:** this surrounds the eye and is where the strongest winds are found
- Alternating band of swirling cloud
- Beneath the storm the sea bulges upwards due to the very low pressure. This causes a storm surge which results in serious flooding for coastal areas.

Why do tropical storms disappear?

Friction: Moving over land slows their movement.

Cooling effect: Cooler waters mean there is less energy.

Questions:

1. Describe what the eye of a tropical storm is like
2. Describe what the eye wall is like
3. What happens to the sea below a tropical storm?
4. Describe the 2 reasons why storms disappear

Lesson 15 – Typhoon Haiyan 2013

Key Terms:

Typhoon: The name given to a tropical storm that forms above the Pacific Ocean.

Typhoon Haiyan: Tropical storm in the Philippines in November 2013, Category 5, 314km/hr winds, 281.9mm of rain in under 12 hours, 5m storm surge

Content:

Primary effects:

- At least 6340 killed
- Habitats & Crops destroyed
- 90% buildings in Tacloban destroyed

Secondary effects:

- 130,000 houses destroyed, leaving 4.2 million homeless
- $14 Billion of damage
- Water supply polluted
- Public Order – Looting
- Airports unusable for supplies

Immediate responses:

- 1,069 emergency shelters set up
- Disaster Emergency Committee helped 3.3 million people outside these centres by providing aid.
- UK aid charities provided shelter, food and medical supplies for up to 800,000 people

Long-term responses:

- UN appeal raised $480 million.
- Typhoon warning systems have been improved.
- People are now better educated about how to respond.

5. Give 3 primary effects
6. Give 3 secondary effects
7. Give 3 immediate responses
8. Give 3 long-term responses

Specification terminology

1. **Geothermal energy**
2. **Perceived safety**
3. **Global atmospheric circulation**
4. **High pressure**
5. **Low pressure**
6. **Tropical storm**
7. **Eye**
8. **Eyewall**
9. **Typhoon**
10. **Typhoon Haiyan**

9. Use lessons 11-15 to write out the definition for each key term above.

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

Homework 7 – Tuesday 20th October		
Lesson 16 – Climate change and tropical storms	**Lesson 17 – Tropical storm management**	**Lesson 18 – UK weather hazards**
Key Terms: **Climate change:** A long-term change in the Earth's average temperature and weather patterns.	**Key Terms:** **Management strategies:** Techniques of controlling, responding to or dealing with an event. **Monitoring:** Recording physical changes, such as tracking a tropical storm by satellite, to help forecast when and where a natural hazard might strike.	**Key Terms:** **Extreme weather:** When a weather event is significantly different from the average or usual weather pattern and is especially severe or unseasonal. This may take place over one day or a period of time.
Content: **There is strong scientific evidence of global warming,** and this may be impacting upon natural systems including the distribution, frequency & intensity of tropical storms Over the last few decades sea surface temperatures in the Tropics have increased by 0.25-05 degrees Celsius. In the future this may affect tropical storms in the following ways: 1. **Increased intensity** – rainfall totals seem to be increasing, leading to increased flooding 2. **They may extend** to the South Atlantic and areas in the Sub-Tropics 3. **Frequency** of these storms may increase 4. **Stalling** – changes in upper atmospheric winds may result in increased stalling of these storms. This is when they remain stationary over an area for several days, increasing the damage caused.	**Content:** Tropical storms cannot be prevented, but they can be **monitored** and their tracks predicted. **Prediction:** • Monitoring wind patterns allows path to be predicted. • Use of satellites to monitor path to allow evacuation **Planning:** • Avoid building in high-risk areas • Emergency drills so that people know what to do • Evacuation routes – people clear on where to go if disaster strikes **Protection:** • Reinforced buildings and stilts to make safe • Flood defences e.g. levees and sea walls • Re-planting Mangroves to improve protection for coastal areas	**Content:** The UK does experience weather hazards despite its **moderate climate:** **Thunderstorms** - following hot weather bring lightning and torrential rainfall **Prolonged rainfall** over a long period - leads to river floods **Drought and extreme heat** - causes rivers to dry-up and reservoirs to run low. Can also result in wildfires. **Heavy snow & extreme cold** – less common these days but can cause significant hardship (particularly in remote rural areas) and transport disruption. Pipes often burst once the cold spell ends. **Strong winds** - can cause disruption to power supplies, transport and severe damage in coastal areas
Questions: 1. How much has temperatures in the tropics increased by? 2. What will happen to the intensity of storms? 3. What will happen to where storms are? 4. What happens when a storm is stalling?	5. What is monitored to predict a tropical storm's path? 6. What is used to monitor tropical storms? 7. Give 2 ways people can plan for a tropical storm 8. Give 2 ways of protecting against tropical storms	9. What can prolong rainfall lead to? 10. What can drought and extreme heat lead to? 11. What can heavy snow & extreme cold lead to? 12. What can strong winds lead to?

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

<table>
<tr><th colspan="3">Homework 8 – Tuesday 3rd November</th></tr>
<tr><th>Lesson 19 – Somerset floods 2014</th><th>Lesson 20 – Evidence of climate change</th><th>Specification terminology</th></tr>
<tr><td>Key Terms:
Social impact: The effect of an event on the lives of people or community.
Economic impact: The effect of an event on the wealth of an area or community.
Environmental impact: The effect of an event on the landscape and ecology of the surrounding area.</td><td>Key Terms:
Quaternary period: The period of geological time from about 2.6 million years ago to the present. It is characterised by the appearance and development of humans.</td><td rowspan="2">1. Climate change
2. Management strategies
3. Monitoring
4. Extreme weather
5. Social impact
6. Economic impact
7. Environmental impact
8. Quaternary period</td></tr>
<tr><td>Content:
Dec 2013 - Feb 2014 – Somerset Floods, SW England
Low-lying area. Wettest January on record
Social effects:
• Residents evacuated to temporary accommodation for months
• 600 homes flooded across Somerset Levels.
• 16 farms evacuated.
• Villages such as Moorland and Muchelney cut off.
Economic effects:
• Estimated £10 million damage
• Local roads cut off by floods.
• Over 1000 livestock evacuated.
• Bristol to Taunton Railway line closed
Environmental effects:
• Floodwaters heavily contaminated with sewage, oil and chemicals.
• Huge amounts of debris had to be cleared.
Management strategies:
• A £20 million Flood Action Plan was launched by Somerset County Council.
• 8km of the River Tone and River Parratt were dredged to increase the capacity</td><td>Content:
Ice and Sediment Cores:
• Ice sheets are made up of layers of snow, one per year. Gases trapped in layers of ice can be analysed. Ice cores from Antarctica show changes over the last 400,000 years.
• Remains of organisms found in cores from the ocean floor can be traced back 5 million years.
Pollen Analysis:
• Pollen is preserved in sediment. Different species need different climatic conditions, so this is a record of past climate.
Tree Rings:
• A tree grows one new ring each year. Rings are thicker in warm, wet conditions
• This gives us reliable evidence for the last 10,000 years.
Temperature Records:
• Historical records date back to the 1850s. Historical records also tell us about harvest and weather reports.</td></tr>
<tr><td>Questions:
1. Give 3 social effects
2. Give 3 economic effects
3. Give 3 environmental effects
4. Give 2 management strategies</td><td>5. How can ice cores show past climates?
6. How can sediment cores show past climates?
7. How can pollen analysis show past climates?
8. How can tree rings show past climates?</td><td>9. Use lessons 16-20 to write out the definition for each key term above.</td></tr>
</table>

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

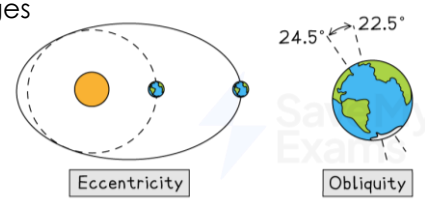
Homework 9 – Tuesday 10th November

Lesson 21 – Natural causes of climate change

Key Terms:
Orbital changes: Changes in the pathway of the Earth around the Sun.

Content:
The greenhouse effect: Energy from the sun warms the earth, carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) traps some of the sun's energy, heating up the earth.

Orbital Changes: Changes in how the Earth moves around the sun changes. Every 100,000 years the Earth's orbit changes from circular to elliptical (egg shape). This changes how much sunlight we receive.



Sunspots: Sun's output is not consistent. Sunspots is the sun releasing more energy. When there are more sunspots, temperatures increase. Lasts around 11 years.

Volcanic Activity: Volcanic eruptions lead to periods of cooling. Ash and dust in the atmosphere reduces the amount of sunlight by 10%.

Questions:
1. What is the greenhouse effect?
2. How do orbital changes change temperature?
3. How do sunspots change temperature?
4. How do volcanic eruptions change the earth's temperature?

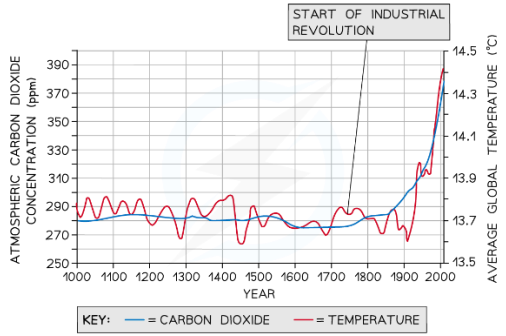
Lesson 22 – Human causes of climate change

Key Terms:
Enhanced greenhouse effect (EGHE): The natural greenhouse process is being enhanced by increasing atmospheric concentrations of certain gases through human activity.

Content:
Fossil fuels: Release carbon dioxide with accounts for 50% of greenhouse gases.

Deforestation: Logging and clearing land for agriculture increases carbon dioxide in the atmosphere and reduces ability to planet to absorb carbon through photosynthesis.

Agriculture: Accounts for around 20% of greenhouse gases due to methane production from cows etc. Larger populations and growing demand for meat and rice increase contribution.



5. How does burning fossil fuels contribute to the EGHE?
6. How does deforestation contribute to the EGHE?
7. How does agriculture contribute to the EGHE?
8. What is the link between carbon dioxide and temperature?

Lesson 23 – Impacts of climate change

Key Terms:
Climate change: A long-term change in the Earth's average temperature and weather patterns.

Content:
Social and Economic effects:
- Increased disease e.g. skin cancer
- Winter deaths decrease with milder winters.
- Less ice in Arctic Ocean increases shipping and extraction of oil and gas reserves.
- Droughts reduce food and water supply in sub-Saharan Africa.
- Water scarcity in South and South East UK.
- 70% of Asia is at risk of increased flooding
- Skiing industry in mountain areas e.g. Alps (Europe) threatened.

Environmental effects:
- Increased drought in Mediterranean
- Sea level rise leads to flooding and coastal erosion of coastal habitats
- Ice melts threaten habitats of polar bears.
- Warmer rivers and oceans affect marine wildlife e.g. coral bleaching and decline in biodiversity
- Forests in North America may experience more pests, disease and forest fires.
- Melting permafrost releases more methane.

9. Give 2 positive social & economic effects
10. Give 2 negative social & economic effects
11. What will happen in the oceans?
12. What will happen to the permafrost?

Year 11 Cycle 1 Geography Knowledge Organiser – The challenge of natural hazards

<table>
<tr><th colspan="3">Homework 10 – Tuesday 17th November</th></tr>
<tr><th>Lesson 24 – Mitigation of climate change</th><th>Lesson 25 – Adaptation to climate change</th><th>Specification terminology</th></tr>
<tr><td>Key Terms:
Mitigation: Action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.</td><td>Key Terms:
Adaptation: Actions taken to adjust to natural events, to reduce potential damage, limit the impacts, take advantage of opportunities or cope with the consequences.</td><td rowspan="2">1. Orbital changes

2. Enhanced greenhouse effect

3. Climate change

4. Mitigation

5. Adaptation</td></tr>
<tr><td>Content:
Mitigation methods
• Alternative energy production will reduce CO2 production. For example, solar, wind, wave, tidal, HEP and geothermal.

• Planting Trees – helps to remove carbon dioxide through photosynthesis.

• Carbon Capture and storage (CCS) – takes carbon dioxide from emission sources is stored underground.

• International Agreements e.g. the Paris Climate Agreement 2015. Aims for countries to reduce greenhouse gas contributions. It sets countries a limit on how many emissions they can emit.</td><td>Content:
• Changes in agricultural systems need to react to changing rainfall and temperature patterns and threat of disease and pests e.g. planting drought-resistant crops, change type of crop grown

• Managing water supplies e.g. by installing water efficient devices and increasing supply through desalination plants, increase storage through building dams and reservoirs

• Reducing risk from rising sea levels would involve constructing or upgrading defences like the Thames Flood Barrier or restoring mangrove forests or raising buildings in areas at risk from flooding on stilts.</td></tr>
<tr><td>Questions:
1. How does alternative energy reduce CO2?
2. How does planting trees reduce CO2?
3. How does CCS reduce CO2?
4. How does international agreements reduce CO2?</td><td>5. Give 2 ways agriculture can adapt
6. Give 2 ways managing water supplies
7. Give 2 ways of reducing risk from rising sea levels</td><td>8. Use lessons 21-25 to write out the definition for each key term above.</td></tr>
</table>

Making of America (Growing Tensions 1789-1838) Knowledge Organiser

Name three states which joined the USA between 1790 and 1838	Maine; Alabama; Ohio; Indiana; Illinois; Michigan; Tennessee; Mississippi; Vermont
Name one early President of the USA 1789-1838	George Washington; John Adams; Thomas Jefferson James Monroe;
What powers did states have to make laws?	Each had its own Governor and could make their own laws but couldn't go against the US Constitution
How many slaves lived in the South by 1838?	Over 2 million
Give three reasons why slavery expanded	Cotton gin sped up the process of separating cotton fibres. - New cotton-growing lands became available after 1790 - A huge demand from the North and overseas
What piece of machinery did Eli Whitney invent?	Cotton Gin
How much cotton was the USA exporting by 1838?	Over a million bales a year
Explain how the Missouri Compromise tried to solve divisions over slavery in the USA	New states added in the West would be in pairs: For every free state there would have to be a slave state. This would keep the balance of power in government
Name three of the Five Civilised Tribes	The Cherokee; Chickasaw; Choctaw; Creek; Seminole
What was the Indian Removal Act of 1830?	A law that promised money to tribes if they relocated to the west of the Mississippi
Which tribe challenged the Indian Removal Act in the Supreme Court?	Cherokee
Which President was responsible for the Indian Removal Act?	Andrew Jackson.
What was the 'Trail of Tears?'	Cherokee were force marched to Indian Territory. 4000 died.

Key Terms

Supreme Court	Highest, most important court in the USA
Constitution	Set of 'rules' by which a country is run, eg. Who can vote
Congress	USA's place of government (Like UK's Houses of Parliament)
State	Areas of the USA with their own government and a governor. They can pass some laws.
Territory	Land with not enough people to be a State. They don't send representatives to Congress.

Making of America (Visions of the West 1839-1860) Knowledge Organiser

Name the two main branches of the Sioux Indians	Lakota and Dakota. Lakota Sioux were more experienced with guns and horses.
What was the main source of food for the Cheyenne?	Buffalo
What was the name of the sacred centre of Sioux culture?	Black Hills of Dakota
Explain why the Sioux moved on to the Plains	Sioux homelands began filling up with other Indian tribes escaping white expansion in the East
Why did migrants from East USA want to travel West from the 1849s onwards?	Economic problems in the East.; Oregon and California had advertising campaigns to attract people.; Manifest Destiny – the belief that God wanted white people to settle in the West of America
Name two diseases which killed people on the trails to Oregon and California	Cholera and Typhoid
Who led the Mormons to Utah?	Brigham Young
Why were the Mormons so keen to settle in the West (in Utah)?	They wanted to practise their religion. They had been persecuted in the East and their leader, Joseph Smith had been killed.
Where was gold first discovered in California in 1848?	Sutter's Mill, California Territory
Name two states or territories added to the USA between 1839 and 1860	California, Colorado, Utah, Kansas
Why did more people go to Pike's Peak than to California to search for gold?	It was nearer and easier to get to. Plus trains could take you to the edge of the Plains.
What impact did the gold rush have on California?	Improved Californian economy (created jobs); Impacted negatively on Indians; environmental impact (mining damaged landscapes and created flooding)
Impacts of Pike's Peak	Population increase led to Colorado becoming a state. New towns grew, tensions with Native Americans

Key Terms

Sioux	The largest Indian tribe
Mormons	A religious group. Christian but with specific beliefs different to most Christians
Gold Rush	Many people travelling to find gold
Wakan Tanka	The Great Spirit – The idea that all living things had their own spirit which came from the earth.
Manifest Destiny	The belief that God's plan was for white Americans to settle the whole continent of America

Making of America (Cause and aftermath of Civil War) Knowledge Organiser

Which political party was established in 1854?	The Republican Party (an anti-slavery party)
What Act was passed in 1854 that allowed states to decide if they wanted to be free or slave states?	Kansas-Nebraska Act
Give a political reason for the start of the Civil War	People in the North were worried that slaveholders in the South were becoming too powerful. People in the South were angry at the election of President Lincoln
Give an economic reason for the start of the Civil War	The North was jealous that the South were benefitting from slavery – ie. not paying their workforce and receiving huge profits from cotton
How did the election of Abraham Lincoln in 1860 lead to Civil War?	His election in 1860 meant that South Carolina voted to secede (leave) the United States. It was quickly followed by 6 other states. Lincoln called this 'Confederacy' of states illegal.
When was the Emancipation Proclamation (which freed all slaves) issued?	1863
Name one positive change for black Americans during the Civil War	By 1862, South Carolina was freed and ex-slaves began setting up regiments. Many slaves in the South were given 40 acres of land by General Sherman.
Name one negative change for black Americans during the Civil War	Some slaves were made to hard labour (eg. digging ditches). Some slaves continued working on cotton plantations even though they were free. They were paid less than white soldiers.
In what year did soldiers get equal pay in the army?	1864 (but they still couldn't serve as officers)
What was the Sea Islands Experiment?	Islands of the coast of South Carolina were given to freed slaves of the South
Name two steps that Lincoln took to rebuild the USA	Passed the 13th Amendment freeing slaves. Set up the Freedman's Bureau (a charity to help ex-slaves)
Name two ways President Johnson failed to help black Americans	Ended the Freedman's Bureau; Allowed Southern states to introduce Black Codes (removed rights for blacks); pardoned (forgave) thousands of Confederate soldiers
Name two ways Radical Republicans helped black Americans	Re-established the Freedman's Bureau; Passed a Civil Rights Law in 1866; Passed the 14th and 15th Amendments (saying that blacks could be citizens and could vote); Sent in soldiers to police the South
Name two ways things got worse for Black Americans after 1870	Freedman's Bureau shut down in 1872; The Supreme Court said that voting rights were down to states to decide; In 1877, soldiers stationed in the South were removed.

Key Terms

Emancipation Proclamation	A statement made by Abraham Lincoln in 1863 declaring that all slaves will be free

Making of America (Settlement and conflict on the Plains) Knowledge Organiser

Name an impact of the railroads on Indians	Disrupted buffalo hunting grounds; Encouraged settlers and cattle ranchers to settle on Plains.
Name an impact of the railroads on workers	Created jobs for thousands (12,000 of whom were Chinese). Paid poorly and working conditions were terrible.
Name an impact of the railroads on the USA	New towns were created. More railroads were created. By 1880s, journey across USA could be done in days rather than months.
Why did the cattle industry cause tension and conflict on the Plains?	Texas Longhorn disrupted buffalo roaming areas. Overgrazing of Plains meant buffalo started to die out.
Give two reasons why people moved to the Plains	Cheap land; Railroads meant farmed goods could be sold easily; Homestead Act (1860) offered people 160 acres free for 5 years.
Why were the Plains so difficult to farm on?	Plains was a long way from big towns so supplies were difficult to get. Few trees so building was difficult. Cholera a problem. People felt isolated.
Name two solutions homesteaders used to survive on the Plains?	Houses were made from earth (sod) Dry-farming techniques and new types of wheat (like Turkey red) which grew well on the Plains. Barbed wire meant enclosing land was easy. Wind pumps used to draw clean water.
What caused Little Crow's War in 1862?	Little Crow (Chief) had signed a reservation agreement in return for supplies from US government. Reservation officials refused to give emergency supplies even when the Sioux were starving.
What were the results of Little Crow's War?	Little Crow was killed. 38 Santee Sioux were publically hanged. Remaining Santee Sioux were forced to move to reservation in Dakota.
What caused Red Cloud's War 1866-68?	Gold discovered on the Sioux reservation in 1862. Red Cloud began attacking some miners. The US government set up forts.
What were the results of Red Cloud's War?	The US were defeated. Fort Laramie Treaty signed promising no settlers on Sioux land.
What caused the Great Sioux War?	Gold discovered on sacred ground. US govt. ordered all Sioux to leave but many refused.
What were the results of the Great Sioux War?	General Custer defeated by Sitting Bull but Sioux eventually forced onto reservations.

Key Terms

Texas Longhorn	A breed of cattle that is particularly good for beef
Reservation	Areas of land that Indians were forced to live on
Dry-Farming	A technique of using soil to retain rainwater. This was used on the dry plains to grow crops.
Fort Laramie Treaty	Treaty signed in 1868 (after previously being signed in 1851) that guaranteed US settlers wouldn't enter Indian lands without permission
Cattle Ranchers	People who made lots of money by rearing cattle and selling it for beef

Making of America (Changing lives 1877-1900) Knowledge Organiser

Give three ways the US government tried to destroy the plains Indians culture	Tribes split up; Indians forced to convert to Christianity; Indian children forced to choose English names; history lessons showed Indians as barbaric.
Which group tried to protect the rights of Native Americans?	'Friends of the Indian' set up in 1883
How did they, in fact, help to destroy the Indian cultures?	They set up schools to help Indian children learn English. They persuaded the US government to pass the Dawes Act in 1887. It gave each Indian family 160 acres if they gave up their claims to tribal lands
How was life in the South for blacks still bad after the end of Reconstruction?	Majority worked as sharecroppers; Jim Crow laws meant there was segregation in the South; Blacks didn't have access to better paid jobs.
What opportunities were there in the West for blacks after the end of Reconstruction?	Homestead Act was open to blacks. By 1879, over 6000 black Americans had moved to Kansas. They were known as the exodusters
How did life for Blacks in the North improve after 1877?	In 1882 Booker T Washington set up a school to train black children to be farmers and house servants. In 1900 he set up the Negro Business League.
How did Big Business create positive opportunities between 1977 and 1900?	Cotton and tobacco demand increased so created jobs. Huge 'bonanza' farms meant jobs for many who couldn't afford their own land. Growth of railroads meant demand for coal, iron and steel.
What negative impact did Big Business have on people between 1877 and 1900	Cotton demand meant more blacks as poorly paid sharecroppers; American Tobacco Company refused to improve wages; Small farms lost out to Bonanza Farms
How did the growth of cities create new opportunities for people between 1877 and 1900?	Work, entertainment, education and freedom.
What problems did the growth of cities lead to?	Overcrowding & Disease
Why did people want to move to America?	American economy was booming by 1880s; USA offered freedom of religion and thought
What problems did immigrants face in America?	Immigrants often ended up in the poorest areas of cities; Laws preventing Chinese workers from

Key Terms

Jim Crow laws	The name given to laws that separated white and black people in the South
Sharecropper	Many black people lived on land owned by whites and had to give them 2/3 of their crops as rent. It gave control to white people and felt a lot like slavery to black people.
Homestead Act	1862 law that said people could get 160 acres of land on the Plains if they paid a small fee and stayed on the land for 5 years.
Bonanza farms	Huge farms owned by large businesses. Around 10,000 acres in size

Beliefs and Values - Year 11 - Medical Ethics.

Key Words			
Abortion	The deliberate termination of a human pregnancy, most often performed during the first 24 weeks of pregnancy	**Hospice**	Hospice care is a style of care. Hospice teams include doctors, nurses, social workers, therapists, counsellors and trained volunteers. Hospices aim to feel more like a home than hospitals do
Cloning	Cloning is the process of producing genetically identical individuals of an organism either naturally or artificially	**Euthanasia**	The painless killing of a terminally ill patient
Genetic Engineering	The deliberate modification of the characteristics of an organism by manipulating its genetic material	**Quality of Life**	How easy or difficult someone's life is – e.g. some illnesses / injuries can cause a low quality of life
Evolution	Scientific theory of the development of humans from apes	**Sanctity of Life**	The belief that all life is sacred as man is made in God's image

Key Ideas		
Cloning & Genetic Engineering 	**Christian Views** ☐ Each human has been uniquely created by God with a purpose: a human clone is a copy, unnaturally created. ☐ We have a God given responsibility to look after and care for God's creation (**Stewardship**). ☐ Catholics believe human life, which begins at conception, is made in the **image of God** so is sacred: embryo research and high death rates during testing is disrespectful to life. ☐ Cloning separates the procreation of children from sex so therefore is unnatural. ☐ Jesus helped those who suffered, and God loves all of His creations. The Bible teaches us to be loving and compassionate (agape): trying to cure terrible illnesses is a caring thing to do. ☐ God is the creator and science should not attempt to take on this role. - ***'There is a time to live and a time to die.'*** ☐ God gave Adam dominion over all of creation – can use cloning for the benefit of humans.	
When does life begin 	• Most people, whether they hold a religious belief or not, would accept that human life is special and worthy of being preserved. For religious believers, life is special because it comes ultimately from God. Life is a gift and is unique and priceless. • Many Christians believe that all babies have a **sou**l from the moment of **conception** and so are fully human. This is based on the teaching in Genesis 1:27 that people are made in the image of God; that God has a plan for every individual (Jeremiah 1:5) and that God is the creative spark from the moment of conception (Psalm 139:13). This means that they believe the foetus is fully human.	
Abortion 	- **Abortion** is the removal of a foetus from the womb in order to end a pregnancy. - In the UK (except Northern Ireland) it is **legal** during the first 24 weeks of pregnancy unless the mother's life is in danger or the foetus is severely deformed. ☒ The ***Catholic Church*** is strongly against abortion. They believe in **sanctity of life**, the idea that life is a sacred gift from God which only God can take away. They see the foetus as a living thing. ☑ The ***Church of England*** think abortion is sometimes acceptable as a pregnancy as a result of rape or where the child would be very ill would lead to a very poor **quality of life.**	
Euthanasia 	- **Euthanasia** is the painless killing of a patient with a terminal illness. - **Voluntary** euthanasia is where the patient asks for their life to be ended. - **Non-voluntary** euthanasia is where the patient is not capable of asking to die, perhaps in a coma. - All forms of euthanasia are currently **illegal** in the UK. ☒ The ***Catholic Church*** is strongly against euthanasia. They believe that only God can give and take life and that life is sacred (**sanctity of life**) . ☑ Some ***liberal Christians*** think euthanasia can be an act of mercy which Jesus tells them is a good thing to do, this is especially the case when someone's **quality of life** is very poor.	
The Afterlife 	- Christians believe that when you die you will be judged and that those who are found to be good will go to **heaven** but those who have sinned and gone against God's wishes will go to **hell**.	
	Roman Catholics believe that there is a middle stage called **purgatory** where souls go to be purified of sin before they go to heaven	**Some Christians** believe that Jesus will return on a future **Day of Judgement** when all souls will be judged

Lessons 1 & 2 Aerobic respiration	Lesson 3 Anaerobic respiration	Lessons 4 & 5 Response to exercise and metabolism
Respiration: The process of releasing energy from food **Energy**: The capacity of a body or a system to do work Respiration is an **exothermic** reaction. All living organisms must respire to release energy for: • Movement • Temperature control • Growth and repair Aerobic respiration word equation: Glucose + Oxygen → Carbon dioxide + water + energy Aerobic respiration symbol equation: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy **Reactants of aerobic respiration** = Glucose and Oxygen **Products of aerobic respiration** = Carbon dioxide, water and energy Aerobic respiration takes place in the **mitochondria**. Aerobic respiration happens all the time in all cells.	**Anaerobic respiration:** Releasing energy from food without oxygen. Anaerobic respiration is <u>the incomplete breakdown</u> of glucose to lactic acid. Takes place in the **cytoplasm** Word equation for anaerobic respiration: Glucose → Lactic acid + Energy Symbol equation for anaerobic respiration: $C_6H_{12}O_6 \rightarrow C_3H_6O_3$ + Energy **Reactants of anaerobic respiration** = Glucose **Products of anaerobic respiration** = lactic acid + energy. Cells will respire anaerobically when energy demand is <u>very high</u> and there isn't enough time to get oxygen to the respiring muscles. Used during high intensity, quick, explosive activities such as 100m sprint. Anaerobic respiration cannot be used for long because lactic acid builds up and it is toxic. This causes muscular fatigue. Fermentation: Anaerobic respiration in yeast and plant cells. Word equation for fermentation: Glucose → ethanol + carbon dioxide Symbol equation for fermentation: $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2C0_2$	Rate of respiration **increases** when you exercise. To allow increase in rate of respiration: • Increased breathing rate • Increased depth of breathing • Increased heart rate After resorting to respiring anaerobically, when you stop exercising you will have an **oxygen debt**. <u>Oxygen debt</u> refers to the amount of extra oxygen required to react with the built-up lactic acid. Lactic acid reacts with oxygen to form carbon dioxide and water: Lactic acid → oxygen + water To provide the <u>extra oxygen</u> needed to pay the oxygen debt, heart rate and breathing rate remain elevated after exercise. **Muscular fatigue**: where cells in the muscle are unable to contact properly due to the build up of lactic acid. **Metabolism**: all chemical reactions happening in an organism.

Lessons 1& 2 Plant organs and tissues	Lesson 3 Photosynthesis	Lesson 4 Limiting factors of photosynthesis
There are 3 main plant organs: • Leaves: Site of photosynthesis • Roots: Absorb water and minerals from the soil, anchor the plant firmly in to the ground. • Stems: Support the leaves and the flowers, connect roots to the leaves, flowers and fruits The leaf is an organ made up of tissue layers these include: • Waxy cuticle: A waterproof layer to prevent water loss • Epidermis: Protective covering • Palisade mesophyll: Contain cells packed with chloroplasts for photosynthesis • Stomata: Hole in the underside of leaves to allow CO_2 in to the leaf and O_2 out. • Guard cells: Control the stomata by opening or closing them • Spongy mesophyll: cells surrounded by lots of air spaces to allow gases to diffuse in and out. Meristem are found at the tips of roots or shoots. Responsible for growth. A plant in a hot, dry climate will have a lower stomatal density than a colder, wetter environment to help reduce water loss.	Photosynthesis word equation: carbon dioxide + water → (light energy, chlorophyll) glucose + oxygen Photosynthesis symbol equation: $6\ CO_2 + 6\ H_2O \xrightarrow[\text{chlorophyll}]{\text{light energy}} C_6H_{12}O_6 + 6\ O_2$ The reactions for photosynthesis are carbon dioxide and water. The products of photosynthesis are glucose and oxygen. Light energy and chlorophyll are needed to drive the photosynthesis reaction. Photosynthesis takes place in the chloroplast in the palisade mesophyll cells of the leaf. Carbon dioxide enters and oxygen exits the leaf by diffusion through the stomata. The leaf can be tested for starch using iodine. Starch turns blue/black in the presence of iodine.	A limiting factor is something that can affect the rate of a reaction depending on its availability. There are 4 limiting factors of photosynthesis: • **Temperature**: Increasing temperature increases the rate of photosynthesis to a certain point after which any further increase in temperature decreases rate. • **Carbon dioxide concentration:** The higher the concentration of carbon dioxide the faster the rate of photosynthesis to a certain point. Beyond that there are other limiting factors affecting rate. • **Light intensity:** Increasing the light intensity increases rate of photosynthesis to a certain point. Beyond which other limiting factors are affect rate. • **Amount of chlorophyll:** Increasing the amount of chlorophyll increases the rate of photosynthesis to a certain point. Beyond which other limiting factors are affecting rate. A lack of chlorophyll can be caused by disease or lack of nutrients needed to make chlorophyll.

Lesson 5 **Photosynthesis required practical**	**Lessons 6** **Uses of glucose and inverse square law for light intensity**	**Lessons 7** **Plant transport systems**
You will investigate: **The effect of light intensity on the volume of oxygen produced by a plant by photosynthesis** **Independent variable**: light intensity **Dependent variable:** Number of bubbles of oxygen produced in set time **Control variable**: Temperature, pond weed (size, species, piece), light source (type of light), time, concentration of carbon dioxide. The more oxygen produced in a set time period the faster the rate of photosynthesis. We can predict that higher light intensity would result in a greater volume of oxygen due to a faster rate of photosynthesis.	There are 5 uses of glucose: **Starch**: Glucose is converted to starch and stored **Energy**: Glucose is used as a reactant in the respiration reaction to release energy **Amino acids**: Glucose is used to make amino acids, to make proteins. **Fats and oils**: Glucose is converted to fats and oils for storage. **Cellulose**: Glucose is made in to cellulose for cell walls. Inverse square law for light intensity: For each distance of a plant from a lamp, light intensity will be proportional to $\frac{1}{d^2}$ where d= distance	**Xylem**: • Forms part of the vascular bundles in plants. • Transports water and mineral ions in one direction from roots to leaves. • Hollow tubes strengthened with lignin, impermeable to water. **Phloem**: • Forms part of the vascular bundles in plants. • Transports dissolved sugars from leaves all round the plant. **Root Hair cells**: • Absorb water from soil by osmosis • Absorb mineral ions from soil by diffusion and active transport **Transpiration**: The flow of water from roots to leaves Rate of transpiration can be measured using a potometer. There are **4 factors that affect rate of transpiration**: Light intensity, temperature, wind and humidity. **Translocation**: The movement of food through the phloem around the plant.

Lessons 1
Sexual and asexual reproduction

Sexual reproduction involves the fusions of male and female gametes

Gametes: sex cells, sperm and eggs in animals, pollen and egg cells in plants

In sexual reproduction genetic information is carried and passed on in genes.

We inherit 1 set of genes from each parent.
The mixing of genetic information leads to variation in the offspring.

	Sexual reproduction	Asexual reproduction
Number of parents?	2 parents (male & female)	1 parent (male or female)
Are offspring called clones?	No offspring are not clones of the parents	Yes offspring is a clone of parent
What happens to make the offspring	Fusion of sperm and eggs	The parent splits (mitosis) or a bud is formed
Is there genetic variation in offspring	Yes offspring is a mix of both father and mother	No offspring are genetically identical to parent
Examples of organisms which reproduce in this way	Dogs, Humans, Hamsters, fish, snakes, birds,	Bacteria, Yeast, daffodils, strawberries

Lessons 2
Meiosis

Gametes are sex cells produced by a special type of cell division called meiosis.

Meiosis is special as the chromosome number reduces by half.

Gametes must have half set of genetic information, 23 chromosomes. This is vital because it ensures fertilisation results in a cell with a full set of genetic information.

Gametes are described as haploid, this means half set of genetic information.

Meiosis occurs in the testes and ovaries.

	Mitosis	Meiosis
Where does it occur	All over the body	Sex organs
Number of divisions	1	2
Creates	All cells apart from gametes	Gametes
Number of chromosomes	46 (diploid)	23 (haploid)
Produces	Two cells	Four cells
Function	Cellular reproduction, growth	Sexual reproduction

Lessons 3
DNA and the genome

DNA is a chemical that all genetic material is made from.

Contains coded information on how to make an organism and how to make it work.

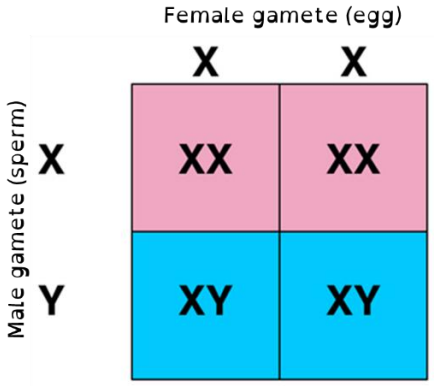
DNA is a polymer, it is made up of two strands, it is twisted to form a double helix.

Chromosomes are made of DNA
Short sections of DNA are called genes
Genes are instructions to make proteins.
Proteins are made from amino acids bonded together.
If you change the order of amino acids, you will change the protein that you make.

Genome: includes all the genetic material in an organism.

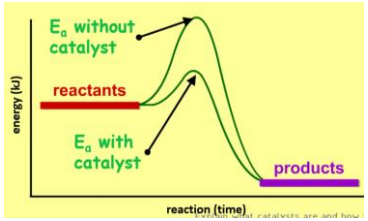
Scientists have worked out the whole of the human genome, this is called the human genome project.

The knowledge of the genome from the Human genome project will help with the identification of genes, understanding the link between genes and disease, aid the development of effective treatments and also helps with developing our understanding of evolution.

Lessons 4 Sex determination	Lessons 5 Genetic inheritance	Lessons 6 Inherited genetic disorders
There are 46 chromosomes in every cell in the human body except gametes. There are 23 pairs of chromosomes. 22 pairs of chromosomes contain genes that control characteristics. 1 pair of chromosomes determine sex. Males have XY sex chromosomes Females have XX sex chromosomes.  Using a punnet square as shown above, it is evident that there is a 50% chance will be female and 50% chance of having a male child.	You have 2 copies of every gene, one inherited from your father and one inherited from your mother. **Allele**: different versions of a gene e.g. hair colour alleles would include blonde, red, black and, brown. **Heterozygous**: When an individuals carries 2 different alleles for a particular gene. **Homozygous**: When an individual carries 2 identical alleles for a particular gene. **Phenotype**: What the organism actually looks like e.g. blue eyes, red flowers **Genotype**: The genetic make up of an organism- refers to the genes the organisms has. **Dominant**: An allele that will show up in the phenotype of an organism. **Recessive**: A characteristic that is masked by a dominant gene.	Polydactyl is an inherited genetic disorder caused by a dominant allele and results in extra fingers or toes. Polydactyl is unusual because it is caused by a dominant allele. Most genetic disorders are caused by inheriting 2 recessive alleles. Cystic fibrosis is an inherited genetic disorder of cell membranes. It results in the body producing lots of thick stick mucus which clogs up the air passages and the passages in the pancreas. Genetic screening: A test to analysis a person's DNA. Antenatal screening: Used to test the DNA of the foetus while it is still in the uterus. Pre-implantation genetic diagnosis: Used to test for genetic disease in an embryo before it is implanted in to the uterus of the female. This forms part of the process of IVF.

Lessons 1 Calculating Rates of Reaction	Lesson 2 Collision Theory & Surface Area	Lessons 3 Required Practical Concentration

• The rate of reaction = How quickly a reaction is happening.
  ○ How quickly reactants are turned into products
• $rate = \frac{amound\ of\ reactant\ lost}{time}\ or\ \frac{amount\ of\ product\ formed}{time}$
• We can record experimental data to allow us to calculate the rate of reaction, these include:
  ○ Measuring the decreasing mass of a reaction mixture.
  ○ Measure the increasing volume of gas given off.
  ○ Measuring the decreasing light passing through a solution
• If you change the temperature or surface area you will still get the same amount of product (you just get them quicker or slower)
• If you change the concentration you will get a different amount of product (and you will get them quicker or slower).
• Gradient of the line gives you the rate of reaction.
• If the gradient increases then the reaction rate is faster.
• If the gradient decreases then the reaction rate is slower.
• To record the gradient of a curve you need to take a tangent.
	• Reactions don't happen unless the substances are in contact.
	• Particles are constantly moving.
	• For a chemical reaction to take place the reactant particles must collide first.
	• For the collision to be effective the particles must have the right amount of energy.
	• The minimum amount of energy required for an effective collision is called the activation energy.
	• The higher the frequency of collision the faster the rate of reaction.
	
	Surface Area/Particle Size
	• The sum of all the areas of each side of a shape
	• Using smaller particles increases surface area
	• Increase in surface area allows more *frequent* collisions at surface
		You will investigate the **Effect of Concentration on Rate of Reaction.**
		
		• **Independent variable**: concentration of hydrochloric acid
		• **Dependent variable**: volume of hydrogen gas produced
		• **Control variable**: amount of magnesium added, temperature of solution
		
		Concentration
		• The number of particles in a given volume.
		• At high concentrations there are more particles.
		• More particles in the same space means more frequent collisions.
		• If we double the concentration we double the frequency of collisions
		• More frequent collisions = faster rate of reaction.
		Pressure
		• Gases only
		• At high pressure, the particles are closer together.
		• This means the particles are more likely to collide more frequently.
		• More frequent collisions = faster rate of reaction.

Lesson 4 Required Practical Temperature	Lessons 5 Catalysts	Lessons 6 & 7 Reversible Reactions & Dynamic Equilibrium
You will investigate the **Effect of temperature on Rate of Reaction.** • **Independent variable**: temperature of sodium thiosulfate • **Dependent variable**: time taken for cross to disappear. • **Control variable**: amount of hydrochloric acid, concentration of solution, concentration of hydrochloric acid Temperature • Particles turn heat energy into kinetic energy • When they get hotter they move faster • When they move faster they collide more *frequently* • Particles have more energy at higher temperatures • More collisions with energy higher than the activation energy (more effective collisions)	• Catalysts speed up the rate of reaction without getting used up (same amount at the start as you have at then end) unlike the reactants. • Catalysts are specific to reactions. • Catalysts lower the reaction's activation energy (E_a). • They do this by providing an alternative pathway • This reduces the energy needed to start a reaction • Lower activation energy means more collisions with energy higher than the activation energy. (more effective collisions)  	• Sometimes reactions can reverse themselves, and the products change back to being reactants again. • RE**ACTANTS ⇌ PRODUCTS** • A **reversible reaction** is a reaction that occurs in both the forward and reverse direction. • It is represented by the symbol ⇌ • The amount of energy released in one direction must be the same as the energy absorbed in the opposite direction. **hydrated copper sulphate** • The forward reaction requires heat – it is endothermic Blue → White • The backwards reaction gives out heat – it is exothermic White → Blue **Equilibrium** is when the rate of the forward reaction is equal to the rate of the backward reaction. There is no observable change For equilibrium to occur: • Closed system • Reversible reaction During equilibrium: • Concentrations of products and reactants stay the same. • But the concentrations are not necessarily equal

Revision Guide: Foundation pages 138-145, Higher pages 142-149

Lesson 8
Le Chatelier's Principle (Higher Tier)

- Describes how the position of equilibria changes to favour the forward or backward reaction
- Equilibrium shifts to reduce change
- When conditions are changed the reaction will do everything it can to counteract the change

Changes:

- If you increase the temperature it will try and reduce it
- If you increase the concentration of the reactants it will try and get rid of some
- If you increase the pressure it will try and reduce it
- If you add a catalyst…
- The position of equilibrium doesn't change (but it will speed up the forward and backward reaction equally)

Revision Guide: Foundation pages 155 -158, Higher pages155-158

Lessons 1 & 2
Early atmosphere and its evolution

The envelope of gases surrounding the earth or another planet is called an atmosphere.
Atmospheres are formed from mixtures of different gases.
Atmospheres can be formed from different combinations of gases.
Different planets have different types of atmospheres.
Scientists predict that the early atmosphere contained :

- a large amount of **carbon dioxide**
- little or no **oxygen**
- **Water** vapour
- small amounts of other gases, such as **ammonia** and **methane**

One theory suggests that the early atmosphere came from intense **volcanic** activity.
Combustion reactions happen in a volcano, where **hydrogen** and **carbon** react with **oxygen** to make **Carbon dioxide** and **water vapour**.
As the Earth cooled the water vapour condensed to form **oceans**.
Nitrogen was also released by volcanoes which gradually built up in the atmosphere because it is unreactive.

Earths atmosphere Today	
Nitrogen	78%
Oxygen	21%
Water	1%
Carbon Dioxide	0.04%

Photosynthesis by primitive plants and algae released oxygen, which gradually built up in the atmosphere.

carbon dioxide + water → glucose + oxygen

Oxygen is a reactive gas, as it built up in the atmosphere it reacted with other gases.

Ammonia + Oxygen → Nitrogen oxide and water

Methane + Oxygen → Carbon Dioxide +Water

Carbon dioxide dissolved in the oceans, formed carbonate compounds and precipitated as limestone.
Carbon dioxide is incorporated into living things which form fossil fuels.

Lessons 3 & 4
Greenhouse effect and global warming

Greenhouse gases are gases that absorb heat radiated from the Earth then release **energy** in all directions, which keeps the Earth warm.
Greenhouse gases present in the atmosphere include:

- water **vapour**
- **carbon dioxide**
- **methane**

Human activities are increasing the amount of some greenhouse gases in the atmosphere. For example:

- farming cattle releases **methane**
- farming rice in **paddy fields** releases methane
- burning **fossil fuels** in vehicles and **power stations** releases carbon dioxide
- **deforestation** releases carbon dioxide and reduces the absorption of carbon dioxide through **photosynthesis**

Greenhouse effect

1. electromagnetic radiation a short wavelength, (e.g. UV) passes through the Earth's atmosphere
2. the Earth absorbs most of the radiation.
3. Some of the radiation is reflected as long wave radiation ,(infrared radiation)
4. some of the infrared radiation is absorbed by the covalent bonds between the atoms in greenhouse gases.
5. The greenhouse gases can then emit the infrared radiation back into the atmosphere.

Global warming is the term used to describe the warming of the climate in the past 200 years
The effects of global warming include:

- **glaciers** and polar ice melting
- **sea levels** rising
- patterns of rainfall changing, producing **floods** or **droughts**
- **habitats** changing

Lessons 5
Atmospheric pollutants

Combustion creates pollutant gases:

Methane + Oxygen -> Carbon dioxide + water

Complete combustion of a **hydrocarbon** fuel occurs when there is a good supply of oxygen. It releases the maximum amount of **energy** and produces carbon dioxide and water.
Incomplete combustion of a hydrocarbon fuel occurs when there is a poor supply of oxygen. Less energy is released.
Water is produced along with carbon monoxide , carbon dioxide and carbon.
Carbon monoxide is a poisonous gas
It binds to **haemoglobin** in your red blood cells, preventing them from carrying oxygen to the cells in your body. Carbon monoxide is colourless and has no smell.
Particulate carbon
Causes health problems for humans because it irritates the lining of the lungs, can make **asthma** worse, and perhaps even cause **cancer**.
Particulate carbon can also cause **global dimming**, which may reduce rainfall.
Sulfur dioxide is caused when sulfur atoms which are present in some fossil fuels are oxidised:
Sulfur dioxide is then further oxidised in the atmosphere to sulfur trioxide, SO_3. This gas dissolves in rainwater to make **acid rain**, which is a dilute solution of sulfuric acid, H_2SO_4.
Acid rain harms and kills plants and animals, especially those that live in aquatic environments. It can also damage man-made objects like statues and buildings
Nitrogen is not present in fuels, but the high temperatures and pressures inside a car engine can cause the nitrogen and oxygen in the air to react together to make oxides of nitrogen.
Nitrogen oxide gases can cause acid rain, and they also react in the atmosphere with other pollutants to make photochemical **smog**.
Smog can have major health effects, causing asthma attacks and even death.

Lesson 1
Finite & Renewable Resources

Finite

- Resources that are being used up faster than they can be replaced.
- There is a limited amount.

Renewable

- Resources that can be replaced at the same rate at which they are used up.

- Humans use the Earth's resources to provide warmth, shelter, food and transport
- Natural resources provide food, timber (wood), clothing and fuels, this is supplemented by agriculture
- Finite resources from the Earth, oceans and atmosphere are processed to provide energy and materials
- Chemists provide new synthetic products which supplement or replace natural products.

Sustainable Development

- Meeting the needs of current generations without compromising the ability of future generations to meet their own needs.

Natural product	Use	Synthetic product that supplements or replaces it
cotton	clothing	polyester
wood	construction material	PVC

Lessons 2 & 3
Pure & Potable Water & Required Practical

Potable Water

- Water that is fit (safe) to drink.

Pure Water

- We get pure water through distillation
- Boil water into steam
- Cool to condense steam and collect water
- Distillation on a large scale would require a lot of energy which would make the process expensive we will look at this in more detail next lesson.
- Pure water only contains H_2O molecules.

Water Treatment

- **Screen** – stops large objects
- **Coarse filter** – large particles removed
- **Sedimentation** –particles fall to bottom, top water drained off
- **Fine filter** – very small particles removed
- **Chlorination** – Chlorine added to sterilise (kill germs)

Chemistry Required Practical: Water Analysis
To analyse the pH and dissolved solid content of 3 water samples

Chemistry Required Practical: Water purification
To obtain pure water from a solution containing water and dissolved solids.

Lesson 4
Treating Waste Water

- Waste water requires treatment before being released into the environment

- Sewage and agricultural waste water require the removal of:
  - Organic matter
  - Harmful microbes

Sewage Treatment

1. Screening removes large solid particles i.e. grit by passing the sewage through a screen.
2. Sedimentation allows the small solid particles (sediment) to sink to the bottom of the tank forming sewage sludge while the liquid (effluent) remains above.
3. The sewage sludge is dried and anaerobically digested (broken down by microorganisms in the absence of oxygen).
4. The effluent is aerobically digested (broken down by microorganisms in the presence of oxygen). This removes organic matter and harmful microbes.

Fresh water / ground water	Desalination	Treatment of waste water
Filtration and sterilisation Requires sterilising agents and filtration equipment	Distillation or using membranes e.g. reverse osmosis Both require lots of energy	Screening, sedimentation, digestion (aerobic and anaerobic) Several steps, requires large treatment plant

Lesson 5 Extracting Metals (Higher Tier)	Lesson 6 Life Cycle Assessments	Lesson 7 Reduce, Reuse & Recycle

Problems with traditional mining:
• Large amounts of waste rock
• Creates large holes in the Earth's crust
• Requires lots of energy
• Only worthwhile extracting high-grade ores
Two alternatives to mining are:
Phytomining:
Advantages
• Uses low grade copper ore
• Requires less energy than smelting
• Produces less air pollution
• Reduces amount of waste rock
Disadvantages
• Can produce toxic chemicals
• Much slower process
• Electrolysis requires large amounts of electricity.
Bioleaching:
Advantages
• Uses low grade copper ore
• Very simple and cheap
• Produces less air pollution
• Reduces amount of waste rock
Disadvantages
• Can produce toxic chemicals
• Much slower process
• Efficiency is very low (lots of waste)
• Electrolysis requires large amounts of electricity.
	• Lifecycle analysis (LCA) is used to work out the **environmental impact** of a product throughout its whole life from extraction of materials through to final disposal.
	• 4 Key Stages:
	  • Raw materials
	  • Manufacture
	  • Use
	  • Disposal
	• 4 Impacts accessed
	  • Water Consumption
	  • Energy used
	  • Carbon Footprint
	  • Natural Resources
	• Life Cycle Assessments are useful for:
	  • Comparing different materials for the same job.
	  • Comparing the same material for different jobs:
		Because both the materials and the energy sources we use are limited/finite, we need to reduce use of these resources.
		• So they don't run out!
		• Also, because obtaining raw materials from the Earth by quarrying and mining causes environmental impacts.
		• The three Rs help to reduce the demand for our limited resources of materials and energy.
		• The three Rs also reduce the amount of waste produced. Landfill takes up space and pollutes the surroundings.
		Glass, Metal and Plastic can be recycled in three steps:
		• Crush
		• Melt
		• Reform

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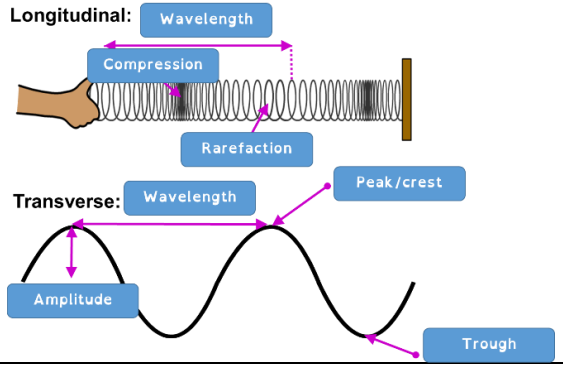
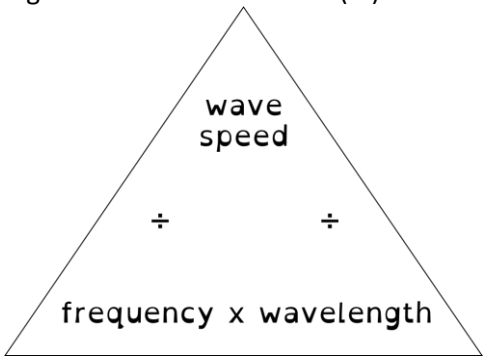
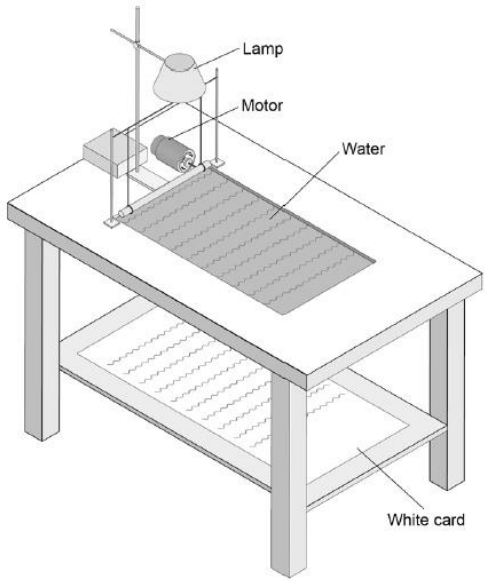
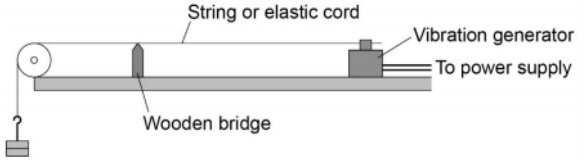
Lesson 1 Introduction to waves	Lesson 2 The Wave Equation	Lesson 3 Required Practical – Properties of waves
• A **wave** is a disturbance that transfers energy without transferring matter. • In a **transverse** wave, the direction of oscillation is perpendicular (at right angles) to the direction of energy transfer. E.g., light, ripples in water. • In a **longitudinal** wave, the direction of oscillation is parallel to the direction of energy transfer. E.g., sound. • The **amplitude** of a wave is the maximum displacement of a point on a wave away from its undisturbed position. For a sound wave, this gives you the volume. • The **wavelength** of a wave is the distance from a point on one wave to the equivalent point on the adjacent wave. • The **frequency** of a wave is the number of waves passing a point each second. For a sound wave, this gives you the pitch. • The **period** of a wave is how long it takes for one wave to pass a point. 	*Period = 1 ÷ frequency* Period in seconds Frequency in Hertz (Hz) You do not need to memorise this equation. • The **speed of sound** can be found by clapping near a wall and listening for the echo. • If you **clap in time with the echo**, the time between claps will be equal to the time taken for the sound to travel from your hands to the wall and back. • You can use **speed = distance ÷ time** • The distance will be **twice** the distance from the person to the wall. • The speed of sound in air is around 300 m/s.# *wave speed = frequency x wavelength* speed of the wave in m/s frequency of the wave in Hertz (Hz) wavelength of the wave in metres (m) 	• You will investigate **the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid.** • Waves in water are investigated using a ripple tank:  • Waves in a solid are investigated using a vibration generator and a piece of string. 

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Lesson 4
The electromagnetic spectrum

- The **electromagnetic spectrum** is a **continuous spectrum** of electromagnetic waves that can be grouped together in terms of their wavelength and frequency.
- The **order of the spectrum** from longest to shortest wavelength is:
- Radio, microwave, infrared, visible light (from red to violet), ultraviolet, x-rays and gamma rays.

Part	Use	Why is this type of wave suitable?
Radio waves	Television and radio	Can travel a long distance through the Earth's atmosphere.
Microwave	Satellite communication	Can travel through the Earth's atmosphere.
Infrared	Electrical heaters	Absorbed by the skin as heat.
Visible	Fibre optic communications	Can travel a long distance through glass fibres.
Ultraviolet	Sun tanning	Absorbed by the skin to produce a dark pigment.
X-rays	Medical imaging	Is absorbed by bone but can travel through skin and tissues.
Gamma rays	Irradiation of food	Kills cells, so will kill bacteria/mould.

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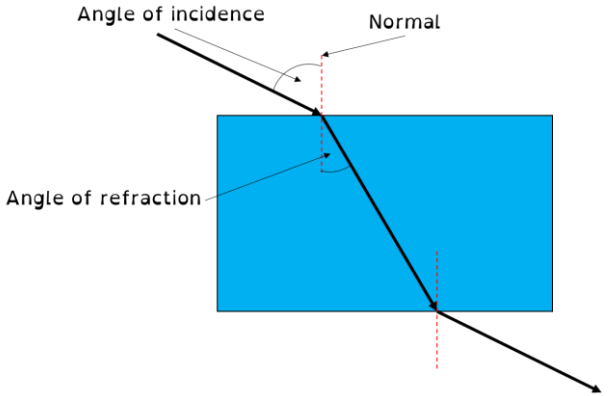
Lesson 5
How electromagnetic waves are generated

- **Changes in atoms or the nuclei of atoms can produce EM waves**.
- When a radio wave is absorbed it causes electrons to move backwards and forwards (oscillate).
- This causes a current that constantly changes direction – an alternating current that has the same frequency as the wave
- **Ultra-violet waves** can cause skin to age prematurely and increase the risk of skin cancer.
- **X-rays and gamma rays** are **ionising radiation** that can cause mutation of genes and cancer.
- Exposure to radiation (called "dose") is measured in **Sieverts** (Sv).
- **Radiation dose** (in Sieverts) is a measure of the damage caused by the radiation in the body.
- **Dose adds up** ("cumulative").

Lesson 6
Refraction

- Different wavelengths of electromagnetic waves are reflected, refracted, absorbed or transmitted differently by different substances and types of surface.
- Refraction is the change in direction that can happen because light travels at different speeds in different materials.
- Light travels more slowly in denser materials, and this means it changes direction towards the normal.
- Refraction won't happen when the light enters a medium at 90° to the surface



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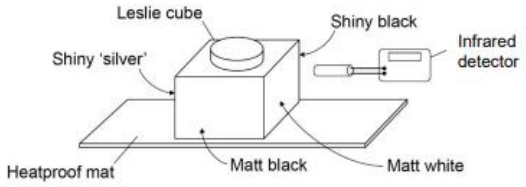
Lesson 7
Required Practical - Radiation

- You will investigate **how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.**



- **Independent variable** – the colour of the surface.
- **Dependent variable** – the temperature measured with the IR thermometer.
- **Control variable** – the distance between the surface and the detector.

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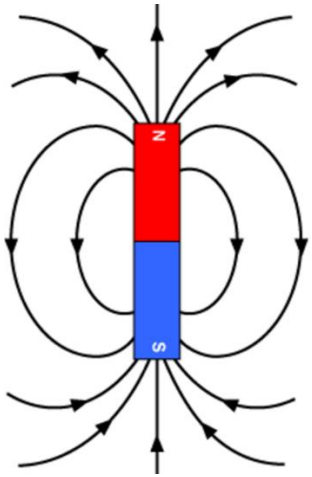
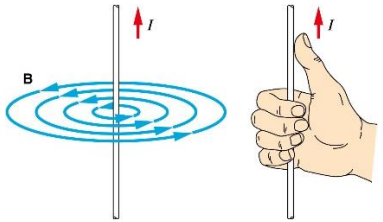
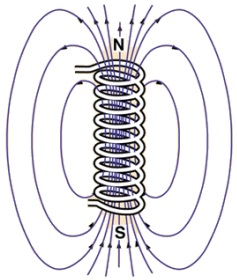
Lesson 1 Magnetic Field Patterns	Lesson 2 Induced Magnetism	Lesson 3 The magnetic effect of a current

• The region around a magnet is called a **magnetic field**. A permanent magnet is an object with a magnetic field.
• The **poles** of a magnet are the areas where the magnetic fields are strongest – usually called North and South. Strictly, we should call these north-seeking and south-seeking.
• Two like poles **repel** each other. Two unlike poles **attract** each other.
• Attraction and repulsion between two magnetic poles are examples of a non-contact force.
• The shape of a magnetic field can be found by placing **iron filings** on paper over a magnet or using a **plotting compass**.
• The magnetic field around a bar magnet is symmetrical:
 
	• An induced magnet is a material that becomes a magnet when it is placed in a magnetic field.
	• **Induced magnetism** always causes a force of attraction.
	• When removed from the magnetic field, an induced magnet loses most/all of its magnetism quickly
	• The strength of an induced magnet will depend on the strength of magnetic field it is placed and the time it is within the field.
	• The strength of a magnet can be simply investigated by seeing how many paperclips it picks up.
	• Smaller paperclips will allow the detection of smaller differences in strength.
		• The **magnetic field around a current-carrying wire is circular**.
		• The strength of the field decreases as you get further from the wire and increases if the current increases.
		 
		• A **solenoid** is a coil of wire with a current flowing through it.
		• Outside the solenoid, the field looks like the field from a bar magnet.
		• Inside the solenoid, the field is strong and uniform.
		 
		• The **strength of a solenoid** can be increased by:
		  • Increasing the current
		  • Increasing the number of loops
		  • Adding an iron core (to make an electromagnet.)

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<table>
<tr><th colspan="2">Lesson 4
HT ONLY: The motor effect</th><th>Lesson 5
HT ONLY: Magnetic Flux Density</th></tr>
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The motor effect states that there is a force on a current-carrying conductor in a magnetic field.
This occurs due to interaction between the magnetic fields.
Where the fields point in the same direction, the field becomes stronger.
Where the fields point in the opposite direction, the field becomes weaker.
There is a force on the wire from where the field is stronger to where it is weaker.

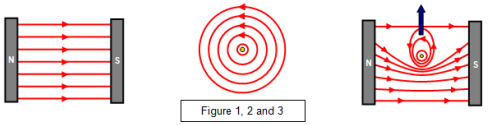

Figure 1, 2 and 3

The size of the force depends on the strength of the magnetic field, the size of the current and the angle between conductor and field (the largest force is when they are at right angles).

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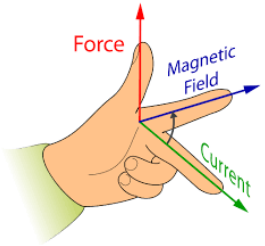
The direction is found using Fleming's left-hand rule where:
Thumb, first and second fingers all at right angles.
First finger is the magnetic field from N→S
Second finger is the current from + → -
Thumb is direction of force



A loop of wire will experience a force in the opposite direction on opposite sides – it is an electric motor.
A motor can be made to rotate faster by: increasing current, increasing the number of coils, increasing the magnetic field strength, or making sure coil is parallel to field.
The motor's direction is reversed by: reversing the current or reversing the magnetic field

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The size of the force in the motor effect is given by the equation:

Force = magnetic flux density x current x length.
Force in Newtons (N)
Current in Amperes (A)
Length in metres (m)
Magnetic Flux Density, the "strength of the magnetic field" in Tesla (T)

(You do not need to memorise this equation)

An object can be made to "float" in a magnetic field if its weight downwards is equal to the magnetic force on it upwards.

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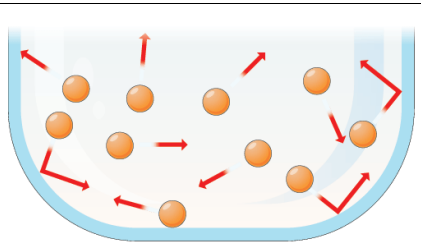
Lesson 7 Specific Latent Heat	Lesson 8 Brownian Motion	Lesson 9 Pressure in gases
• The **specific latent heat** of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature: • **Specific latent heat of fusion** – change of state from 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.