



10

Name: \_\_\_\_\_

Form: \_\_\_\_\_

**Knowledge Organiser**  
**Autumn Term**  
**2023/24**  
**Year 10**



## Contents

6. Tier 2 Vocabulary

8. English

18. Maths

22. Biology

26. Chemistry

42. Physics

46. Religious Studies

52. History

56. Geography

60. Spanish

64. French

## A Knowledge Rich Curriculum at Great Sankey High School

Research around memory suggests that if knowledge is studied once and not revisited or revised, it is not stored in the long-term memory. This means that after one lesson, or revising for one test, the knowledge will not be retained unless it is studied again. To ensure that knowledge is embedded in the long term memory it must be revisited frequently. Ensuring knowledge is embedded aids understanding, and in turn makes future learning more successful. To quote Daniel Willingham's learning theory,

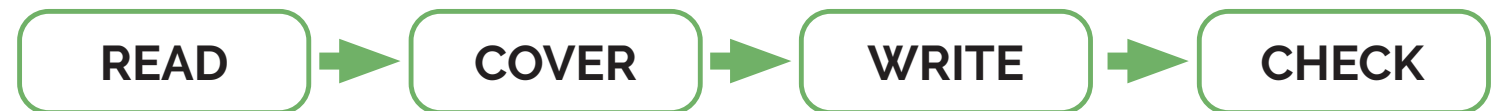
***“Thinking well requires factual knowledge that is stored in our long-term memory”***

As part of home learning, students should be revising what they have been taught recently but also content they were taught previously. Therefore, as part of our strategy to embed learning over time we have developed knowledge organisers across years 7 -11. These will provide key content and knowledge allowing students to pre-learn and re-learn, a vital part of processing all the information required to be successful. This knowledge will form the backbone of assessments in school.

## How to use your knowledge organiser

Knowledge organisers will be used in subject lessons, homework activities and form time and therefore you need to bring your knowledge organiser to school every day.

Ensuring that knowledge is retained into your long-term memory and you are ready for tests takes work!



To encourage students to build good study habits, students will be assigned homework quizzes on a week A through the Google Classroom. Students will be expected to use revision strategies such as read, cover, write, check to learn key knowledge and will then complete the quizzes to demonstrate their learning. Completion of these quizzes is an essential homework activity and will be closely monitored by the pastoral team.

## Other methods that you may wish to try at home are listed below:

- Create mind maps.
- Create flashcards.
- Get sticky with your learning: write out key points from the KO as you read over it on post-it notes.
- Write your own basic recall quizzing questions around the keywords, definitions and key facts that you need to know. Test yourself with these questions and then leave it overnight to answer them the next day.
- Write your own challenging questions using the following command words – explain, compare, evaluate. Then create a model answer for these questions.
- Put the key words from your KO into new sentences.
- Make mnemonics to remember the order of particular concepts.
- Draw a comic strip, storyboard or a timeline describing any series of events that have a chronological order.
- Write yourself or a partner some quiz questions. Quiz each other or swap your questions to see if you can answer each other's questions.
- Think about the big picture – why is knowing specific information important to you/other people/society/companies/science/technology? The more links that you can make, the more meaningful you make your learning and the more likely it is that you will remember it. Think about the big picture – are there any links in the content on your KO to anything that you have watched on TV, read about or heard in the news?
- Give yourself spelling tests.
- Definition tests.
- Draw diagrams of key processes or theories.
- Draw images and annotate/label them with extra information.
- Create fact files.
- Create flowcharts for descriptions or explanations that have a chronological order.
- Summarise in your own words each section.
- Get your parents/carers to test you.
- Pick out key words and write definitions.
- Pre-learning (read a section of your knowledge organiser prior to the lesson).
- Learn key quotes (if applicable). Consider what you may say about these quotes e.g. what the author is trying to make you think/feel, their choice of language, what can be inferred from it.
- Write a letter/blog/article to someone explaining a key idea or concept.
- Prepare to overcome any hurdles: write down any questions or any areas of the KO that you feel you need to speak to your teacher about.
- Use the guidance that may have been given with a specific KO to help you learn the information and use it.

***“Don't practise until  
you get it right.  
Practise until you  
can't get it wrong.”***



# Portable Knowledge in STEM at KS4



STEM stands for **Science**, **Technology**, **Engineering** and **Maths**, and it is important that you can see connections between each of these subjects. In the real world there are very few challenges that only require one set of skills. For example, you wouldn't be able to design a new app, video game or computer program without an understanding of all of the STEM concepts. This section of the knowledge organiser will show you how different STEM subjects have things in common, including examples of how you might use them, and how some things may actually appear slightly different from one subject to the next. As Geography is a Natural Science we can include that too.

EXAMPLE	SCIENCE	TECHNOLOGY & ENGINEERING	MATHS	GEOGRAPHY
Tally chart	Can be used to record the number of pupils in different height ranges in biology.	Can be used when choosing a final design choice from a selection of draft designs.	Can be used to record the number of pupils (usually labelled frequency) with different eye colours or what their favourite subject is.	Can be used to record the number of people visiting honeypot sites when studying tourism such as visitor numbers in Jamaica over a 5 year period.
Pie chart	Can be used to display the % of different hydrocarbons in crude oil or % of different gases in the atmosphere in chemistry.	Can be used to display results of a tally chart.	Can be used to display the proportion or % of pupils who travel to school in different way.	Can be used to record the amount of people working in different job sectors over time in the UK in comparison to other countries.
Bar chart	Can be used to display the number of people with different blood groups in biology.	Can be used to display results of a tally chart.	Can be used to display the number of pupils with a different favourite sweet.	In geography the term histogram and bar chart are interchangeable and are used to display data such as the percentage of forest lost in a range of countries.
Histogram	This is similar to a bar chart but the bars touch each other and they represent continuous data that is grouped, for example number of pupils in different height ranges in biology.	Can be used to display research data. Can also be used to represent time on a "Gant" chart.	In maths this can be used to show the distribution of a data set such as the ages within a population. In most cases, a histogram has different class widths meaning the area of each bar is the frequency for it.	A range of different bar charts and histograms are used when writing up fieldwork.
Line graph	Can be used to display the time taken for salt to dissolve at different temperatures in chemistry.	Can be used to represent trend data during research pieces.	In maths these are sometimes called scatter graphs or timeseries graphs. They can be used to display house prices and/or the trend in a data set over time.	Can be used when studying climate graphs. Line graphs are also used when analysing climate data over a period of time.
Line of best fit	In biology a line of best fit can be point to point, but in chemistry they are most often a straight line. In all 3 sciences they could be a curve depending on distribution of the points. For example the extension of a spring in physics.	x	In maths you might be asked to add a line of best fit to a scatter graph. It is always a straight line drawn with a ruler and can be used on graphs to show correlation between hours of revision and score in test. In GCSE Statistics, we use correlation coefficients and linear regression equations to analyse this in detail.	In geography lines of best fit are used to look for negative and positive correlations when comparing data usually in physical geography modules. It is always a straight line drawn with a ruler through as many points as possible.

# Portable Knowledge in STEM at KS4



Hopefully this section of the knowledge organiser will help you spot where things crossover from one STEM subject to another as you move from lesson to lesson. REMEMBER some things are exactly the same, some are very similar but might be called different things, and some things are different altogether! .....and don't forget STEM stands for **Science, Technology, Engineering and Maths**

EXAMPLE	SCIENCE	TECHNOLOGY & ENGINEERING	MATHS	GEOGRAPHY
Range	Range around a mean can be used with data for heart rate after exercise in biology, amount of hydrogen gas produced in a chemical reaction in chemistry and number of times a ball bounces in physics.	x	The range is a measure of the spread of a data set. It can be used to compare data, with a smaller range meaning it is more consistent such as comparing times athletes run 100m over 10 races.	Range is used in the geographical skills section of course. Range can be used when looking at rainfall and temperature data for different locations or when using development indicators such as literacy rate, life expectancy etc.
Mean, Median and Mode	Mean, median and mode can be used to analyse any sets of data with a range of results.	x	Mean, median and mode can be used to analyse any sets of data in conjunction with the range.	Mean, median and mode are used in the geographical skills section of the course and can be used to analyse any sets of data with a range of results.
Continuous data	These are data values that can take any value and are grouped/rounded. In biology an example would be bubbles of oxygen produced during photosynthesis.	x	These are data values that can take any value and are grouped/rounded. Data could be length, time, capacity or mass.	This is where you have any value in your data. An example would be mm of rainfall.
Discrete data	In science this is sometimes called discontinuous data. An example would be blood group or eye colour in biology.	x	These are specific data values and can be quantitative (numerical) and qualitative (word or category). Examples include type of colour, the result from rolling a dice or the number of pets people have.	Discrete data in geography includes both primary and secondary data. Fieldwork data could include rock sample sizes and how they change from the source to the mouth of a river.
Using co-ordinates	x	Used by a CNC machine to position the cutter when machining a piece of material. Marking out a series of holes from dimensions on a drawing.	4 and 6 figure grid references are used when plotting in 4 quadrants and used in transformations.	Both 4 and 6 figure references are used across all topics in geography to locate places from a map.
Taking measurements that are accurate and precise	Accurate data is close to the true value and precise data gives similar results if you repeat the measurement. In science there are far too many examples to mention!	Used when marking out materials prior to cutting and quality during checking when manufacturing a component.	Being able to read a variety of scales is a key skill for plotting and drawing graphs or measuring angles and lines. It is important in constructions and scale drawings to be within 0.1 cm or 1°	Measurements and accuracy are really important when studying map skills, especially when looking at scale and distance.

Year 10 Term 1		Definition Sentence	Contextual Sentence
1	<b>classical</b>	Representing a high standard within a traditional form or style.	The orchestra played a selection of classical music.
2	<b>comprehensive</b>	Including with all or nearly all elements or aspects of something.	We have a comprehensive selection of art materials.
3	<b>comprise</b>	Consist of; be made up of.	The play comprises three acts.
4	<b>confirmed</b>	Fixed in habit and unlikely to change. Stated that a report or fact is true.	She was a confirmed fan of the band. The phonecall confirmed he had won.
5	<b>contrary</b>	Opposite in nature, direction, or meaning.	Contrary to popular belief, many cats dislike milk.
6	<b>converted</b>	Changed the form, character, or function of something.	The school converted a classroom to a new office area.
7	<b>couple</b>	Two people or things of the same sort considered together. To link or combine something with something else.	A couple of pupils helped tidy the room. You must couple the wire to the battery.
8	<b>decades</b>	Periods of ten years.	Music has changed over the decades.
9	<b>definite</b>	Clearly stated or decided; not vague.	She has very definite ideas about what kind of a job she wants.
10	<b>deny</b>	Refuse to give something to someone; to refuse to admit the truth or existence of.	You can't deny that she's a good singer.
11	<b>differentiation</b>	The process of making two or more things (or people) different.	Mix the paints carefully to allow a gradual differentiation in colour.

12	<b>disposal</b>	The action or process of getting rid of something.	The disposal of radioactive waste is a problem.
13	<b>dynamic</b>	Constant change, activity, or progress; energetic.	This was a dynamic period in history.
14	<b>eliminate</b>	To completely remove or get rid of something.	Try to eliminate fatty foods from your diet.
15	<b>empirical</b>	Based on observation or experience	We now have empirical evidence that the moon is covered with dust.
16	<b>equipment</b>	The necessary items for a particular purpose.	Collect the sports equipment from the gym at the end of the day.
17	<b>extract</b>	Remove/take out, especially by using effort or force. A short passage taken from a text, film, or piece of music.	They extract coal from open pits and underground mines. This extract is taken from his new novel.
18	<b>file</b>	A folder/box for holding loose papers together and in order for easy reference. To march or walk in a single line.	It is good to keep revision notes organised in a file. In silence, they started to file into the room for the exam.
19	<b>finite</b>	Limited in size or extent.	Every computer has a finite amount of memory.
20	<b>foundation</b>	An underlying basis or principle. The lowest part of a building, typically below ground level.	Good research should be the foundation of your report. The foundation of the house was completed last week.
21	<b>global</b>	Relating to the whole world; the whole of something/of a group of things.	The probable result of global warming will be a rise in sea levels.
22	<b>grade</b>	A particular level of rank, quality or value.	You should get a good grade next year.

# Tier 2 Vocabulary

23	<b>guarantee</b>	A formal assurance that certain conditions will be met; a promise with certainty.	The computer comes with a three-year guarantee.
24	<b>hierarchical</b>	Of the nature of a hierarchy; arranged in order of rank.	The Roman Empire had a very hierarchical structure.
25	<b>identical</b>	Exactly the same as.	All the chairs in the room were identical.
26	<b>ideology</b>	A system of ideas and ideals.	The ideology of reincarnation is one of second chances.
27	<b>inferred</b>	To conclude something from evidence and reasoning rather than from pure fact.	His cold personality can be inferred from the description given in chapter one.
28	<b>innovation</b>	A new idea, method, or device	The company is very interested in product design and innovation.
29	<b>insert</b>	To place, fit, or push something into something else.	Insert the cable into the slot on the side of the phone.
30	<b>intervention</b>	Interfering with an outcome - especially of a condition / process to prevent harm or improve something.	Military intervention may increase the conflict even further.
31	<b>isolated</b>	Being in a remote location. Happening only once.	The castle was in an isolated position. The theft was an isolated incident.
32	<b>media</b>	The main means of mass communication (broadcasting, publishing, and the Internet) are regarded together.	The media coverage of the Olympics was very good.

33	<b>mode</b>	A way in which something happens or is done; a fashion or style in clothes, art, literature, etc.	Flying is now a common mode of transport.
34	<b>paradigm</b>	A typical example or pattern of something.	Fast and skilful, he is the paradigm of the perfect football player.
35	<b>phenomenon</b>	A fact or situation that is observed to exist or happen.	Gravity is a natural phenomenon.
36	<b>priority</b>	A thing that is regarded as more important than others.	She made homework her priority.
37	<b>prohibited</b>	Something that has been forbidden/ banned.	The sale of alcohol to people under 18 is prohibited.
38	<b>publication</b>	The preparation and issuing of a book, journal, or piece of music for public sale.	The publication contained several short stories and poems.
39	<b>quotation</b>	Something that is quoted - a word / phrase / passage referred to or repeated. Offers or prices given for something.	The quotation was taken from "Macbeth". The quotation for the repair was £100.
40	<b>release</b>	To set free from restraint/ confinement; to make something available to the public.	The band will release their new single on Friday.
41	<b>reverse</b>	To move backwards; to make something the opposite of what it was.	The winners were announced in reverse order.

## A CHRISTMAS CAROL

Plot		Characters		Vocabulary	Context												
Stave 1	Scrooge treats Bob, Fred, and others with contempt, only caring for money and himself. On Christmas Eve, he has a visit from Marley's Ghost, who warns Scrooge of his fate of the visit of the three spirits.	<b>Ebenezer Scrooge</b>	The main character. He is miserable, miserly, tightfisted and horrid. He rejects Christmas and refuses to offer help or kindness to anyone. The events of the novel change Scrooge completely into a generous, open-hearted man.	Stave (Chapter)	Written by Dickens in 1843 as a direct comment on the conditions endured by the poor (particularly children) during the 'Hungry Forties'. Initially intending to write a pamphlet on the subject, Dickens felt the novel would have more impact and be a "sledgehammer blow" on behalf of the poor.												
Stave 2	The Ghost of Christmas Past shows Scrooge scenes of himself as a young boy in school and as a young apprentice. They also witness Scrooge's breakup with his fiancée and the life and family he could have had. Scrooge reflects on how he has treated others.	<b>Bob Cratchit</b>	Scrooge's clerk. Bob is hard-working, uncomplaining and loving to his family. He is humble and meek and grateful for all he has.	Narrative													
Stave 3	The Ghost of Christmas Present shows Scrooge people celebrating Christmas: the Cratchit family, people in solitary places and his nephew, Fred. Finally, Scrooge sees two monstrous children: Ignorance and Want.	<b>Fred</b>	Scrooge's nephew. He is positive, kind and warm-hearted. He persists in inviting Scrooge to Christmas dinner, as he realises it is Scrooge who misses out in refusing.	Dramatic Irony													
Stave 4	The Ghost of Christmas Yet-to-Come shows Scrooge reactions to his own death and how he is thought of after passing on. This is contrasted with the death of Tiny Tim.	<b>Tiny Tim</b>	Bob Cratchit's youngest son. Tim is a "cripple" and not likely to survive for long. Despite this, he is good natured and thinks of others. He says, "God bless us, everyone!"	Prose													
Stave 5	Scrooge wakes on Christmas morning, reborn as a new man. He delights in putting right his wrongs from Stave 1 and opens himself up to helping others and celebrating Christmas.	<b>Marley's Ghost</b>	Scrooge's dead business partner. He warns Scrooge of his fate after death, if he does not change his ways.	Hyperbole													
<b>Themes</b> <table border="1"> <tr> <td>Christmas</td> <td>Children</td> <td>Poverty</td> </tr> <tr> <td>Generosity</td> <td>Family</td> <td>Responsibility</td> </tr> <tr> <td>Forgiveness</td> <td>Injustice</td> <td>Redemption</td> </tr> <tr> <td>Change</td> <td>Supernatural</td> <td>Death</td> </tr> </table>		Christmas	Children	Poverty	Generosity	Family	Responsibility	Forgiveness	Injustice	Redemption	Change	Supernatural	Death	<b>Spirits of Christmas Past, Present and Yet-to-Come</b>	These three ghosts all play a part in Scrooge's transformation. Each contribute by showing Scrooge key events in Scrooge's life and the lives of others.	Metaphor	Having known periods of poverty and hardship in his own childhood, Dickens was a fierce opponent of the Poor Law, which advocated workhouses and prisons as a solution to the problem of social inequality.
Christmas	Children	Poverty															
Generosity	Family	Responsibility															
Forgiveness	Injustice	Redemption															
Change	Supernatural	Death															
<b>Assessment Objectives</b> AO1, AO2 and AO3 are equally weighted for this question		<b>Fan</b>	Scrooge's sister and the (dead) mother of Fred. Fan is kind to Scrooge when he is a boy in school.	Foreshadowing	Dickens saw a need for the wealthy to share their fortunes and help the most vulnerable in society. He directly references the views of Thomas Malthus, who saw poverty as inevitable and a need to 'decrease the surplus population'.												
AO1	Read, understand and respond to texts. Students should be able to: <ul style="list-style-type: none"> <li>use textual references and quotations, to support and illustrate interpretations.</li> <li>maintain a critical style and develop an informed personal response.</li> </ul>	<b>Fezziwig</b>	Scrooge's old boss. He shows seasonal generosity to his workers, including Scrooge who is his apprentice.	Third Person Intrusive	Christmas had fallen out of favour by 1843 and was not universally celebrated. Although a Christian holiday, celebrating the birth of Jesus Christ, it also encompassed pagan traditions around the winter solstice and looked ahead to the coming spring. In addition, Dickens saw Christmas as a time of sharing food, gifts and time. For Dickens, the 'Christmas spirit' is generosity and compassion for others. Dickens can be partially credited with cementing the popularity of the holiday.												
AO2	Analyse the language, form and structure used by a writer to create meanings and effects, using relevant subject terminology where appropriate.	<b>Mrs Cratchit</b>	Bob's wife. She makes the best of not having much money and makes the most of what she has for her family. She is slightly less forgiving of Scrooge than her husband.	Exclamatory Tone													
AO3	Show understanding of the contexts in which the text was written.	<b>Belle</b>	Scrooge's fiancée. She breaks up with Scrooge, as she can see that money means more to him than she does.	Humour													
				Allegory	Ghost stories were traditional at Christmas. These were often read aloud, and the novella format allows for this. The story uses many tropes of the ghost genre and combines these with a morality tale.												
				Listing													
				Non-linear	<b>Tips</b> <ul style="list-style-type: none"> <li>Support points with reference to characters and events and refer back to the question set.</li> <li>The provided extract can be useful for language analysis (AO2).</li> <li>Remember to integrate points of context into discussion of the characters, events and themes.</li> </ul>												
				Dialogue													
				Genre													
				<b>Structure and Form</b> Written in five chapters called 'staves' (after the musical stave which also has five lines).  The novel is cyclical in nature, with the last stave directly referencing the events of the first.  The stages of Scrooge's redemption are clear. His initial solitude in Stave 1; his gradual realisation and lessons learned in Staves 2-4; his rebirth in Stave 5.													





**A Christmas Carol**

You are advised to spend about 45 minutes on this question.

You should use the extract below and your knowledge of the whole novel to answer the question.

Write about some members of the Cratchit family and how they are important to the novel as a whole.

In your response you should:

- refer to the extract and the novel as a whole.
- show your understanding of characters and events in the novel.
- refer to contexts of the novel.

[40]

The children drank the toast after her. It was the first of their proceedings which had no heartiness in it. Tiny Tim drank it last of all, but he didn't care twopence for it. Scrooge was the ogre of the family. The mention of his name cast a dark shadow on the party, which was not dispelled for a full five minutes.

After it had passed away they were ten times merrier than before, from the mere relief of Scrooge the Baleful been done with. Bob Cratchit told them how he had a situation in his eye for Master Peter, which would bring in, if obtained, full five-and-sixpence weekly. The two young Cratchits laughed tremendously at the idea of Peter's being a man of business; and Peter himself looked thoughtfully at the fire from between his collars, as if they were deliberating what particular investments he should favour when he came into receipt of that bewildering income. Martha, who was a poor apprentice at a milliner's, then told them what kind of work she had to do, and how many hours she worked at a stretch, and how she meant to lie a-bed tomorrow morning for a good long rest; tomorrow being a holiday she passed at home. Also how she had seen a countess and a lord some days before, and how the lord "was much about as tall as Peter"; at which Peter pulled up his collars so high that you couldn't have seen his head if you had been there. All this time the chestnuts and the jug went round and round; and by and by they had a song, about a lost child travelling in the snow, from Tiny Tim, who had a plaintive little voice, and it very well indeed.

There was nothing of high mark in this. They were not a handsome family; they were not well dressed; their shoes were far from being waterproof; their clothes were scanty; and Peter might have known, and very likely he did, the inside of a pawnbroker's. But they were very happy, grateful, pleased with one another, and contented with the time; and when they faded, and looked happier yet in the bright sprinklings of the Spirit's torch at parting, Scrooge had his eye on them, and especially Tiny Tim, until the last.

**Exemplar response**

The Cratchit family are very important to 'A Christmas Carol' because they play a big part in the central story of Scrooge's redemption. They are also important because Dickens wanted to portray the poor of Victorian London in the 19th century in a positive way and they help him do achieve his aims.

We first encounter the father of the Cratchits, Bob, in the first chapter. He is not named by Dickens here – we only discover his name later in the book – and this is perhaps deliberate to show his lowly status – Scrooge only cares of him as a "clerk" and not a human being. Bob is one of the first 'victims' we see of Scrooge's miserly ways – he only has "one piece of coal" and has to "warm himself on a candle" so he is important in establishing Scrooge's meanness and penny-pinching ways. Moreover, Bob reinforces the message of Christmas by "applauding" Fred when he speaks on the benefits of Christmas. Scrooge doesn't want to give Bob Christmas Day off. This was not uncommon at the time and Bob is important in showing the audience how poorly employees were often treated. In the extract, Bob "toasts" Scrooge with his family which shows how grateful he is to Scrooge, despite being so badly treated by him. This was important for Dickens to show how grateful and humble the poor are and weren't the monsters they were thought of.

In Stave three, we see the rest of the Cratchit family. They are obviously poor (Mrs Cratchit is in her "twice turned gown") and they have a small "goose" for dinner. However, they are grateful and make the best of it. Mrs Cratchit and Belinda are "brave in ribbons" and it is said that the goose was treated like a "feathered phenomenon" or a "black swan". This shows how grateful they are and was central to the theme. They are also a loving family and the day is full of fun (they "laughed tremendously").

Tiny Tim is a "cripple" but is selfless and kind-hearted and cares about others as can be seen when he says "God bless us everyone" and thinks of others when he goes to church. He is important because Scrooge has a face to put to his Malthusian comment of "decrease the surplus population" and changes his mind. In fact, Tiny Tim's death shows a stark contrast to Scrooge's – the boy is mourned and will live on, whereas Scrooge will not. Therefore, Tiny Tim plays a hugely important role in Scrooge's redemption.

Finally, the Cratchits are important at the end of the novel – Scrooge buys them a "turkey" and it is the "biggest one in the shop". This shows just how much Scrooge has changed.

Overall, the Cratchits are essential in showing the 'grateful poor' as was Dickens' intention and also play a huge part in showing Scrooge's transformation.

**Commentary**

The opening sentence shows a clear focus on the question and addresses the 'importance'. The candidate then brings in contextual points and discusses Dickens' intentions in writing the novel. The second paragraph keeps the focus firmly on why Bob is important in the novel. It also brings in some AO2 points about technique as well as some context – discussing how employees were treated.

The candidate also uses the extract here.

There are appropriate direct references from the extract and other parts of the text, used to support the candidate's astute points. Overall this response shows assured understanding of the demands of the task and covers all the Assessment Objectives in a sustained, integrated way.

**Explorations in Creative Reading (GCSE English Language Paper 1 Section A – AQA)**

Q	What is the Q asking?	Subject terminology	Excellence criteria	Sentence starters	
<b>Read</b>	5-10 mins to read the source				
<b>1: facts</b>	<b>Read lines... to ... List 4 things you learn about ...</b> 1. Re-read the specified lines. 2. Copy 4 facts: do not infer. <b>4 marks – 5 minutes</b>		<ul style="list-style-type: none"> <li>○ Focus on facts, not inference or analysis</li> <li>○ You can quote the text</li> </ul>		
<b>2: analyse language</b>	<b>Read lines ... to ... . How does the writer use language to present ...?</b>  1. Re-read the specified lines. 2. Highlight or underline 3 quotations relevant to the question. You can quickly annotate. 3. Write 3 PEEA paragraphs responding to the question.  <b>8 marks – 10 minutes</b>	<ol style="list-style-type: none"> <li>1. <b>Adjective:</b> describes a noun.</li> <li>2. <b>Adverb:</b> describes a verb.</li> <li>3. <b>Alliteration:</b> words start with same sound.</li> <li>4. <b>Allusion:</b> reference to another text or event.</li> <li>5. <b>Colloquial language:</b> informal language.</li> <li>6. <b>Euphemism:</b> replacing an offensive phrase with milder words.</li> <li>7. <b>Hyperbole:</b> over-exaggeration.</li> <li>8. <b>Imagery:</b> visual language.</li> <li>9. <b>Imperative verb:</b> command.</li> <li>10. <b>Juxtaposition:</b> contrasting ideas.</li> <li>11. <b>Metaphor:</b> comparison.</li> </ol>	<ol style="list-style-type: none"> <li>12. <b>Modal verb:</b> shows possibility e.g. could, might.</li> <li>13. <b>Onomatopoeia:</b> words which sound like what they describe e.g. boom.</li> <li>14. <b>Oxymoron:</b> combines contradictory terms e.g. a minor crisis.</li> <li>15. <b>Pathetic fallacy:</b> using the weather to set the emotion or mood.</li> <li>16. <b>Personification:</b> giving an object human characteristics.</li> <li>17. <b>Semantic field:</b> group of words with similar connotations.</li> <li>18. <b>Sibilance:</b> repetition of “s” sound.</li> <li>19. <b>Simile:</b> comparison using “like” or “as”.</li> <li>20. <b>Symbolism:</b> image represents an idea.</li> <li>21. <b>Triple:</b> list of three.</li> <li>22. <b>Verb:</b> action word.</li> </ol>	<p><b>Point</b></p> <ul style="list-style-type: none"> <li>○ Respond directly to the Q using precise vocabulary.</li> <li>○ Use “in order to” to address key concepts.</li> </ul> <p><b>Evidence</b></p> <ul style="list-style-type: none"> <li>○ Select precise evidence</li> <li>○ Embed fluently in a sentence</li> </ul> <p><b>Explain / analyse</b></p> <ul style="list-style-type: none"> <li>○ What do the words suggest, imply or symbolise?</li> <li>○ Explore more than one word, idea or interpretation</li> <li>○ Use subject terminology.</li> </ul>	<p>The writer portrays ... as ... in order to suggest that...</p> <p>This is clear when we read “...” Evidence of this is “...”</p> <p>This means that... We learn that... The writer communicates that... The word / language device suggests / conveys... This indicates that... In addition, the word / language device is used because... This reinforces the idea that...</p>
<b>3: analyse structure</b>	<b>Use the whole source. How does the writer structure the text to interest you as a reader?</b>  1. Identify 3 or more structural devices, choosing one from the beginning, one from the middle, and one from the end of the text.  2. Write 3 PEEAs responding to the question, thinking beginning, middle, end.  <b>8 marks – 10 minutes</b>	<p><b>Beginning: Narrative perspective</b></p> <ol style="list-style-type: none"> <li>1<sup>st</sup> person: told from the character’s perspective (I)</li> <li>2<sup>nd</sup> person: directed to the reader (you)</li> <li>3<sup>rd</sup> person: external narrator (he, she, it)</li> <li>Limited narrator: doesn’t have full knowledge of the situation</li> <li>Omniscient narrator: full knowledge and understanding</li> <li>Unreliable narrator: we question the narrator’s credibility</li> </ol> <p><b>Beginning: Introducing Ideas</b></p> <ol style="list-style-type: none"> <li>Establishing setting</li> <li>Introducing character(s)</li> <li>Establishing an atmosphere</li> </ol>	<p><b>Middle: shifts in...</b></p> <ol style="list-style-type: none"> <li>Focus</li> <li>Place</li> <li>Time (flashforward / flashback)</li> <li>Narrative perspective</li> <li>Atmosphere / mood</li> </ol> <p><b>Ending:</b></p> <ol style="list-style-type: none"> <li>Circular structure: the narrative ends where it begins</li> <li>Cliff-hanger: the narrative ends suddenly</li> <li>Resolved ending: loose ends are tied up</li> <li>Unresolved ending: loose ends are not tied up</li> </ol> <p><b>Overall structure:</b></p> <ol style="list-style-type: none"> <li>Linear: events are told in the order that they happen, chronologically</li> <li>Non-linear: events are not in order</li> <li>Motif: a pattern of ideas, images or words repeated throughout the text</li> </ol>	<p><b>Point</b></p> <ul style="list-style-type: none"> <li>○ Respond directly to the question using precise vocabulary</li> <li>○ Use “in order to” to address key concepts</li> </ul> <p><b>Evidence</b></p> <ul style="list-style-type: none"> <li>○ Select precise evidence</li> <li>○ Embed fluently in a sentence</li> </ul> <p><b>Explain / analyse</b></p> <ul style="list-style-type: none"> <li>○ Explore the effect of the structural device</li> <li>○ Use subject terminology</li> </ul>	<p>The writer structures the text by... in order to...</p> <p>The writer introduces the idea of... The writer focuses on... The writer develops the idea of... The writer draws the extract to a close by...</p> <p>This is evident in the line “...”</p> <p>The structural device is used because... This suggests that... This introduces / develops... This focusses our attention on... The writer zooms in on... because...</p>
<b>4: present a point of view</b>	<b>Read lines ... to ... Having read this section of the text, a student said “.....” To what extent do you agree?</b>  1. Re-read the specified lines. 2. Agree/disagree table. 3. Write 4 PEEA paragraphs.  <b>20 marks – 20 minutes</b>	<p><b>All language and structural devices</b></p> <p><b>Use XXOX to structure your argument:</b> X: strongest agree point X: next agree point O: other side of the argument – if relevant X: final agree point</p>		See Question 2	See Question 2


**Analytical verbs:**

- **presents:** portrays, conveys
- **shows:** demonstrates, illustrates
- **suggests:** hints, implies, indicates
- **reveals** that...: exposes, clarifies
- **emphasises:** confirms, highlights
- **creates** debate about...: initiates, generates, provokes
- **explores** the idea that...: considers, prompts, questions
- **challenges** the idea that...: confirms
- **confirms** the idea that...: supports, justifies, develops
- **believes**...: perceives, trusts, learns, observes
- **considers**...: appreciates, clarifies, examines
- **sympathises**...: emphasises, senses, pities, understands
- **discovers**...: realises, understands, decides, concludes
- **develops** the idea that...: builds, changes

## Explorations in Creative Writing (GCSE English Language Paper 1 Section B – AQA)

**Example question:**

Write a description for a magazine inspired by this image:



OR

Write the opening of a story about isolation.

24 marks for content and organisation, 16 marks for technical accuracy

**Developing your character:**

Before the exam, you need to create a fully developed character and know everything about them. When you go into the exam, you can “drop” your character into the image to give you a starting point.

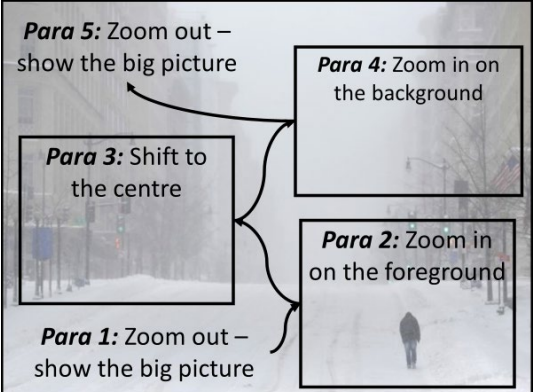
Make sure you know your character’s...

- Family and education background
- Experience of work and employment
- Experience of historical events e.g. World War Two
- Personality and characteristics
- Likes and dislikes (food, clothes....)

For each of these, ask yourself **why**. E.g. Why does my character become angry easily? Why did my character leave school at 16?

### Excellence criteria for self-assessment

**Structuring your writing 1: take a journey through the image**



**Para 5:** Zoom out – show the big picture

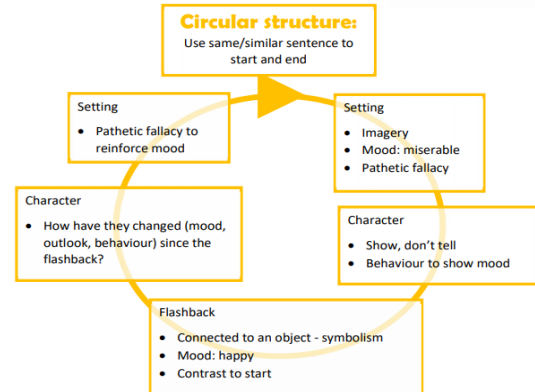
**Para 4:** Zoom in on the background

**Para 3:** Shift to the centre

**Para 2:** Zoom in on the foreground

**Para 1:** Zoom out – show the big picture

**Structuring your writing 2: circular structure**



**Circular structure:**  
Use same/similar sentence to start and end

**Setting**

- Imagery
- Mood: miserable
- Pathetic fallacy

**Character**

- Show, don't tell
- Behaviour to show mood

**Flashback**

- Connected to an object - symbolism
- Mood: happy
- Contrast to start

**Using descriptive language: show, don't tell**

We use a range of language devices to show rather than tell the reader what the character is doing. E.g. She was sad. → Her body drooped. Slowly, she wrapped her arms around herself, hoping to stop herself shattering into a million pieces. As her lip began to quiver, a single tear fell.

Use all the language devices listed on the other side of this Knowledge Organiser (see Question 2) to describe:

○ Facial expression	○ Reactions to other people	○ Changing weather
○ Body language and movement	○ Tone of voice	○ How an object moves
○ Clothing and appearance		○ How an event makes the character feel

**Using a range of sentence structures – start with...**

1. Two –ing verbs	<b>Raising</b> a hand...
2. Two or three adjectives	<b>Humid and clammy</b> , the air...
3. Two –ly adverbs	<b>Rapidly, quickly</b> , the bird...
4. A preposition (over, under, in)	<b>Under the moon</b> , the river...
5. A simile	<b>Like a...</b>
6. A connective:	<b>First</b> , we...
7. The noun – adjective, adjective - sentence:	<b>The tree – bony, twisted</b> – grew...
8. More, more, more sentence:	The <b>more</b> he cried, the <b>more</b> he felt...
9. The so, so sentence:	It was <b>so</b> small, <b>so</b> tiny...
10. It was one of those days...	<b>It was one of those days when...</b>

**Using a range of punctuation**

.	End a sentence
,	Separate clauses in a sentence (where you take a breath)
-	Add additional information in an informal way
;	Add additional information – full sentence before and after the ;
:	Introduce a list OR a shocking idea e.g. Morning arrived: disaster!
( )	Include additional information that isn't essential to the sentence
?	Pose a question
!	Show shock or surprise (use sparingly)
...	Build tension or leave a gap
'	Indicate possession (Amy's work) or omission (I can't do it)

	<b>Target</b>
<b>Content and organisation: 24 marks</b>	<b>Communication is convincing</b> – it reads like a novel / short story
	<b>Communication is compelling</b> – it is a short story I would be interested in reading
	<b>Tone, style and register are matched to audience</b> – you have written in the style of a novelist
	<b>Extensive and ambitious use of vocabulary</b>
	<b>Sustained crafting of linguistic devices</b> – you have used a range of language devices throughout
	<b>Use of structural features</b> – e.g. circular structure
<b>Technical accuracy: 16 marks</b>	<b>Inclusion of a range of complex ideas</b> – e.g. you explore different moods, emotions, aspects of character
	<b>Paragraphs are linked</b>
	<b>Sentence demarcation is accurate</b> – full stops, commas etc are in the correct place
	<b>Wide range of punctuation used accurately</b>
	<b>Uses the full range of sentence forms for effect</b>
	<b>Secure control of complex grammatical structures</b>
	<b>High level of accuracy in spelling</b>
	<b>Extensive and ambitious use of vocabulary</b>

The Soldier by Rupert Brooke  
The one about dying unselfishly for your country.

- "there's some corner of a foreign field/ That is for ever England"
- "A pulse in the eternal mind"
- "hearts at peace, under an English heaven."



**Content:** In this poem, the persona, a soldier heading to war, talks about the possibility of dying in a foreign country. He claims that this should not be an occasion for sadness, but that by dying he will have made "a corner of a foreign field" a small part of England. He **personifies** England as his mother, who gave birth to him and raised him to become the person he is. He feels that he owes his life to her and therefore unselfishly sacrifices his life. He believes dying will be comforting and that he is only giving back the things that England gave to him and his memory and sacrifice will live on after death.

**Context:** The poem is **idealistic**. Rupert Brooke was a young, untested soldier, who had attended public school and was Cambridge educated. Athletic and called "the handsomest young man in England," he was part of the Bloomsbury group of authors and becoming known for his poetry. He wrote this poem at the start of the **First World War** as part of a series of **sonnets** and Winston Churchill admired its **selfless patriotism**. Brooke wrote idealistically about the war. He had not seen action and was never to. After embarking for war, he contracted blood-poisoning from a mosquito bite and died on French hospital ship. The poem has become a **symbol for a lost generation of youth**.

**Form:** This poem is a **sonnet**, traditionally used for love poetry. Rather than a person, this sonnet expresses Brooke's love and devotion to his country. Written in the **first person**, it follows an unwavering **iambic pentameter** and clear **rhyme scheme**, that demonstrates the persona's commitment to England. It is characterised as **Georgian** poetry with **motifs** of nature, youth and innocence.

**Structure:** The first **8 lines, or octave**, focus on how England enriched his life and he owes it to her. Whereas, the last **6 lines, or sestet**, reflect on how his death is meaningful, and reciprocal. It will bring him peace, and England security. Usually, there is conflict or debate between the two parts of a sonnet, but in *The Soldier* there is only harmony. The structure of the poem embodies the harmonious relationship between man and country.

**Language Features:**

- England is **personified** through the **extended metaphor** of a mother who has nurtured a son who is willing to die to protect her, embodying ideas of heroic sacrifice.
- **Natural imagery** is used extensively to express his love of the English countryside and creates a **Romantic**, idealised idea of war without pain or suffering.
- **Religious imagery** reveals his sense of faith and belief that his sacrifice will be immortalised by God.

**Key Themes:**

- Deep and lasting love (for his country) that is unselfish / Nature and Place
- Faith, belief and worship
- Attitudes to war and patriotism

**Good to compare with:**

- Sonnet 43
- A Wife in London
- Living Space
- Dulce, Mametz Wood, The Manhunt

A Wife in London by Thomas Hardy

The one with the tragic telegram and the ironic letter.

- "She sits in tawny vapour"
- "The street lamp glimmers cold"
- "He –has fallen - in the far South Land..."
- "His hand, whom the worm now knows"



**Content:** The poem opens with a description of a wife sitting at home alone in London, against the backdrop of fog and misery which enfolds her. A sharp knock at the door brings her to her senses, and a messenger delivers a telegram with the tragic news that her husband, who is at war in a distant country, has been killed. The poem moves to the following day. Here a letter is delivered to her from her husband who wrote it before he died. He talks with enthusiasm of his hopes for coming home and their future together. The joy and optimism with which he speaks serves to emphasise the terrible waste of his life and the wife's desolation and sadness.

**Context:** In the poem, Hardy speaks as an **observer** and chooses to focus on those left behind at home at times of war. The war he is speaking about is **the Boer War** – a series of campaigns fought against the Boers (or Dutch) over territory in the **south of Africa**. The war was a **distant one** and one many thought was unnecessary and wasteful of life, as many men died needlessly of diseases like enteric fever. He uses the isolation of the wife to emphasise her helplessness in the face of her separation from her husband – she could be any one of any number of wives left behind – and employs the letter "page full" of hope to show the futility of war and how many died in their prime.

**Form:** The **persona** in the poem is an observer who watches in a detached manner contributing to the helpless and melancholy tone. **The irregular rhythm** and dashes create pauses and reflect the disbelief of the wife at the news. There is an **asymmetrical rhyme scheme (ABBAB)** which is broken once in the half rhyme of "smartly" and "shortly" – reflecting the wife's struggle to absorb the news.

**Structure:** Hardy **deliberately divides** the poem into two opposing halves – **The Tragedy and The Irony**. The **first 2 stanzas** accentuate the wife's loneliness trapped in the web of London's fog and build to climax of anticipation with the tragic news. The second 2 stanzas **juxtapose** the news of the husband's death with his joyful prose, fresh and firm. Hardy does this to show how war can crush hope and joy.

**Language Features:**

- Hardy uses **visual imagery** and the **pathetic fallacy** of the fog to distil the wife's isolation and grief. The fog encloses her and foreshadows the grip of death into which she will fall, and **imagery of light** offers no warmth, hope or consolation.
- **The contrast** of the **opening imagery** with the husband's joyful language, punctuated by powerful **alliteration**, creates a deep sense of irony and loss.
- **The graphic imagery** of his "hand" once "fresh" and "firm" now intimately acquainted with the worm focuses on his physical decay and the horror of war.

**Key Themes:**

- Love and relationships
- Pain and suffering – Death and Loss
- The impact of war on the individual

**Good to compare with:**

- The Manhunt
- As Imperceptibly as Grief
- Dulce/ Mamez Wood

Dulce et Decorum Est by Wilfred Owen

The famous one about the horrific effects of a gas attack.

- "Bent double like old beggars... coughing like hags"
- "All went lame; all blind"
- "As under a green sea, I saw him drowning"
- "Obscene as cancer"



**Content:** The persona describes the suffering of the exhausted soldiers, which he is one of, as they march away from battle back to their rest camp. They are broken, injured and so tired they appear drunk. Suddenly, the shout of "Gas!" rings out. A chlorine gas shell has been dropped and the soldiers scramble to get their gas masks on. One soldier is unable to and flounders toward the persona choking on gas. The persona recounts how in all his dreams he still sees the man's face plunging towards him. He directly asks the reader if he had seen young men die in such an obscene way could they ever say to others that it is sweet and fitting to die for your country. He calls this a lie.

**Context:** 2<sup>nd</sup> Lt Wilfred Owen was a decorated soldier, who won the highest honour of the **Military Cross** for bravery in the front line of battle in **the First World War**. Unlike, Brooke he experienced the horror and depravity of battle first hand and felt that his one duty as a poet was to tell the "**truth.**" He wasn't unpatriotic, in fact after treatment for shell shock (PTSD) he returned to the front, but was sadly killed in action on 4<sup>th</sup> Nov 1918, 7 days before the war ended. The **Latin phrase** in his poem means *It is sweet and fitting to die for your country*. It was often displayed in military training camps to inspire trainee soldiers to greater patriotism. Owen criticises this as a lie told by the establishment which he finds disgraceful.

**Form:** The poem has some **regular and irregular features**. The **regular ABAB rhyme scheme** reflects the relentless trudge and suffering of the soldiers plight; however the **stanzas are of irregular length** and the **iambic pentameter falters** at times, perhaps showing the unpredictability of war or the soldiers exhaustion. It can seem disjointed, fragmented and confusing – like war.

**Structure:** It is written in the **first person** and is almost certainly **autobiographical** in nature. It starts with a **past tense** description of the long trudge of the soldiers back to rest camp, and **develops** to the panic of the gas attack. It **then flashes forward** to the present and the horrific dreams the persona still has of the incident. **It ends** with a **graphic description** of the soldier's death on the back of cart and **questions** the honesty and integrity of those who spread the "old lie" to the young.

**Language Features: (there are almost too many)**

- **Similes** are used extensively by Owen to describe the condition of the men and the experience of the gas attack.
- **Graphically violent imagery** to describe the soldier's hideous death, including powerful **adjectives and verbs** convey the brutal, shocking reality of war.
- **Direct address** – "My friend" challenges the reader, authorities and other poets (including Jessie Pope) to consider the falsehood they pedal to youth of Britain.

**Key Themes:**

- War and its impact
- Pain, suffering, death, loss and PTSD
- Negative Emotions

**Good to compare with:**

- Mametz Wood
- The Manhunt
- London

### Mametz Wood by Owen Sheers

The one where a mass grave of dead soldiers is unearthed.

- "the wasted young"
- "blown and broken bird's egg of a skull"
- "a wound working a foreign body to the surface of the skin"



**Content:** The persona in the poem describes that how even now the farmers in France are still finding the remains of soldiers who died on the battlefields of the **First World War** in the earth as they plough. The remains seem to be near a place called **Mametz Wood** where a particularly brutal battle, that cost many lives, took place. The narrator references how they were commanded to walk into battle and face the devastating machine guns. The poem moves to the present and the discovery of a mass grave of soldiers that has just been discovered and recounts how they are linked arm in arm and how their mouths seem to be open as if they are mid song.

**Context:** *Mametz Wood* was written in 2005 by British poet Owen Sheers. Mametz is a village in Northern France; the woodland nearby was the site of an especially bloody battle during **World War I**, in which around 4,000 men from the British Army's Welsh Regiment were killed. Sheers's poem is set many years later, and considers the way that, even a century after the conflict, the land around Mametz Wood is still filled with fragments of the dead soldiers' bodies. The poem is thus a consideration of the horrors of war, its lasting effects, the fragility of life, and the time it takes nature to heal from such atrocities. It is a commemorative and **elegiac** in tone.

**Form:** The poem is written in **tercets** (3 line stanzas) that seem a little less robust than a quatrain, perhaps hinting at the delicate balance between life, death and nature. Sheers chooses to write in **the 3<sup>rd</sup> person**, which creates a sense of distance and detachment. He uses **enjambment** within and between stanzas, which could reflect the slow unearthing and passing of time as the pieces are dug up. It creates a reflective tone.

**Structure:** The **first 3 stanzas** focus on the "years" after the war and how farmers found the fragile remains of the "wasted young" leading the narrator to reflect on their death at the mercy of machine guns. The **4<sup>th</sup> stanza** brings us to the **present day** and how "even now" the earth is still healing from the horror. The **final 3 stanzas are written "this morning"** and create a sense of immediacy around the horrific discovery of a mass grave – a reminder that this war is forever present in our history.

### Language Features:

- The earth is **personified** as a "sentinel" who guards the remains of the soldiers and ensures they do not slip from memory. It is also described as wounded, suggesting how it still needs to heal from the horror of war.
- **Images of brokenness and fragility** such as the **symbolism** of the "bird's egg" emphasise the fragility of life but also how war can **dehumanise** those who fight in it.
- **Graphic imagery** is used to describe the mass grave to suggest the horrific manner of their death, but is contrasted with the **metaphor** of the "mosaic" emphasising their beauty and delicacy.

### Key Themes:

- Attitudes to war/ death and loss
- The passage of time/ the past
- Nature

### Good to compare with:

- Dulce/ The Soldier
- The Manhunt/ A Wife in London
- To Autumn

1. The Manhunt by Simon Armitage:  
The one about the scarred soldier.

- "frozen river"
- "foetus of metal"
- "unexploded mine"



**Content:** The wife of a soldier gets to know her husband again after he returns home injured from the war. Her husband is physically scarred by the injuries he sustained in the war, but he also has deeply buried psychological scars as result of his traumatic experiences. The poem traces his physical scars and explores deeper into the "unexploded mine" of PTSD. Physically, they can remain close, but there is a gap between them now emotionally as he struggles to let her in.

**Context:** *The Manhunt* is a **contemporary poem** and was originally aired as part of a Channel 4 documentary, *Forgotten Heroes: The Not Dead*. In the film, the poem is read by Laura, the wife of Eddie Beddoes, who is the subject of the poem. He served as a peace-keeper in Bosnia before being discharged due to injury and depression. Armitage wrote the poem after interviewing veterans returning from war and as a means of exploring the psychological impact on those who survived intense trauma.

**Form:** The poem is written in **couplet –long stanzas**, which have lines of varying length, from **Laura's perspective**. At the start, the couplets rhyme, but the **rhyme** breaks down making the poem feel disjointed and conveys the theme of brokenness. It may reflect their struggle to reconnect and how she will have to learn who her husband now is.

**Structure:** Each **couplet** introduces a different injury and the reader explores the body and mind of the soldier alongside his wife, experiencing the process at the same time. The use of **enjambment** mimics the way she traces the injuries that run continuously across his body and explores the damage done. It demonstrates the slow progress she is carefully making.

**Language Features:**

- The soldier's body is described by using **adjectives of damage** to show how broken war has left him.
- Parts of the body and mind are described using **metaphors** suggesting his is compiled of broken objects and that part of his humanity has been erased.
- **The verbs** express her tenderness and caution in how she approaches him.
- The final **metaphor of the "unexploded mine"** refers to the tension and stress his memories cause which he has not come to terms with yet.

**Key Themes:**

- War and its lasting effects
- Love and relationships
- Pain and suffering
- Loss and change

**Good to compare with:**

- Dulce, Mamez Wood
- A Wife in London
- London
- As Imperceptibly a Grief







# Year 10 Mathematics Knowledge Organiser

Topic		Key terms – use <a href="http://www.amathsdictionaryforkids.com">www.amathsdictionaryforkids.com</a> to help	
Discrete data	Data that can only take certain values	3, 6, 10, -9, 4235 are all <b>discrete data</b> values	
Continuous Data	This is data in which all values are possible	The heights measured were all examples of <b>continuous data</b>	
Speed	A way of measuring how quickly something is moving or being done	<b>Speed</b> = Change in Distance ÷ Time.	
Acceleration	The rate of change of the velocity of an object with respect to time	<b>Acceleration</b> = Change in Speed ÷ Time	

## Averages and Spread

Hey diddle diddle, the **median's** the **middle**  
 You **add then divide** for the **mean**  
 The **mode** is the one you see the **most**  
 And the **range** is the **difference** between  
 Yeah!

Median	Mean
Find the median of 6, 4, 3, 6, 7, 11, 9, 15	Find the mean of 8, 6, 2, 3, 11, 12, 0
Put the numbers in order, smallest first 3 4 6 <b>6</b> 7 9 11 15	Find the sum of the numbers Total = 42
There are two numbers in the middle, 6 and 7 - find halfway between them $(6 + 7) \div 2 = 6.5$ So 6.5 is the <b>median</b>	There are 7 items in the data set (the numbers) so we will divide by 7 $42 \div 7 = 6$ So 6 is the <b>mean</b>
Mode	Range
Find the mode of 1, 3, 6, 4, 3, 2, 7, 8, 10	Find the range of 2.6, 3.7, 2.1, 8.4, 2.9, 3.6
Find the number that appears the most (Putting them in order can help) 3 appears the most (twice) so <b>3 is the mode</b>	Find the Highest and Lowest numbers and calculate Highest - Lowest Highest = 8.4 Lowest = 2.1 Range = 8.4 - 2.1 = 6.3

## Means from Tables

### Discrete Data

Add a frequency density 'fx' column

Number of badges	Frequency	fx
0	2	$0 \times 2 = 0$
1	8	$1 \times 8 = 8$
2	4	$2 \times 4 = 8$
3	3	$3 \times 3 = 9$
4	5	$4 \times 5 = 20$
5	3	$5 \times 3 = 15$

Mean = 'fx' total ÷ 'Frequency' total  
 $fx$  total = 60 Frequency total = 25  
 $60 \div 25 = 2.4$  badges

### Grouped Continuous Data

Time taken (mins)	Frequency
$0 < m \leq 10$	3
$10 < m \leq 20$	8
$20 < m \leq 30$	11
$30 < m \leq 40$	9
$40 < m \leq 50$	9

First, find the midpoint of each group, and then follow the same rules as if it were discrete data!

Frequency	Midpoint (x)	fx
3	$\frac{0+10}{2} = 5$	$3 \times 5 = 15$
8	$\frac{10+20}{2} = 15$	$8 \times 15 = 120$
11	$\frac{20+30}{2} = 25$	$11 \times 25 = 275$
9	$\frac{30+40}{2} = 35$	$9 \times 35 = 315$
9	$\frac{40+50}{2} = 45$	$9 \times 45 = 405$

## Distance & Velocity Time Graphs

### Distance-Time graphs

If an object moves along a straight line, the distance travelled can be represented by a distance-time graph

A - travelled 30km in 2 hours  
 B - stationary period  
 C - travelled 30km further from start  
 D - travelled 60km back to starting point

### Velocity-Time Graphs

A velocity-time graph shows the speed and direction an object travels over a specific period of time



# Year 10 Mathematics Knowledge Organiser

Topic	Key terms – use <a href="http://www.amathsdictionaryforkids.com">www.amathsdictionaryforkids.com</a> to help	
Number Fractions & Percentages	Percentage	An amount given out of 100 The <b>percentage</b> 37% means '37 out of every 100'.
	Decimal multiplier	A decimal used to find the percentage of an amount. $15\% = 15/100 = 0.15$ so 0.15 is the <b>decimal multiplier</b> .
	Equivalent Fractions	Fractions that are equal to each other $\frac{2}{3}$ and $\frac{8}{12}$ are <b>equivalent fractions</b> .

## Calculating with Fractions

### Simplifying

To write a fraction in its simplest form, (cancel down), you must divide both parts by their HCF.

$$\frac{6}{12} \stackrel{\div 6}{=} \frac{1}{2}$$

### Fraction of an Amount

Step 1: Divide by the denominator.  
Step 2: Multiply by the numerator.

Find  $\frac{3}{4}$  of 20

Step 1:  $20 \div 4 = 5$

Step 2:  $5 \times 3 = 15$

### Add and Subtract

Look for a common denominator.

$$\frac{2}{3} + \frac{4}{5}$$

In this case, 15 is a common denominator  
We now write them as equivalent fractions

$$\frac{10}{15} + \frac{12}{15} = \frac{22}{15} = 1\frac{7}{15}$$

We do exactly the same for subtraction

$$\frac{7}{8} - \frac{3}{7}$$

$$\frac{49}{56} - \frac{24}{56} = \frac{25}{56}$$

### Mixed Numbers

An **improper fraction** is one where the numerator is greater than the denominator. A **mixed number** is a number with an integer part and a fraction part

Improper → Mixed

$$\frac{13}{4} = \frac{4}{4} + \frac{4}{4} + \frac{4}{4} + \frac{1}{4} = 3\frac{1}{4}$$

Mixed → Improper

$$3\frac{2}{5} = \frac{3 \times 5 + 2}{5} = \frac{17}{5}$$

### Calculating with Mixed Numbers

Change into improper fractions FIRST, then calculate as normal.

$$2\frac{1}{3} - 1\frac{2}{5} = \frac{7}{3} - \frac{7}{5}$$

### Multiplying

Multiply the numerators  
Multiply the denominators

$$\frac{3}{7} \times \frac{2}{5} = \frac{3 \times 2}{7 \times 5} = \frac{6}{35}$$

$$1\frac{2}{3} \times 2\frac{4}{5}$$

$$\frac{5}{3} \times \frac{14}{5} = \frac{5 \times 14}{3 \times 5} = \frac{70}{15} = 4\frac{10}{15} = 4\frac{2}{3}$$

## Calculating with Percentages

### Percentage of an Amount

To find 10% of an amount → ÷ by 10

Find 15% of 20

$$\begin{array}{r} 10\% = 2 \\ + 5\% = 1 \\ \hline 15\% = 3 \end{array}$$

Find 21% of 60

$$\begin{array}{r} 10\% = 6 \\ + 10\% = 6 \\ + 1\% = 0.6 \\ \hline 20\% = 12 \\ 21\% = 12.6 \end{array}$$

### Percentage Increase

Add to the original amount

Non Calculator

Increase 80 by 12%

$10\% = 8$

$1\% = 0.8$

$2\% = 1.6$

$12\% = 9.6$

$80 + 9.6 = 89.6$

Calculator

Increase 120 by 23%

$100\% + 23\% = 123\%$

$123\% = 1.23$  Multiplier

↙ Multiply by the multiplier

$120 \times 1.23 = 147.6$

### Percentage Decrease

Subtract from the original amount

Non Calculator

Decrease 40 by 27%

$10\% = 4$

$1\% = 0.4$

$7\% = 2.8$

$20\% = 8$

$27\% = 10.8$

$40 - 10.8 = 29.2$

Calculator

Decrease 35 by 16%

$100\% - 16\% = 84\%$

$84\% = 0.84$  Multiplier

↙ Multiply by the multiplier

$35 \times 0.84 = 29.4$

### Reverse Percentages

Lauren is given a 12% pay rise.  
Her new salary is £24,080

What was Lauren's salary before the pay rise?

The new salary is 12% larger than the original.

So let the original = 100%.

The new must be 100% + 12% = 112%

112% as a decimal multiplier is 1.12

$so\ original \times 1.12 = \pounds 24,080$

$original = \pounds 24,080 \div 1.12 = \pounds 21500$

### Percentage Change Profit & Loss

$$\frac{Change}{Original} \times 100$$

$$\frac{Profit\ or\ loss}{Cost} \times 100$$

Original skirt price = £15

Sale price = £12

$$\frac{3}{15} \times 100 = 20\%$$

Profit or loss is selling minus cost

Sale price = £25.20 cost £18

profit = £7.20

$$\frac{7.20}{18} \times 100 = 40\%$$



# Year 10 Mathematics Knowledge Organiser

**Topic**  
Summer 2:  
Probability

## What is relative frequency?

**Relative frequency** is the number of times an event happens, divided by the total number of outcomes that took place in an experiment, known as the number of trials.  
It is sometimes also known as **experimental probability**. The more times an experiment is carried out, the more reliable the relative frequency will be and closer to the theoretical probability.

## Probability Notation

**Probability notation** is an efficient way of writing the probability of events happening or not happening. To do this we use **set notation**, which is used when working with Venn diagrams.

Events are usually notated using capital letters, as well as the use of some greek letters.

$P(A)$	Event A	The probability of event A happening.
$P(A')$	Complement	The probability of event A not happening.
$P(A \cup B)$	Union	The probability of event A or B happening.
$P(A \cap B)$	Intersection	The probability of event A and B happening.

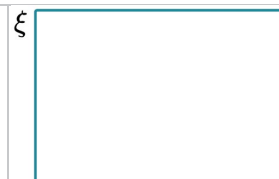
**Venn diagram symbols** are a collection of mathematical symbols that are used within set theory. Venn diagrams were created by mathematician John Venn and are used widely today within computer sciences, problem-solving and set theory.

Symbol	Description
{ }	Curly Brackets, contain all items in a set
,	Comma - separates all items in a set
'	Complement - the items not in a set
$\xi$	The Universal Set - contains all items in every set and subset required
$\phi$	The Empty Set - contains no items

To describe a mathematical set using symbols, we need to know the symbols, and what they represent.



We will mainly look at two sets: set A and set B. The shaded region shows the items within the set. Firstly, we start with the universal set,  $\xi$ . We represent this as a rectangle and draw the symbol around the outside.



## Venn Diagrams

$\xi$	$\xi$	$\xi$
Here are the two sets, A and B	The universal set, $\xi$	A
$\xi$	$\xi$	$\xi$
$A'$ Everything but A is $A'$	B	$B'$ Everything but B is $B'$
$\xi$	$\xi$	$\xi$
$A \cap B$ The intersection, A and B	$A \cup B$ The union of A and B, which we call <b>A or B</b>	$(A \cup B)'$ The compliment of A or B
$\xi$	$A' \cup B$ Not A, or B (the complement of A, union B) Not A, union B	$A \cap B'$ Just A (A intersection B') A and not B
$\xi$	$A \cup B'$ A, or Not B (A union the complement of B) A union Not B	$B \cap A'$ Just B (B intersection A') B and not A



# Year 10 Mathematics Knowledge Organiser

Topic
Algebra Manipulation and Solving

Key terms – use <a href="http://www.amathsdictionaryforkids.com">www.amathsdictionaryforkids.com</a> to help		
Expression	Numbers, symbols and operators (such as + and ×) grouped together that show the value of something.	$3(4x + 9y + 5z)$ is an expression.
Expanding brackets	"Expanding" means <b>removing the ( )</b> ... but we have to do it the right way!	Expand the expression $(x + 5)^2$
Simplify	In general, it is simpler when it is <b>easier to use</b> .	Simplify $7x + 4y + 2x - 3y$
Factorise	Finding what to multiply to get an expression.	Factorise $x^2 + 8x - 20$

## Expanding Brackets

To expand brackets: multiply everything in the bracket by the term outside the bracket

### Single Bracket Expansion

$$\begin{array}{l} \text{Expanding} \\ 2(g + 4) \\ = 2g + 8 \end{array}$$

$$\begin{array}{l} \text{Expanding} \\ 5n(n + 3) \\ = 5n^2 + 15n \end{array}$$

2 Single Brackets → Expand then Simplify

$$\begin{array}{l} 5(x+3) + 6(x-4) \\ 5x + 15 + 6x - 24 \\ = 11x - 9 \end{array}$$

### Double Bracket Expansion

$$\begin{array}{l} (x+7)(x-4) \\ x^2 - 4x + 7x - 28 \\ = x^2 + 3x - 28 \end{array}$$

How you expand it out is your call - Crab's Claw, FOIL, ... the choice is yours

## Factorising

Factorising is the opposite of expanding. You need to identify factors that the terms share... it could be a **number (HCF)**, a **letter** or **both!**

$$\begin{array}{l} 5x + 15 = 5(x + 3) \\ 10x - 12 = 2(5x - 6) \\ 10xy + 15y = 5y(2x + 3) \\ 8x^2y + 4xy^2 = 4xy(2x + y) \end{array}$$

## Quadratics

A quadratic is a 3-part equation that is equal to zero and has 2 roots.

Factorise  $x^2 + 7x - 18$

Find 2 numbers that **× to -18** and **+ to 7**

2 numbers are 9 and -2

Answer  $(x + 9)(x - 2)$

To solve, we equate the brackets to zero.

$$\begin{array}{l} (x + 9)(x - 2) = 0 \\ x + 9 = 0 \quad x = -9 \\ x - 2 = 0 \quad x = +2 \end{array}$$

## Inequalities

Inequalities follow the same rules as equations (with one exception see second example!)

As when solving equations, you need to get the unknown on its own on one side of the inequality.

$$\begin{array}{l} 2x - 5 \geq 7 \\ +5 \quad +5 \\ 2x \geq 12 \\ \div 2 \quad \div 2 \\ x \geq 6 \end{array}$$

The exception to the normal rules comes when you divide by a negative number. When you divide by a negative you reverse the symbol

Add or subtract to isolate the variable term. Multiply or divide to solve for the variable. If **multiply or divide** by a **negative number** then **reverse the inequality symbol**.

$$\begin{array}{l} -3x + 5 \leq -16 \\ -5 \quad -5 \quad \text{Subtract} \\ -3x \leq -21 \\ \frac{-3x}{-3} \geq \frac{-21}{-3} \quad \text{Divide by -3, reverse inequality} \\ x \geq 7 \end{array}$$

## Communicable Diseases

**Communicable (infectious) diseases** are caused by pathogens such as bacteria and viruses that can be passed from one person to another e.g. bacteria and viruses. These are called **pathogens** (microorganisms that cause disease).

Pathogens can be spread by:

- **By air** (including droplet infection), including coughing, sneezing, and talking.
- **Direct contact**, which is common in plants, and includes STI transmission in humans.
- **By water**, where the pathogen enters the body through the digestive system.

### Viral diseases

Viruses use your body cells as a host to reproduce, which destroys your cells. Examples include **measles, HIV/AIDS, and Tobacco mosaic virus (TMV)**.

### Bacterial disease

Bacterial disease affect animals and plants. Examples include **salmonella, gonorrhoea,** and bacteria that cause **crown galls** in plants.

### Diseases caused by fungi and protists

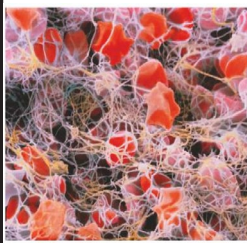
Fungal diseases include **athlete's foot** and **rose black spot disease**, a disease that affects plants and can often be devastating. Protist diseases are rare, but very dangerous, including malaria, which is spread between people by female mosquitos.

### Preventing infections

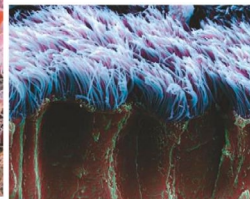
**Ignaz Semmelweis** introduced the policy of **washing hands in hospitals**, which saw a large decrease in hospital deaths. Other pioneering discoveries included **Louis Pasteur developing vaccines** and **Joseph Lister developing antiseptic chemicals**.

Other methods of preventing infections are **hygiene, isolating infected individuals, destroying or controlling vectors, and vaccinations**.

### Human defence responses


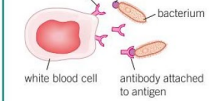
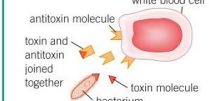


**Figure 1** The scabs that restore the protective barrier of the skin and prevent pathogens getting in are made of red blood cells tangled in protein strands formed by platelets



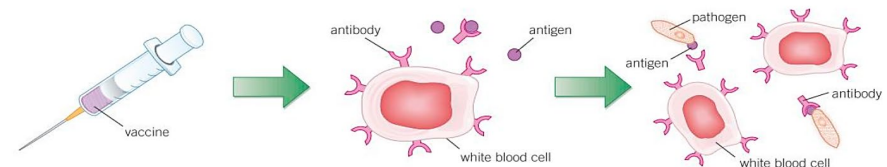
**Figure 2** The cilia of the airways beat together to move mucus containing trapped pathogens away from the lungs

**Table 1** Ways in which your white blood cells destroy pathogens and protect you against disease

Role of white blood cell	How it protects you against disease
<b>Ingesting microorganisms</b> 	Some white blood cells ingest (take in) pathogens, digesting and destroying them so they cannot make you ill.
<b>Producing antibodies</b> 	Some white blood cells produce special chemicals called antibodies. These target particular bacteria or viruses and destroy them. You need a unique antibody for each type of pathogen. When your white blood cells have produced antibodies once against a particular pathogen, they can be made very quickly if that pathogen gets into the body again. This stops you getting the disease twice.
<b>Producing antitoxins</b> 	Some white blood cells produce antitoxins. These counteract (cancel out) the toxins released by pathogens.

## Preventing and treating disease

### Vaccinations

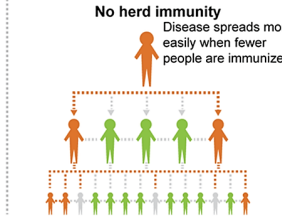
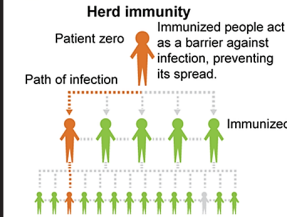


Small amounts of dead or inactive pathogen are put into your body, often by injection.

The antigens in the vaccine stimulate your white blood cells into making antibodies. The antibodies destroy the antigens without any risk of you getting the disease.

You are immune to future infections by the pathogen. That's because your body can respond rapidly and make the correct antibody as if you had already had the disease.

■ Infected 
 ■ Vaccinated 
 ■ Not vaccinated but healthy

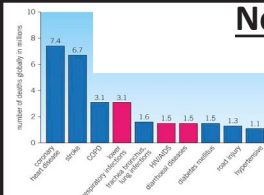


Vaccines contain a **dead or weakened** version of a pathogen, allowing your white blood cells to practice destroying it. The aim of vaccines is to create **herd immunity** amongst a population.

### Discovering and developing drugs

A lot of the compounds that are used in medicines today were discovered from plants and microorganisms. Examples include **aspirin, digitalis,** and the antibiotic **penicillin**, that was discovered by **Alexander Fleming**. It is important that bias is avoided when developing a drug, and so methods like **placebos, blind trials,** and **double blind trials** are often used by researchers.

## Non-communicable diseases

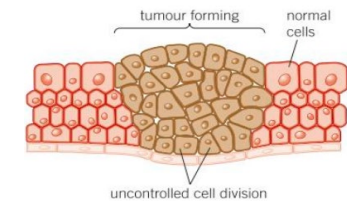


**Figure 1** The leading causes of death globally in 2012 (WHO). Non-communicable diseases (blue bars) contribute to more deaths than communicable diseases (pink bars).

There are many **risk factors** for diseases. A risk factor is something that increases the chances of a disease developing. Risk factors include **family history, smoking, alcohol, poor diet, lack of exercise, and carcinogens** (agents that cause cancer).

### Cancer

Cancerous cells are called **malignant tumours**, which are cells that have divided uncontrollably and can spread around the body. **Benign tumours** are cells that have divided uncontrollably but stay in one place. Risk factors of cancer include, **family history, smoking, ionising radiation,** and certain viruses such as **HPV**.



**Figure 1** A tumour forms when there is uncontrolled cell division

## Year 10 Biology: Infection and Response Key Vocabulary

Key word	Definition	Contextual Sentence
<b>benign tumours</b>	Growths of abnormal cells that are contained in one area, usually within a membrane, and do not invade other tissues.	Moles on the body are usually examples of <b>benign tumours</b> .
<b>cancer</b>	The common name for a malignant tumour, formed as a result of changes in cells that lead to uncontrolled growth and division.	Ionising radiation such as UV light is a risk factor for skin <b>cancer</b> .
<b>carcinogens</b>	Agents that cause cancer or significantly increase the risk of developing cancer.	Some chemicals found in smoking tobacco such as tar are <b>carcinogens</b> .
<b>causal mechanism</b>	Something that explains how one factor influences another.	Alcohol is a <b>causal mechanism</b> for cirrhosis of the liver.
<b>clinical trials</b>	Test potential new drugs on healthy and patient volunteers.	If successful at the first stage of <b>clinical trials</b> , the new drug will then be tested on sick volunteers.
<b>communicable disease</b>	Disease caused by pathogens that can be passed from one organism to another.	Viruses, bacteria, protists, and fungi are all examples of <b>communicable diseases</b> .
<b>correlation</b>	An apparent link or relationship between two factors.	Smoking is positively <b>correlated</b> to lung cancer.
<b>ionising radiation</b>	Has enough energy to cause ionisation in the materials it passes through, which in turn can make them biologically active and may result in mutation and cancer.	Sunbeds use <b>ionising radiation</b> .
<b>malignant tumours</b>	Invalidate neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours. They are also known as cancers.	Chemotherapy and radiotherapy are treatments for <b>malignant tumours</b> .
<b>non-communicable diseases</b>	Are not infectious and cannot be passed from one organism to another.	Cancer and diabetes are examples of <b>non-communicable diseases</b> .
<b>pathogens</b>	Microorganisms that cause disease.	Salmonella bacteria is an example of a <b>pathogen</b> .
<b>placebo</b>	A medicine that does not contain the active drug being tested, used in clinical trials of new medicines.	Researchers will often use a <b>placebo</b> when developing a new drug to avoid bias.
<b>preclinical testing</b>	The site of aerobic cellular respiration in a cell.	The sperm contains many <b>mitochondria</b> to release energy for movement.
<b>sexually transmitted disease (STD)</b>	Transmitted from an infected person to an uninfected person by unprotected sexual contact.	The use of condoms is one way to reduce the spread of <b>sexually transmitted diseases (STDs)</b> .
<b>tumour</b>	A mass of abnormally growing cells that forms when the cells do not respond to the normal mechanisms that control growth and when control of the cell cycle is lost.	The two types of <b>tumours</b> are benign and malignant.
<b>vaccine</b>	Dead or inactive pathogenic material used in vaccination to develop immunity to a disease in a healthy person.	<b>Vaccines</b> are used to create herd immunity amongst a population to reduce the spread of a pathogen.
<b>virus</b>	Pathogens that are much smaller than bacteria and can only reproduce inside living cells of other organisms.	Influenza and TMV are both examples of <b>viruses</b> .

## Photosynthesis

Plants can make their own food by **photosynthesis**. This takes place in the green part of plants (especially the leaves) as well as in algae. It is an **endothermic** reaction as it requires an input of energy from the environment (light).

Photosynthesis can be summarised as follows:

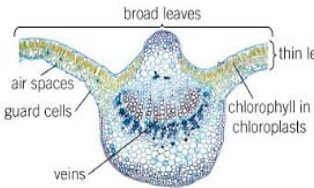
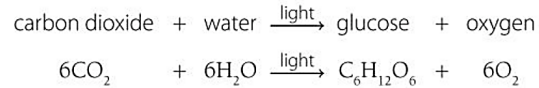


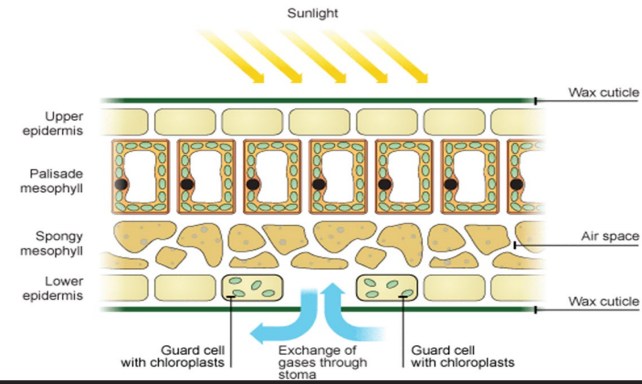
Figure 2 Leaves are well-adapted for photosynthesis

### Leaf adaptations

Leaves are highly adapted for photosynthesis. Adaptations include:

- **Broad**, giving them a large surface area to absorb light.
- **Thin** for easy gas diffusion.
- Contain **chlorophyll** to absorb light.
- **Xylem** and **phloem** to transport water and minerals as well as sugars around the leaf.
- **Air spaces** to allow gas exchange.
- **Guard cells** to open and close **stomata** to regulate gas exchange.

## Structure of a leaf



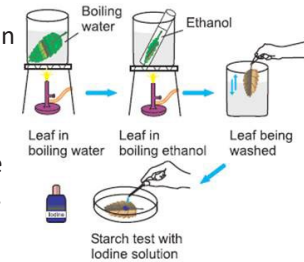
## How plants use glucose

Plants use photosynthesis to make **glucose**, which they use for a variety of things. Plants may use glucose to:

- Build larger molecules such as **cellulose**, to strengthen cell walls, and **starch**, which is insoluble so is easier to store.
- Make **amino acids** which can be made into proteins which can be used in many ways, including to make enzymes.
- Make **lipids** such as fats and oils which can be used in cells as an energy store.

### Testing a leaf for starch

You can test a leaf for starch to see if it has been photosynthesising, as starch is stored glucose. You first need to place the leaf in a test tube of ethanol and heat it in a water bath. This removes the green colouring. You then remove the leaf from the test tube and add iodine to it. If the iodine turns **blue/black** then the leaf contains starch.



## The rate of photosynthesis

Plants need light, warmth, and carbon dioxide in order to photosynthesise. Sometimes, one or more of these things can be in short supply which limits the amount of photosynthesis. These are known as **limiting factors**.

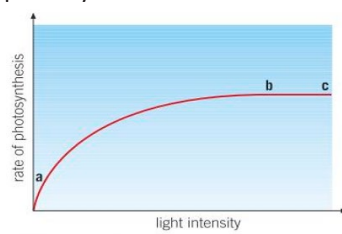


Figure 1 Investigating the effect of light intensity on the rate of photosynthesis

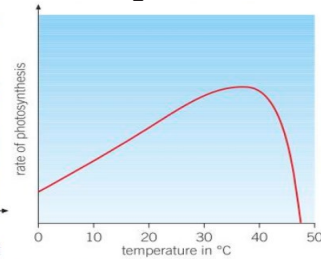


Figure 2 The effect of increasing temperature on the rate of photosynthesis

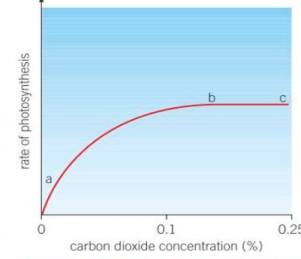
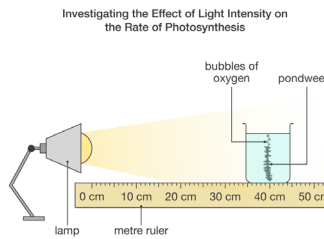


Figure 3 The effect of increasing carbon dioxide concentration on the rate of photosynthesis

### Investigating how light intensity affects photosynthesis

You can investigate how light intensity affects the rate of photosynthesis by moving a lamp further away from some **pondweed** that is in water. As the pondweed photosynthesises, you can count the **number of bubbles of oxygen** produced in a given time, which gives an indication of the rate of photosynthesis. The closer the lamp to the pondweed, the greater the number of bubbles.



## Making the most of photosynthesis (Higher)

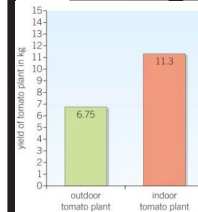


Figure 1 One piece of American research showed the crop yield for tomatoes was almost doubled in a greenhouse



Figure 2 By controlling the temperature, light, and carbon dioxide levels in a greenhouse like this you can produce the biggest possible crops.

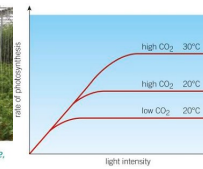
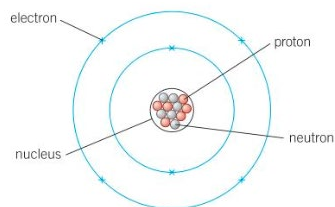


Figure 3 Growers need to look at this type of data to help them decide the best economic condition for growing their plants. The cost of providing the conditions that give the very highest yields may be too expensive and may wipe out the profits from the bigger, cleaner crop



Key word	Definition	Contextual Sentence
<b>endothermic reaction</b>	A reaction that requires a transfer of energy from the environment.	Photosynthesis is an <b>endothermic reaction</b> as it takes in light energy from its' surroundings.
<b>glucose</b>	A simple sugar.	Plants use carbon dioxide and water, as well as taking in light, to make <b>glucose</b> and oxygen.
<b>limiting factors</b>	Limit the rate of a reaction, for example photosynthesis.	Carbon dioxide is often a <b>limiting factor</b> for photosynthesis as the Earth's atmosphere is made from only 0.04% carbon dioxide.
<b>photosynthesis</b>	The process by which plants make food using carbon dioxide, water, and light.	The rate <b>photosynthesis</b> is greatest in bright, warm, carbon dioxide rich environments.

# Year 10 Atomic Structure & The Periodic Table



## Atomic structure

Atoms contain sub-atomic particles. **protons**, **neutrons** and **Electrons**. **Protons** and **neutrons** are found in the centre of the atom, called its **nucleus** and **electrons** are found in **energy shells** around the **nucleus**. This **nucleus** is not the same as what is found in plant cells.

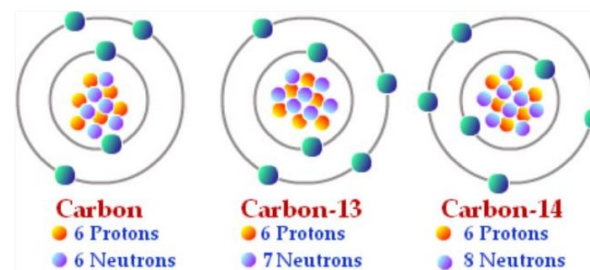
Sub-atomic Particle	Mass	Charge
<b>Proton</b>	1	+
<b>Neutron</b>	1	No charge
<b>Electron</b>	1/2000	-

## Atomic number

All the atoms of a particular element have the same number of **protons**. For example, Na has eleven **protons** in its **nucleus**. The number of **protons** in each atom is called its **atomic number**.

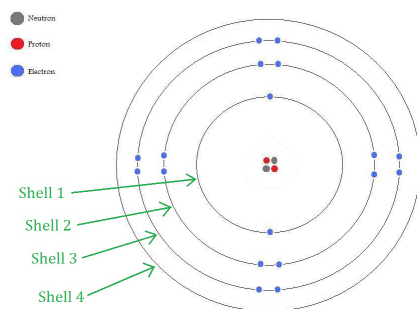
## Isotopes

Atoms of the same element with the same number of protons but with different numbers of neutrons are called **ISOTOPES** e.g.

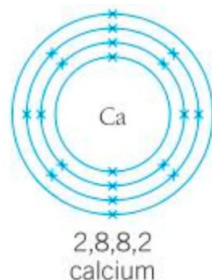


## Electron Structure

The electrons in an atom are arranged in energy shells (levels). The lowest energy level (the 1<sup>st</sup> shell) can hold up to a maximum of 2 electrons, the next energy level (2<sup>nd</sup> shell) can hold a maximum of 8 electrons and so on. You need to be able to draw the atoms from Hydrogen to calcium.



Calcium has the structure of 2,8,8,2



## Properties of Alkali metals

The characteristic **properties** of the alkali metals are:

- They are **soft** and can be cut by a knife. Softness increases going down the group
  - They have a **low density**. Lithium, sodium and potassium float on water.
  - They have **low melting and boiling points**.
- These **properties** mean that the alkali metal do also share some **properties** with typical metals:
- They are **good conductors of heat and electricity**.
  - They are **shiny**. This is only seen when alkali metals are cut.

## Reactions of alkali metals

The alkali metals are **highly reactive**, they react with oxygen and water. They can also react with acid, however, the reaction is extremely dangerous. We can use word and symbol equations to represent the reactions.

## Electron configuration and alkali metals

The alkali metals all have one **electron** in their outer shell. This means that:

- They are found in group 1 of the periodic table
- They have similar physical **properties**
- They can readily lose the outer shell **electron** to form positive ions with a +1 charge and a full outer shell.

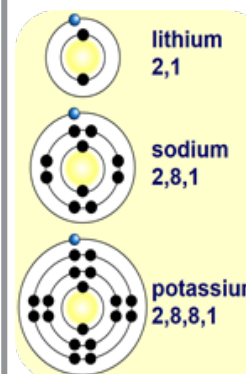
## Group 7, The Halogens

Reactivity decreases going down Group 7. To explain this you consider the same factors you look at with alkali metals.

- The shielding effect of the inner **electrons**
- The size of the **atom**
- The nuclear charge

## Halogen Properties

They have **low melting points** and **boiling points**. Their melting points and boiling points increase going down the group. They are **poor conductors of heat and energy**.



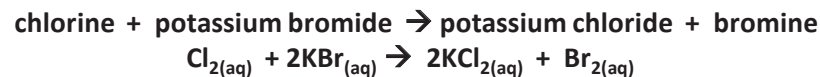
Group 7 Halogen	F—F F <sub>2</sub>	Cl—Cl Cl <sub>2</sub>	Br—Br Br <sub>2</sub>	I—I I <sub>2</sub>
<b>Melting Point</b> (°C)	-220	-101	-7	114
<b>Boiling Point</b> (°C)	-188	-35	59	184

Reactivity can be explained by how easily an **electron** is lost or gained to form an **ion**.

### Displacement Reactions

A more reactive halogen will **displace** a less reactive halogen from solutions of its salts. For example; chlorine will displace bromide **ions**, which form bromine **molecules**

	How the halogens react with hydrogen
$F_{2(g)} + H_{2(g)} \rightarrow 2HF_{(g)}$	Explosive, even at $-200^{\circ}C$ and in the dark.
$F_{2(g)} + H_{2(g)} \rightarrow 2HF_{(g)}$	Explosive in sunlight but slow to react in the dark.
$F_{2(g)} + H_{2(g)} \rightarrow 2HF_{(g)}$	Only reacts at over $300^{\circ}C$ in the presence of a platinum catalyst
$F_{2(g)} + H_{2(g)} \rightarrow 2HF_{(g)}$	Only reacts over $300^{\circ}C$ in the presence of a platinum catalyst (very slow, reversible)



### Explaining the trends

You can explain trends in reactivity as you go down the group in terms of the attraction between **electrons** in the outermost shell and the **nucleus**.

This electrostatic attraction depends on;

- The distance between the outermost **electrons** and the **nucleus**.
- The number of occupied inner shells (energy levels) of **electrons**, which provide a shielding effect.
- The size of the positive charge on the **nucleus** (called the nuclear charge).

19	<b>F</b> fluorine
35	<b>Cl</b> chlorine
80	<b>Br</b> bromine
127	<b>I</b> iodine
210	<b>At</b> astatine

Li	↓ getting <i>more</i> reactive
Na	
K	
Rb	
Cs	

F	↓ getting <i>less</i> reactive
Cl	
Br	
I	
At	

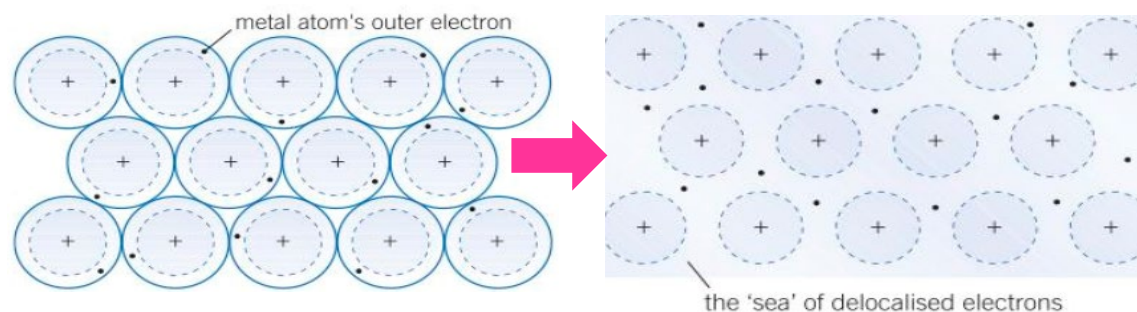
### Metallic Bonding

**Metal ions** are formed and the outer shell **electrons** (delocalised **electron**) from each **atom** can move throughout the structure

#### Bonding in metals

Metals will lose **electrons** and form **ions**, just like in ionic bonding, but instead of transferring the outer shell **electrons**, they will "float" around the **atom**. We call these **electrons** delocalised **electrons**. The form layered structure.

The **electrostatic forces** between the positive **ion** and the negative **electrons** will strongly hold the **atoms** together in a regular lattice structure. This means that metals will need a lot of **energy** to break the strong **electrostatic forces** of attraction. This is the reason why metals have a high melting and boiling points and is a solid at room temperature ( $20^{\circ}C$ )



#### Why can you shape metals?

Metals can be hammered and bent into different shapes (this is known as being malleable), and drawn out into wires (known as ductile) because the layers of **atoms** in pure metal are able to slide over each other. The **atoms** in pure metal, such as iron, are arranged in closely packed layers. This regular arrangement allows the **atoms** to slide over one another quite easily. This is why pure iron is relatively soft and easily bent into shape

#### Uses of Metals

Due to the giant metallic structure, metals are very versatile. They can be used for

- Electrical wires due to being ductile.
- Pots & pans due to the ability to conduct heat and the ability to be malleable.
- Coins; due to their solid nature and shiny appearance
- Jewellery: easy to shape (malleable)
- Technology such as phones and computers.
- As alloys, the most common is stainless steel which is used by

## The Reactivity Series

Very Reactive ↑	Li	Lithium	↓ Very Unreactive
	K	Potassium	
	Ba	Barium	
	Ca	Calcium	
	Na	Sodium	
	Mg	Magnesium	
	Al	Aluminum	
	C	Carbon	
	Zn	Zinc	
	Fe	Iron	
	Ni	Nickel	
	Sn	Tin	
	Pb	Lead	
	H	Hydrogen	
	Cu	Copper	
	Hg	Mercury	
	Ag	Silver	
	Au	Gold	
	Pt	Platinum	

Carbon and Hydrogen are not metals but are included for reference.

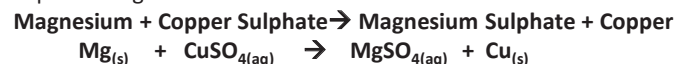
Copyright © 2012 F.L. Givens

## The Reactivity Series

The reactivity series is a list of metals with the most reactive at the top and decreasing reactivity as you go down the list. We can use reactions with water, oxygen or acid to help place them in order. For example: **zinc + acid = small fizz, but potassium + acid = explodes.**

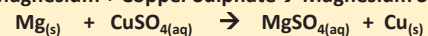
## Displacement Reactions

A more reactive metal will displace a less reactive metal from a compound. e.g.

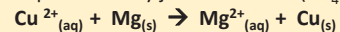


## More info (higher)

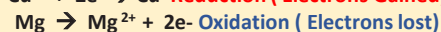
**Magnesium + Copper Sulphate → Magnesium Sulphate + Copper**



This equation can be represented by just the metals ( $\text{SO}_4$  is a spectator ion)



You can also use **half equations** to show what is happening in terms of the movement of electrons.



## Naming salts

The first part of a salt's name comes from the metal.

The second part is determined by the acids e.g.

**Sulphuric** Acid makes Metal **Sulphates**  
**Hydrochloric** Acid makes Metal **Chlorides**  
**Nitric** Acid makes Metal **Nitrates**

## General Equations

For this topic, you need to know some general equations.

**Acid + Metal → Salt + Hydrogen**

**Acid + Base → Salt + Water**

**Acid + Carbonate → Salt + Water + Carbon Dioxide**

**Acid + Alkali → Salt + Water**

## Salts from metals

A more reactive metal than Hydrogen can displace it from an acid to make salt. *Salt is a compound formed when the Hydrogen from an acid is replaced by a metal or Ammonium ( $\text{NH}_4^+$ ) ions.*

**Magnesium + Sulphuric Acid → Magnesium Sulphate + Hydrogen**



Pure dry crystals of salt can be obtained from a solution. Some of the water is evaporated from the solution by heating it until the point of crystallisation. The Magnesium atom loses electrons to form an ion



The Mg is **oxidised**, it has lost electrons



## Salts from insoluble bases

A **base** is a compound that reacts with an acid to produce salt and water. There are two types of bases: a soluble base (known as an alkali) and an insoluble base (called an insoluble base).

The general equation is: **Acid + Base → Salt + Water**

E.g. **Copper Oxide + Sulphuric Acid → Copper Sulphate + Water**



## Making more salts

Two other important ways of making salts are the reactions

**Acid + Alkali → Salt + Water** and **Acid + Carbonate → Salt + Water + Carbon Dioxide**

## Extracting Metals

Metals are extracted from rocks called **ores**. How they are extracted depends on their position in the reactivity series.

Metals above carbon are extracted by **electrolysis**, they need a lot of energy.

Metals below Carbon in the series are extracted by **REDUCTION with carbon**. This relies on a displacement reaction between the metal oxide and carbon.

**Metal Oxide + Carbon → Metal + Carbon Dioxide**

e.g. **Lead Oxide + carbon → Lead + Carbon Dioxide**

*The Lead is reduced the Carbon is oxidised.*

Unreactive metals like Gold and Platinum can be found as elements and do not need to be extracted by chemical processes.

## Making Salts



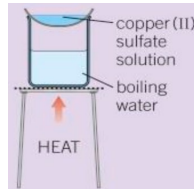
Add to warm  $\text{H}_2\text{SO}_4$



Add CuO in excess



Filter



Evaporate & dry

An **atom** can achieve a full outer **electron** shell by losing or gaining **electrons**. This charged **atom** is called an **ion**.

## Why do atoms react together?

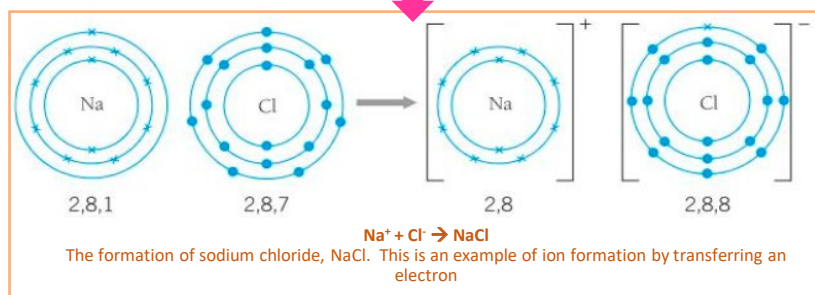
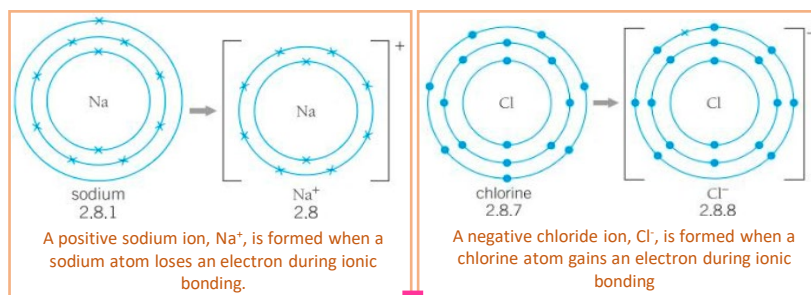
All **atoms** want a full outer shell. This is the reason chemical reactions happen. **Atoms** will either transfer **electrons** or share **electrons** depending on the bonding. There are 3 types of bonding; Ionic, Covalent and Metallic.

## Positive Ions

When an **atom** loses an **electron** it becomes a positive **ion**. This is because they have more positive **protons**, but have less negative **electrons**. Therefore the overall charge is positive. See the diagram of Sodium.

## Negative Ions

When an **atom** gains an **electron** it becomes a negative **ion**. This is because they have more negative **electrons**, than positive **protons**. This makes the overall charge of the **ion** negative. This can be seen using the chlorine diagram.



## Charges on Ions

The charge on the **ion** depends on how many **electrons** they gain or lose. The table shows the general ones. Transition metals will form the **ion** based on the roman numbers in its name; Iron (II) oxide will form a  $\text{Fe}^{2+}$  **ion**.

GROUP	ION
1	+1
2	+2
3	+3
4	Rarely form <b>ions</b>
5	-3
6	-2
7	-1
0	Don't form <b>ions</b> as they have a full outer shell

Ionic bonding occurs when a metal and a non-metal combine. This process creates an **electrostatic force** that joins a positive ion and negative ion together, resulting in what is known as an ionic bond.

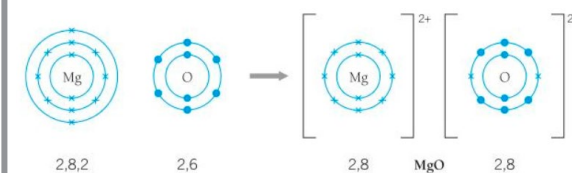
## Ionic bonding: Calcium Chloride

Calcium needs to lose two **electrons** from its outer shell. Chlorine can only gain one **electron**, so in this case you will need two chlorine **atoms** to bond with.

## Ionic bonding: Magnesium oxide

As you can see from the diagram for ionic bonding, you can see that the magnesium **atom** loses 2 **electrons** from its outer shell forms a  $\text{Mg}^{2+}$  **ion** and it will transfer the two **electron** to the oxygen **atom**, forming a negative oxide **ion**,  $\text{O}^{2-}$ .

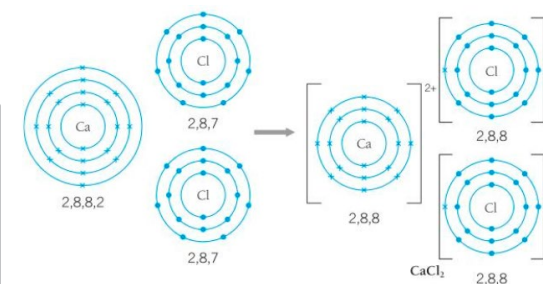
Notice how the **ions** are drawn in square brackets with the charge written in the top right.



## Force of Attraction

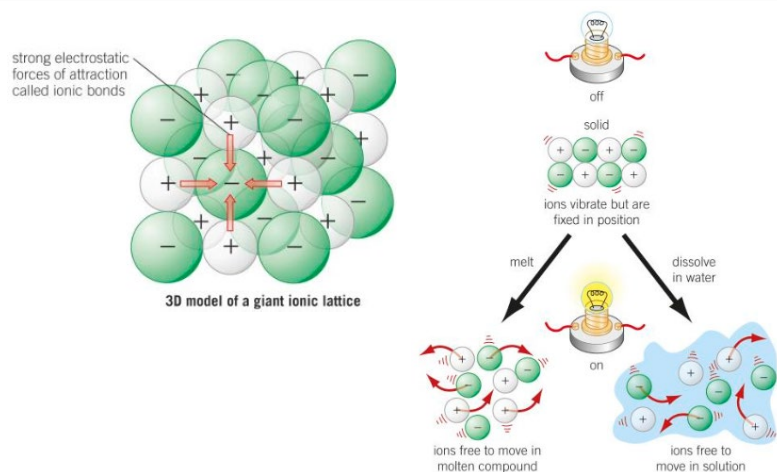
The force between the positive **ion** and the negative **ion** is called **electrostatic force**.

Looking at the sodium chloride where one **electron** is transferred, whereas magnesium oxide transfers two **electrons**. This means that's magnesium oxide has a stronger bond than sodium chloride



## Properties of Ionic Substances

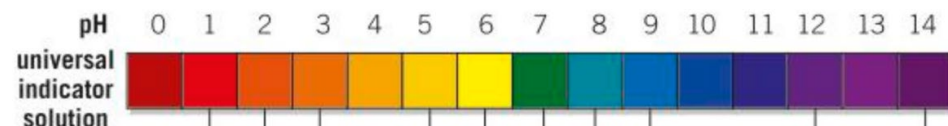
When an ionic substance is molten or in a solution, it can conduct electricity. This is due to the free movement of ions that carry the electrical charge. However, solid ionic substances are unable to conduct electricity as their ions are in a fixed position and cannot move or carry the electrical charge.



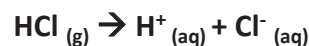
## Ionic Compound Properties

Ionic Solid	Molten Ionic Compound	Ionic Compound in Solution
<p><b>Ions</b> are fixed in position in a giant lattice structure. They vibrate but cannot move around.</p> <p>It does not conduct electricity.</p>	<p>High temperatures provides enough <b>energy</b> to overcome the many strong forces of attraction between the <b>ions</b>.</p> <p><b>Ions</b> are free to move around within the molten compound. It does conduct electricity.</p>	<p>Water <b>molecules</b> separate <b>ions</b> from the lattice. <b>Ions</b> are free to move around within the solution.</p> <p>It does conduct electricity.</p>

## Neutralisation and the pH scale

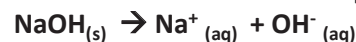


All **acids** release  $\text{H}^+$  (aq) ions when added to water. It is this excess of  $\text{H}^+$  (aq) ions that makes a solution **acidic**. An **acidic** solution is less than 7 on the pH scale.



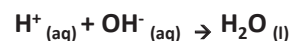
**The greater the concentration of  $\text{H}^+$  ions the lower the pH value.**

All **alkalis** release  $\text{OH}^-$  ions when added to water, the excess  $\text{OH}^-$  ions make the solution **alkaline**. An **alkaline** solution is above 7 on the pH scale

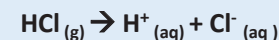


**The greater the concentration of  $\text{OH}^-$  ions the higher the pH value**

A value of 7 indicates that the substance is **neutral**. Water is an example of a neutral substance. The **ionic equation** for the formation of water is;

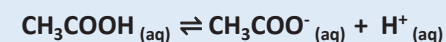


## Strong and weak acids



In this reaction **ALL or 100 %** of HCl **ionises** or dissociates into ions, we call this a **Strong Acid**. Other examples are Sulphuric acid and Nitric acid.

For some acids, only a few  $\text{H}^+$  ionise into ions for example Ethanoic acid. This is the reason why it is a **weak acid**



The concentration of  $\text{H}^+$  ions is related to pH values as follows

$$\text{pH } 1 = 0.1\text{M}$$

$$\text{pH } 2 = 0.01\text{M}$$

$$\text{pH } 3 = 0.001\text{M}$$

$$\text{pH } 4 = 0.0001\text{M}$$

As the concentration of  $\text{H}^+$  ions decreases by a factor of 10. This is called the order of magnitude, the pH value will increase by one unit.

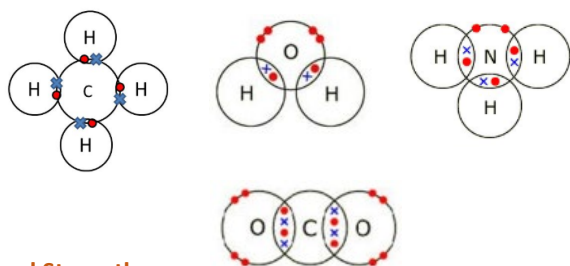
Therefore if we make a solution 10 times more dilute the pH value increases by 1.

## Covalent Bonding

Non-metal **atoms** can achieve a full outer shell with other non-metals **atoms** by sharing **electrons**. This is called covalent bonding.

### What you need to be able to draw

The simple covalent **molecules** you need to be able to draw are hydrogen ( $H_2$ ), Oxygen ( $O_2$ ), Nitrogen ( $N_2$ ), hydrogen chloride (HCl), water ( $H_2O$ ), methane ( $CH_4$ ), carbon dioxide ( $CO_2$ ) ammonia ( $NH_3$ ).



### Bond Strength

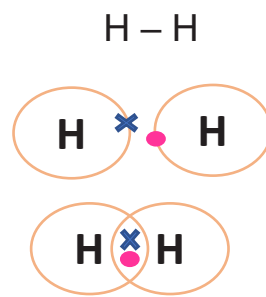
A double bond is harder to break than a single bond and a triple bond is harder to break than a double bond.

## Sharing Electrons

Covalent bonds share **electrons** to form a pair of **electrons**. The positive nuclei of the **atoms** are strongly attracted to the shared pair of negative **electrons** in the covalent bond, so covalent bonds are very strong and require a lot of **energy** to break. You can have single bonds, double bonds and triple bonds. You can represent it by a dot and cross diagram and also by a displayed formula (eg:  $N \equiv N$ ).

### Single Bond

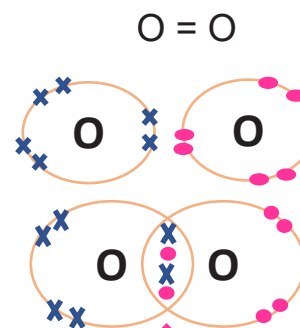
1 shared pair of **electrons**



A shared pair of **electrons** given both **atoms** a stable arrangement and forms a covalent bond

### Double Bond

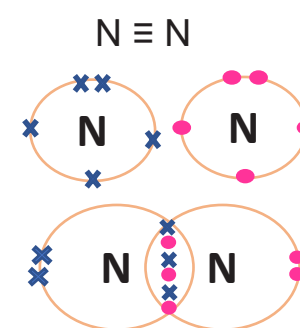
2 shared pair of **electrons**



This is a double covalent bond (with two pairs of **electrons**). Only the **electrons** in the highest **energy** level (outer shell) are shown here

### Triple Bond

3 shared pair of **electrons**



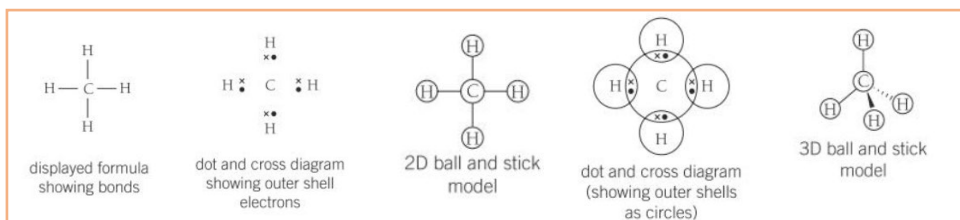
This is a triple covalent bond (with three pairs of **electrons**).

## The Structure Of Simple Molecules

Small, simple **molecules** can be represented in different ways, depending on what information you need from the diagram.

### Models

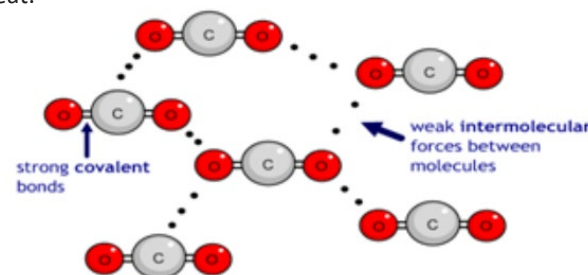
Way in which you can represent simple covalent **molecules**. Models are great to show an idea across, however, you need to consider which model you need to use as they all have advantages and disadvantages. As a scientist, you need to decide which is the best model to use.



## Simple covalent molecules properties

Simple covalent **molecules** have low melting and boiling points. This is because of the weak **intermolecular forces** acting **between** the **molecules** not the breaking of the strong covalent bonds between the **atoms**.

Simple covalent **molecules** share **electrons** therefore do not have any free **electrons** or have any charges, this means that they cannot conduct electricity and they are poor conductors of heat.



## Giant Covalent Structures

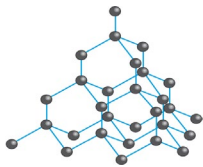
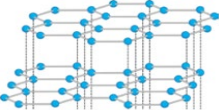
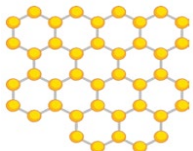
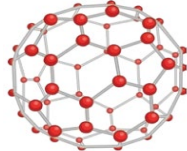
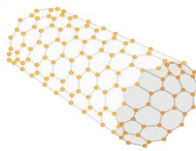

These are substances made up of thousands of **atoms** joined together by covalent bonding.

## Giant covalent structures

Giant covalent structures contain lots of **atoms**, each joined to adjacent **atoms** by covalent bonds. The **atoms** are usually arranged into a regular giant lattice, that are extremely strong structures because of the many bonds involved. They are also called macromolecules.

The table shows the different allotropes (molecular structure) but the same element carbon: graphite, diamond, graphene, and Buckminsterfullerenes.

In GCSE Silica (silicon dioxide) is often mentioned, to compare it to the diamond structure..

					
<b>Diamond</b>	<b>Graphite</b>	<b>Graphene</b>	<b>Fullerene</b>	<b>Nanotube</b>	<b>Silicon dioxide (silica / sand)</b>
<p>Each carbon is bonded to another 4 carbons No free <b>electrons</b> Cannot conduct electricity. Very strong High melting point</p> <p>Used in jewellery. Used in construction as drill bits Used to cut glass</p>	<p>Each carbon is bonded to another 3 1 delocalised <b>electron</b> Can conduct electricity Very strong covalent bonds Arranged in layers Is soft and slippery High melting point</p> <p>Used as a lubricant Used in electrolysis Used in pencils. Used as brake linings Used as moulds in industry</p>	<p>Is one single layer of graphite. Joined to 3 other carbons, with 1 delocalised <b>electron</b> Hexagonal shape Strong Can conduct electricity due to the delocalised <b>electron</b>. Very light</p> <p>Used in electronics Used as an anti-corrosion coating Used to make flexible displays for electronic goods</p>	<p>First one discovered was C<sub>60</sub> structure Hollow ball shape Arranged in hexagons (but could be also pentagons or heptagons) Large surface area. High tensile strength</p> <p>Used to cage other <b>molecules</b> as a drug delivery system. Used as a catalyst Used as a lubricants.</p>	<p>Tiny carbon cylinders. Can conduct electricity and thermal <b>energy</b>. Light High tensile strength. Uses nanotechnology. Can be used in medicine as a delivery system Can be layered</p> <p>Used as a composite to strengthening other materials. Used as semi-conductors</p>	<p>Has a similar structure to diamond. High melting point. Hard Very strong Doesn't conduct electricity.</p> <p>Used to make glass Used in tooth paste as an abrasive. Used in some cements</p>



## What is Crude Oil?

Crude oil is a finite resource that is formed from dead plant and animal that have been buried under the sea floor. Over time layers of silt and sand built up on it, causing the carbon-based organisms to break down under the heat and pressure.

## What is crude oil made up of?

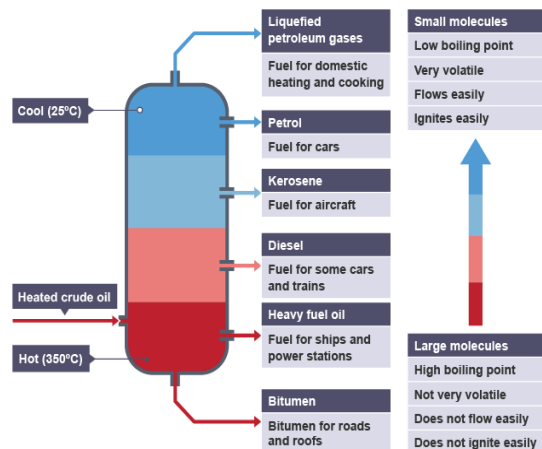
Crude oil is a mixture of different length hydrocarbons from the **alkane** family. A **hydrocarbon** is a compound that is made up of only carbon and hydrogen atoms.

Crude oil is fairly useless when its first taken out of the ground, however, once the mixture is separated into its different substances, known as fractions, they become useful.

## Fractions & Fractional Distillation

Below is a diagram that represents **fractional distillation**. The crude oil is made up of **different length molecules**. We can separate out the different lengths (**fractions**) using the boiling points of each molecule length. The longer chains exit towards the bottom and the short chain's exit towards the top.

The diagram also shows the **properties** of the lengths of molecules. These properties allow us to use them for different things; mostly for fuels.



## General Formula

**Alkanes** are a series of **hydrocarbons** which have the general formula  $C_nH_{2n+2}$ . It is called a **homologous** series, that is known as a single bonded, saturated **hydrocarbon**.

**HOMOLOGOUS**  
Same Relation

Alkane	Molecular formula	Structural formula	Ball-and-stick model
Methane	CH <sub>4</sub>		
Ethane	C <sub>2</sub> H <sub>6</sub>		
Propane	C <sub>3</sub> H <sub>8</sub>		
Butane	C <sub>4</sub> H <sub>10</sub>		

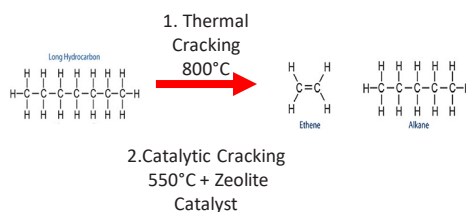
## Structure and bonding of alkanes

Covalent bonds are **strong** – a lot of energy is needed to break them. Substances with covalent bonds often form **molecules** with low melting and boiling points.

## Cracking and alkenes

**Cracking** is a reaction in which larger saturated **hydrocarbon molecules** are broken down into smaller, more useful hydrocarbon molecules. There are 2 main methods

1. Thermal Cracking
2. Catalytic Cracking



## What is combustion?

Combustion is a chemical reaction between fuel and oxygen. Depending on how much oxygen there is depends on the products it produces.

### Complete Combustion

If there is plenty of oxygen, then it produces carbon dioxide and water. You can write this as a word equation



Carbon dioxide increases global warming.

### Incomplete Combustion

If there is a lack of oxygen, then it will produce carbon monoxide + water + carbon particulates.



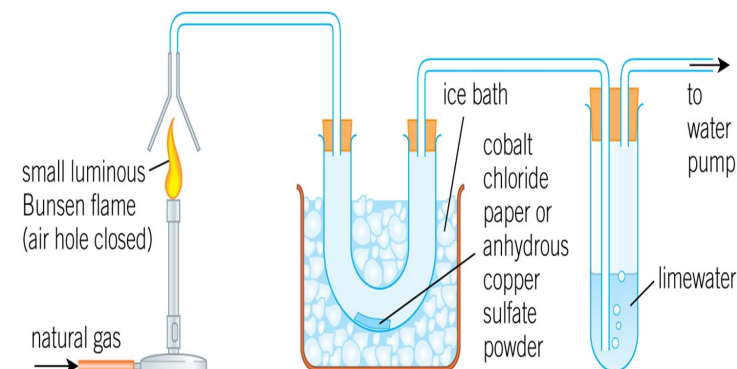
Carbon monoxide is toxic to humans. Carbon particulates cause global dimming and respiratory issues.



## Burning Fuels

The test for **carbon dioxide** is bubbling the gas through **limewater**; if there is **CO<sub>2</sub>** present, then the **limewater** turns cloudy.

The test for **H<sub>2</sub>O** and **CO<sub>2</sub>** (the products of combustion) is using the equipment below. It uses **cobalt blue paper** to test for water and **limewater** to test for CO<sub>2</sub>



### Speed

**Speed** is the distance travelled by an object in a certain amount of time.  
Speed is a **scalar** object, it only has a magnitude and it doesn't matter about its direction.

**Velocity** is how far some thing travels in a certain time in a certain direction.  
Velocity is a **vector** quantity, it has a magnitude and a direction.

#### Calculating Speed, distance and time

**Units**  
Speed (m/s), Distance (m), time (s)

### Acceleration

Acceleration is the **rate of change in speed** (or velocity)  
It can be calculated using the equation

**Acceleration = change in speed / time**

Which can be written as  
 $a = \frac{v - u}{t}$

$a$  = acceleration (m/s<sup>2</sup>)  
 $u$  = end velocity (m/s)  
 $v$  = start velocity (m/s)  
 $t$  = time (s)

**Another way to calculate acceleration**  
 $v^2 - u^2 = 2as$

$a$  = acceleration (m/s<sup>2</sup>)  
 $u$  = end velocity (m/s)  
 $v$  = start velocity (m/s)  
 $s$  = displacement/ distance (m)

### Distance- Time Graphs

On a distance time graph the gradient can be used to find the speed

### Velocity- Time Graphs

Gradient = Acceleration

**Higher Only: Area under the graph = distance travelled**

Key Vocabulary	Definition	Contextual Sentence
<b>Acceleration</b>	change of velocity per second (in metres per second per second, m/s <sup>2</sup> )	The <b>acceleration</b> of the car increased as the driver pressed the pedal harder.
<b>Deceleration</b>	change of velocity per second when an object slows down	The <b>deceleration</b> of the car was caused by the driver pressing the breaks.
<b>Displacement</b>	distance in a given direction	The boat had a <b>displacement</b> of 120m North
<b>Gradient</b>	change of the quantity plotted on the y-axis divided by the change of the quantity plotted on the x-axis	You can find the speed of an object on a distance – time graph by taking the <b>gradient</b> .
<b>Tangent</b>	a straight line drawn to touch a point on a curve so it has the same gradient as the curve at that point	A <b>tangent</b> can be used to find acceleration on a graph that shows a non-uniform velocity.
<b>Velocity</b>	speed in a given direction (in metres/second, m/s)	An object travelling in a circle will have a constant speed but a changing <b>velocity</b> .

# Year 10 Physics: Electricity Basics Knowledge

### Circuit Symbols

	switch (open)		lamp
	switch (closed)		fuse
	cell		voltmeter
	battery		ammeter
	diode		thermistor
	resistor		LDR
	variable resistor		
	LED		

### Series vs Parallel

<b>Current:</b> Is the same at any point in the circuit $I_1 = I_2 = I_3$	<b>Current:</b> Is shared across branches, equals the power source. $I_1 = I_2 + I_3$
<b>PD:</b> Is split between the components $V_1 = V_2 + V_3$	<b>PD:</b> Each branch equals the PD across the cell. $V_1 = V_2 = V_3$
<b>Resistance:</b> Total resistance equals the sum of each individual resistor	<b>Resistance:</b> Total resistance is always less than the smallest resistor

### Investigating Resistance

1. Connect the circuit as shown in the diagram above.
2. Connect the crocodile clips to the resistance wire, 100 cm apart.
3. Record the reading on the ammeter and on the voltmeter.
4. Move one of the crocodile clips closer until they are 90 cm apart.
5. Record the new readings on the ammeter and the voltmeter.
6. Repeat the previous steps reducing the length of the wire by 10 cm each time down to a minimum length of 10 cm.
7. Use the results to calculate the resistance of each length of wire by using  $R = V/I$ , where R is resistance, V is voltage and I is current.
8. Plot a graph of resistance against length for the resistance wire

**Ammeter** Measures current, must be placed in **series**

**Voltmeter** Measures potential difference, must be placed in **parallel**

Equation	Symbol	Units
Charge Flow = Charge x Time	$Q=It$	Charge- coulomb (C) Current- Amp (A) Time- Second (s)
PD = Current x resistance	$V=IR$	PD – volts (V) Current- Amp (A) Resistance- Ohm ( $\Omega$ )
Power = Current x PD	$P=IV$	Power- Watt (W) Current- Amp (A) PD – volts (V)
Power = current <sup>2</sup> x resistance	$P=I^2R$	Power- Watt (W) Current- Amp (A) Resistance- Ohm ( $\Omega$ )
Energy = power x time	$E=Pt$	Energy- Joule (J) Power- Watt (W) Time- Second (s)
Energy = charge x PD	$E=QV$	Energy- Joule (J) Charge- coulomb (C) PD – volts (V)

### Ohm's Law Potential Difference is directly proportional to current, assuming temperature is kept constant or $V=IR$

#### Fixed Resistor

Straight line through zero  
 $V \propto I$

#### Filament Bulb

$V$  is not  $\propto I$   
Due to temp increase

#### Diode

$V$  is not  $\propto I$   
Current only flows in +ve

#### Thermistor

Resistance decrease as temperature increases

#### LDR

Resistance decrease as light intensity increases

### Static Electricity (Physics Only)

Things with an **electric charge** feel a force while in an **electric field**.

**Static electricity** is caused when electrons are transferred from an insulator to another due to **friction**

**Friction & Electron Transfer**

Number of electrons: m      Number of electrons: n

Friction      Electron transfer

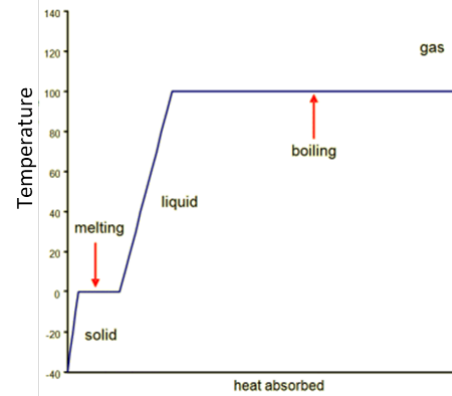
⊖ Static Buildup      ⊕ Static Buildup

Types of Energy Transfer		
Conduction	Convection	Radiation
<ul style="list-style-type: none"> <li>Energy transferred by direct contact</li> <li>Energy flows directly from warmer object to cooler object</li> <li>Can occur within one object</li> <li>Continues until object temperatures are equal</li> </ul>	<ul style="list-style-type: none"> <li>Occurs in gases and liquids</li> <li>Movement of large number of particles in same direction</li> <li>Occurs due to difference in density</li> <li>Cycle occurs while temperature differences exist</li> </ul>	<ul style="list-style-type: none"> <li>Energy transferred by electromagnetic waves such as light, microwaves, and infrared radiation</li> <li>All objects radiate energy</li> <li>Can transfer energy through empty space</li> </ul>

### Thermal Conductivity

The higher the thermal conductivity of a material, the higher the rate of energy transfer by conduction across the material

### Change of state



$$\text{Specific latent heat} = \frac{\text{energy, J}}{\text{mass, kg}}$$

- The freezing point of a substance is the same temperature as the **melting point**.
- The energy transferred to a substance as it changes state is called its **latent heat**.
- The energy stored by particles in a substance is its **internal energy**.
- This energy is sum of the **kinetic** energy of particles and their **potential** energy.
- The specific latent heat of fusion is the energy needed to change **1kg** of a substance from **solid to liquid** at its **melting point** (without a change in temperature)
- The specific latent heat of vaporisation of a substance is the energy needed to change **1kg** from **liquid to vapour**, at its **boiling point** (without a change in temperature)

### Specific Heat Capacity

The **specific heat capacity** of a substance is defined as:

- The amount of **energy** required to raise the temperature of 1 kg of a substance by **1 °C**

The amount of energy needed to raise the temperature of a given mass of a substance by a given amount can be calculated using the equation:

$$\Delta E = mc\Delta\theta$$

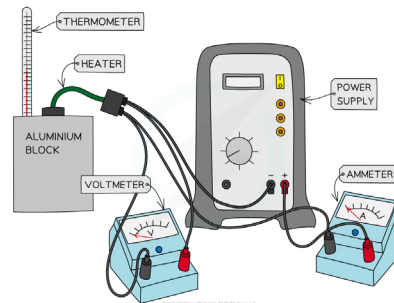
Where:

- $\Delta E$  = change in **energy**, in joules (J)
- $m$  = **mass**, in kilograms (kg)
- $c$  = **specific heat capacity**, in joules per kilogram per degree Celsius (J/kg °C)
- $\Delta\theta$  = **change in temperature**, in degrees Celsius (°C)

### Required Practical 1: Specific Heat Capacity

#### Variables

IV = Time,  
DV = Temperature,  
CV = Material of the block, Current, Voltage

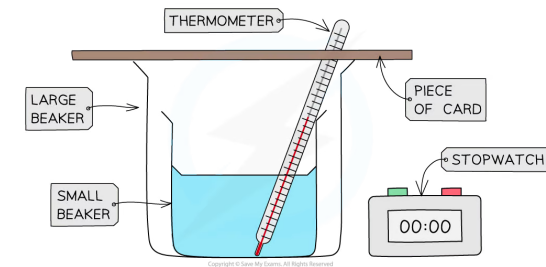


- Set up apparatus.
- Measure the initial temp of block
- Turn on the power
- Take temp every 1 min for 20 minutes
- Switch off the power supply.
- Monitor the thermometer and record the final temperature reached for the block

### Required Practical 2: Insulation

#### Variables

IV = Time,  $t$  (s)  
DV = Temperature,  $T$  (°C)  
CV: Volume of water, The temp of the water at the start, the thickness of material



- Set up the apparatus
- Place a piece of cardboard over the beakers as a lid
- Record the temp of water at star, then every 2 mins for 20 minutes,
- Repeat the experiment, changing the material

## Year 10 Physics: Electricity and Thermal Energy Vocab

Key Vocabulary	Definition	Contextual Sentence
<b>Ampere (A)</b>	The unit of current.	The phone had a current rating of <b>2A</b>
<b>Coulomb (C)</b>	The unit of charge	One amp is the same as one <b>Coulomb</b> per second
<b>Diode</b>	A non-ohmic conductor that has a much higher resistance in one direction (its reverse direction) than in the other direction (its forward direction).	A <b>diode</b> is used in a circuit to control the direction the current is able to flow in.
<b>Electric Field</b>	A charged object (X) creates an electric field around itself, which causes a non-contact force on any other charged object in the field.	The electron is repelled due to the <b>electric field</b> of the object.
<b>Ion</b>	A charged atom or molecule.	The atom lost an electron to become a positive <b>ion</b> .
<b>Ohm's Law</b>	The current through a resistor at constant temperature is directly proportional to the potential difference across the resistor	The fixed resistor obeys <b>Ohm's Law</b> .
<b>Parallel</b>	Components connected in a circuit so that the potential difference is the same across each one.	When a bulb breaks in a <b>parallel</b> circuit, the other bulbs remain lit.
<b>Potential Difference</b>	A measure of the work done or energy transferred to the lamp by each coulomb of charge that passes through it. The unit of potential difference is the volt (V)	The <b>potential difference</b> was determined using the voltmeter.
<b>Resistance</b>	Resistance (in ohms, $\Omega$ ) = potential difference (in volts, V) $\div$ current (in amperes, A)	As the electrons moved through the conductor they encountered <b>resistance</b> .
<b>Series</b>	Components connected in a circuit in such a way that the same current passes through them.	When a bulb breaks in a <b>series</b> circuit, the other bulbs do not remain lit.
<b>Static Electricity</b>	Electric charge stored on insulated objects	A static shock is caused by a build up of <b>static charge</b> .
<b>Volts</b>	The unit of potential difference.	The UK mains potential difference is <b>230V</b>

Key Vocabulary	Definition	Contextual Sentence
<b>internal energy</b>	the energy of the particles of a substance due to their individual <b>motion</b> and <b>positions</b>	The <b>internal energy</b> of the substance increased as it was heated.
<b>latent heat</b>	the <b>energy transferred</b> to or from a substance when it <b>changes its state</b>	The unit of <b>latent heat</b> is J/Kg
<b>specific latent heat of fusion <math>L_f</math></b>	<b>energy</b> needed to melt <b>1 kg</b> of a substance with <b>no change</b> of temperature	The <b>specific latent heat of fusion</b> for water is 330 KJ/kg
<b>specific latent heat of vaporisation <math>L_v</math></b>	<b>energy</b> needed to boil away <b>1 kg</b> of a substance with <b>no change</b> of temperature	The <b>specific latent heat of vaporisation</b> for water is 2,260 KJ/kg
<b>Specific heat capacity</b>	The amount of <b>energy</b> required to raise the temperature of 1 kg of a substance by <b>1 °C</b>	Water requires a large amount of energy to heat up as it has a high <b>specific heat capacity</b>
<b>Thermal conductivity</b>	The rate of thermal energy transfer through a material	Metal is used to make frying pans as it has a <b>high thermal conductivity</b>

GCSE Paper 1 Religion Christian Practices
1. Worship
2. Prayer
3. Baptism
4. Holy Communion
5. Pilgrimage
6. Festivals
7. Role of the Church in the local community
8. Mission and Evangelism
9. Church growth
10. The importance of the worldwide Church (reconciliation)
11. Christian Persecution
12. The Church's response to world poverty

## 1. Worship

**Liturgical** – Follows a set structure or ritual e.g. RC

**Non-liturgical** - Does not follow a set structure or ritual

**Informal** – Non-liturgical worship that is 'spontaneous' or 'charismatic'

**Private** – worshipping alone

### Why is worship important?

- It brings a sense of togetherness as a community
- It makes a person feel closer to God
- It is peaceful – allowing for prayer and meditation
- It is an external expression of their faith.

## 2. Prayer

Nature and purpose of prayer

### PACT

P- Praising and adoring God

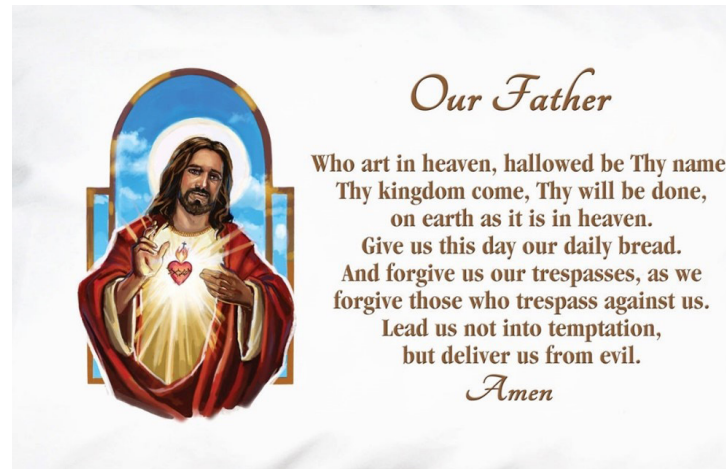
A- Asking

C- Confession

T- Thanksgiving

When Jesus' disciples asked him to teach them how to pray, he answered with the Lord's Prayer. Christians see it as a model of good prayer as it combines all aspects of PACT.

***"Our Father who art in heaven, hallowed be thy name"  
"Give us this day our daily bread. And forgive us our sins."***



## 3. Baptism

Sacraments are holy rituals through which believers receive a special gift of grace. Roman Catholics believe in seven sacraments, Protestants believe in just two.

Baptism is a ritual through which a person becomes a member of the Church. It involves the use of water to symbolise the washing away of sin. Infant baptism is for babies and young children. It welcomes the child into the Christian family and is believed to cleanse the child of the Original Sin of Adam and Eve. Believer's baptism is for people who are old enough to understand the significance of the ritual. The person is fully immersed under the water to wash all their sin (not just original sin).

## 4. Eucharist/Communion

Holy Communion (also known as the Eucharist) is the sacrament that uses bread and wine to celebrate the sacrifice of Jesus on the cross and his resurrection. It recalls the Last Supper of Jesus, using his words and actions. Christians interpret the meaning of Holy Communion in different ways. Roman Catholics believe in transubstantiation. This means they believe the bread and wine literally become flesh and blood. Many other Christians see the bread and wine as symbolic.

***"This is my body Eat this and remember me."***

***"This is my blood...drink this and remember me."***

In most churches the Holy Communion service has two parts: the ministry of the Word (which focusses on the Bible) and the ministry of Holy Communion (the offering, consecrating and sharing of bread.)

## 5. Pilgrimage

A pilgrimage is a journey made by a believer to a holy site for religious reasons. As well as making a physical journey to a sacred place, the pilgrim also makes a spiritual journey towards God.

**Lourdes**- the place where the Virgin Mary appears to a young girl Bernadette. Mary told Bernadette to dig and when she did a spring of water emerged. Pilgrims visit the site to drink the water in the hopes it will heal them.

**Iona**- An island of the coast of Scotland, discovered by St. Columba. Said to be so beautiful it must be the creation of God. Called the 'thin place', as it is believed this is place where the space between heaven and earth is at its thinnest.

## 6. Festivals

A festival is a day or period of celebration for religious reasons. Festivals help Christians to remember and celebrate the major events in their religion- particularly the life, death and resurrection of Jesus.

Christmas commemorates the incarnation and birth of Jesus. Celebrations begin on the 25th December and last 12 days, ending with Epiphany (which recalls the visit of the wise men).

Easter celebrates the resurrection of Jesus from the dead. Celebrations begin before Easter Sunday and finish with the feast of the Pentecost.

## 7. The role of the Church in the local community

The Church is the holy people of God, also called the Body of Christ, among whom Christ is present and active. A church is a building in which Christians worship. Individual churches and the Church as a whole help the local community in a variety of ways.

1. Trussell Trust- A charity running over 400 food banks in the UK. These provide emergency food, help and support to people in crisis in the UK.
2. The Oasis Project- A community hub run by Plymouth Methodist Mission Circuit. Provides an internet café, creative courses, a job club, training opportunities, a meeting place and a food bank. Spiritual and practical help is given to those in need.
3. Street Pastors- An initiative started in London in 2003 by a Christian charity the Ascension Trust. Adult volunteers are trained to patrol the streets in urban areas. The main aim originally was to challenge gang culture and knife crime in London. The focus then widened to responding to drunkenness and anti-social behaviour.
4. Parish Nursing Ministries- This Christian charity supports whole person health care through the local church. They provide churches with registered parish nurses, who promote well being in body, mind and spirit.

## 8. The place of mission and evangelism

A mission is a vocation or calling to spread the faith. The Church has a mission to tell non-believers that Jesus Christ, the Son of God, came into the world as its savior. Christians spread the faith through evangelism (showing faith in Jesus by example or telling others). They do this to fulfill Jesus' instructions to the disciples to spread his teachings (the Great Commission).

**'Therefore, go and make disciples of all nations, baptising them in the name of the Father and of the Son and of the Holy Spirit, and teaching them to obey everything I have commanded you.'** Matthew 28:19-20

## 9. Church growth

Up to a third of the world's population claim to be Christian (including people who rarely attend church), and around 80,000 people become Christians each day. The Church expects new Christians to help spread the faith as part of their commitment to Jesus.

Christ for all Nations is an example of a Christian organization promoting evangelism. They do this by holding evangelistic meetings throughout the world, but particularly in Africa. Some of their large open air-rallies held in Africa have drawn crowds of up to 1.6 million people.



## 10. The importance of the worldwide Church

The worldwide Church has a mission to restore people's relationship with God and with one another. The Church therefore plays an important role in reconciliation (restoring harmony after relationships have broken down), through initiatives to develop peace and understanding.

The Corrymeela Community brings together people from different backgrounds, including people of different faiths or political leanings.

Irish Churches Peace Project brings Catholics and Protestants together in Northern Ireland.

## 11. Christian persecution

Christians have faced persecution (hostility and ill treatment (from the beginning of the Church, and Christians are still persecuted worldwide today. For some Christians, persecution can have positive effects: it can strengthen the faith, allow them to share in Jesus' sufferings, and even inspire others to become Christian.

The Church helps those who are persecuted through prayer, practical help and financial support, and by raising awareness of persecution and campaigning against it. Christian Solidarity Worldwide campaigns for religious freedom for all.

## 12 The Church's response to world poverty

Christians try to help those living in poverty because Jesus taught that this was important. For example:

- Jesus once told a rich man to sell everything and give to the poor.
- The parable of the Rich Man and Lazarus tells of a rich man who ends up in hell for ignoring a beggar.
- The parable of the Good Samaritan teaches the importance of helping others.

Three Christian charities that help those in poverty are:

- Christian Aid supports projects to encourage sustainable development.
- Tearfund works with over 90,000 churches worldwide to help lift people out of poverty.
- CAFOD gives short term aid such as food, water and shelter and works with local organisations to train, supply and support communities to work their own way out of poverty.





Key Term	Definition	Contextual Sentence
<b>Worship</b>	Acts of religious praise, honour or devotion	Christians worship God in church each Sunday.
<b>Liturgical worship</b>	A church service that follows a set structure of ritual	Roman Catholics have liturgical worship.
<b>Non-liturgical worship</b>	A service that does not follow a set text or ritual	Non-conformist Christians have non-liturgical worship.
<b>Informal worship</b>	A type of non-liturgical worship sometimes 'spontaneous' or 'charismatic' in nature	The Pentecostal Church have informal worship.
<b>Prayer</b>	Communicating with God , either silently or through words of praise, thanksgiving or confession, or requests for God's help or guidance.	Prayer is a key way for Christians to worship God.
<b>Sacrament</b>	Rites and rituals through which the believer receives a special gift of grace; they are an 'outward sign' of an 'inward grace'.	The Roman Catholic Church have seven sacraments.
<b>Baptism</b>	The ritual through which people become members of the Church; baptism involves the use of water as a symbol of the washing away of sin.	Baptism is a sacrament in both the Roman Catholic and Protestant Church.
<b>Holy Communion (Eucharist)</b>	A service of thanksgiving in which the sacrificial death and resurrection of Jesus are celebrate using bread and wine; also called Eucharist, Mass, the Lord's Supper, the Breaking of Bread, and the Divine Liturgy.	There is a similar pattern in the way most churches celebrate Holy Communion.
<b>Pilgrimage</b>	A journey by a believer to a holy site for religious reasons; pilgrimage is an act of worship and devotion.	Iona is an important pilgrimage site for Christians.
<b>Festival</b>	A day or period of celebration for religious reasons.	Festivals help Christians remember the major events in their religion.
<b>Christmas</b>	The day commemorating the Incarnation, the birth of Jesus; also seen as the season of 12 days ending with the Epiphany.	Christmas is celebrated on the 25th December.
<b>Easter</b>	The religious season of celebrating the Resurrection of Jesus from the dead; it starts on Easter Day and finished with the feast of the Pentecost.	Easter is the most important Christian festival.
<b>Church</b>	1. The holy people of God, also called the Body of Christ, among whom Christ is present and active. 2. A building in which people worship.	The Church help the local community through food banks.
<b>Agape</b>	A word in the Bible that describes selfless, sacrificial, unconditional love.	Showing agape love is part of the Christian way of life.
<b>Mission</b>	The vocation or calling of a religious organisation or individual to go out and spread their faith.	The Church has a mission to spread the gospel to non-believers.
<b>Evangelism</b>	Spreading the Christian gospel by public preaching or personal witness.	The Alpha Course is an example of evangelism.
<b>Reconciliation</b>	A sacrament in the Catholic Church; also, the restoring of harmony after relationships have broken down.	The Corrymeela Community works for reconciliation.
<b>Persecution</b>	Hostility and ill treatment, especially because of race, or political or religious beliefs.	Christians have faced persecution throughout the history of the Church.

GCSE Paper 2 Themes Relationships and The Family
1. Sexuality
2. Homosexuality
3. Co-habitation
4. Purpose of the Family
5. Contraception
6. Polygamy
7. Divorce and Remarriage
8. Sex before & outside marriage
9. Gender Equality

## 1. Sexuality

Human sexuality refers to the way people express themselves as sexual beings. A heterosexual relationship is a relationship with a member of the opposite sex. A homosexual relationship is a relationship with a member of the same sex, either between a man and another man or a woman and another woman.

Christianity: Marriage is the only valid place for heterosexual relationships. Christians are unfaithfulness and Catholics believe that sex before marriage is wrong.

Islam: Heterosexual relationships are allowed and Muslims are expected to marry and raise a family. The only sexual relationship should take place between husband and wife.

Homosexuality is condoned in Christianity when the Bible says that sex between two men is 'detestable.' Roman Catholics may state that the action of sex is the sin and therefore homosexual couples should remain chaste. Muslims may also say that homosexuality goes against natural law and those involved will face God on judgement day.

However, many Christians and Muslims believe we should avoid making judgements and welcome any relationship if it is loving and committed.

## 2. Homosexuality

Homosexual relationships involve a relationship with a member of the same sex. This was only legalised in 1967 in the UK and in some traditional Muslim countries is still illegal and punishable today. In 2004 same-sex couples were allowed to have civil partnerships (the same sex marriage) but this is not allowed within the Christian church. Homosexuality is condoned in Christianity when the Bible says that sex between two men is 'detestable.' Roman Catholics may state that the action of sex is the sin and therefore homosexual couples should remain chaste. Muslims may also say that homosexuality goes against natural law and those involved will face God on judgement day.

However, many Christians and Muslims believe we should avoid making judgements and welcome any relationship if it is loving and committed.

## 3. Co-habitation

Christianity: Christians who are opposed to sex before marriage believe cohabitation is wrong. Catholics are opposed to any sexual relationship outside of a marriage. Anglicans accept that although marriage is best, people may live together if they are in a loving relationship. Islam: Believe it's wrong as sex should only occur within a marriage.

## 4. Purpose of the Family

Christians place very high value on family life, as love is at the heart of all relationships and this is where children learn to love. Christians believe it's important to look after the elder generations of the family and to respect their parents because of the commandment 'honour your mother and father'. For Muslims the extended family is the basis of Islamic society and part of God's plan. The family shapes the moral values and character of the child and the role of the mother is very significant in shaping the lives of children, whereas husbands are seen to be the main providers of the family. 'Heaven is under the feet of the mothers'.

## 5. Contraception

Contraception is a way of preventing pregnancy.

There are different methods of contraception: The pill, condoms, injection, etc.

Christianity:

The Catholic Church teach that artificial methods of contraception goes against God's laws as it is the purpose of marriage and sex is to have a family. Only natural forms of contraception are allowed in family planning.

Anglicans accept people should have only as many children as they can afford and contraception is therefore permissible before conception. 'Be fruitful and increase in number; fill the earth'. Genesis 2:24

Islam: Contraception is only acceptable in the context of marriage, not for unmarried people. There is an expectation that Muslims will have children, but they believe the couple should be able to decide when to have the family and how many children to have. 'God wishes to lighten your burden.'

## 6. Polygamy

Polygamy is where a man or a woman has more than one married partner. If it is done in secret this is bigamy. It is illegal in the UK. Christianity: Christians believe that the ideal marriage is between one man and one woman.

Islam: Islam allows for a man to have more than one wife at a time. The Prophet Muhammad had several wives. The first wife has to consent.

## 7. Divorce and Remarriage

Divorced can be filed one year after marriage and can only be sanctioned by a court. People divorce for a number of reasons such as: addiction, abuse, falling out of love, inability to have children, financial pressures and adultery. People can get married as many times as they wish to their original or a different spouse.

**Christianity:** Jesus taught that anyone who divorced and remarried was committing adultery as they are still married in the eyes of God. Some Christians argue if it is the lesser of two evils (for example, a partner is suffering abuse).

**Islam:** Divorce is allowed in Islam but is not favourable and all attempts of fixing broken relationships should be made. If this does not work then an abortion may go ahead. However, they have to wait for three months before the divorce is finalised to ensure the women is not pregnant and that they are certain (Iddat)

## 8. Sex before and outside of Marriage

The Anglican and Catholic Churches and Islam teach that sex before marriage is wrong. In the past, sexual relationships outside of marriage was considered shocking, especially for a woman. In Britain, sex before marriage is now widely accepted but adultery (sex outside of marriage) is generally considered to be wrong. Muslims believe casual sex is wrong. They believe it can lead to promiscuity and other evils such as rape and deception. Under Islamic law, it is a sexual offence. Christians believe adultery (cheating) is wrong because it involves secrecy, lies and a betrayal of trust.

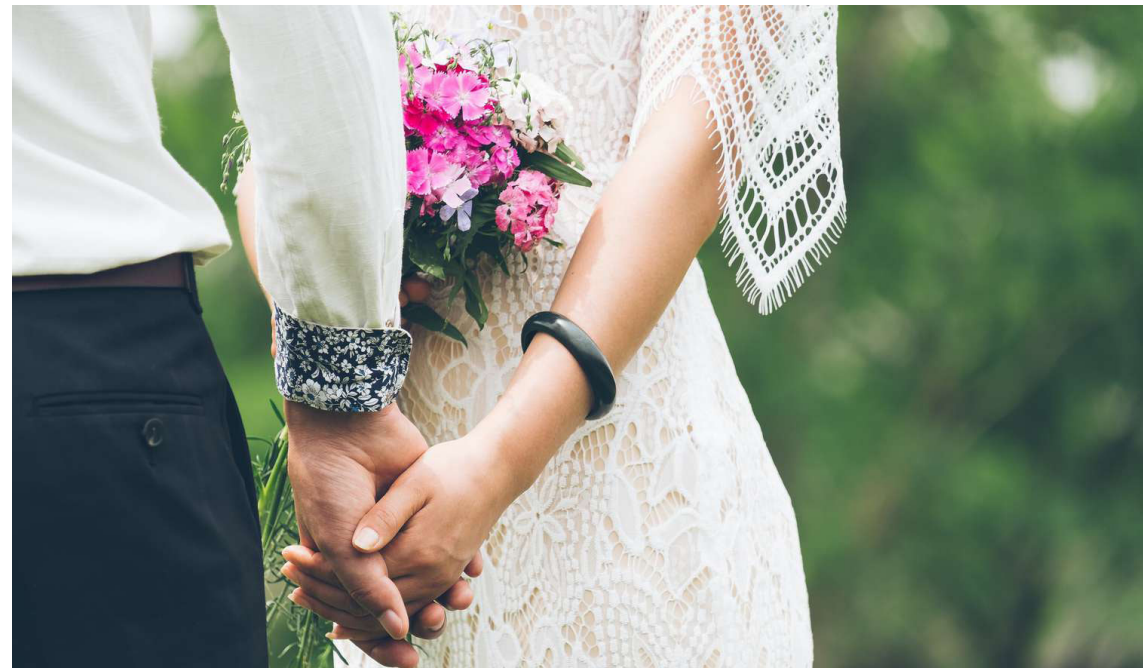
Sex outside of marriage:

- Adultery is considered a serious sin. Muslims should avoid situations which could lead to this sort of sin.
- They believe it is wrong because it is a betrayal of trust and goes against the marriage promises.
- In some countries governed by Shari'ah law the punishment for adultery is death, though it is hard to get caught.
- 'And do not go anywhere near adultery: it is an outrage, and an evil path'. Qur'an 17:32

## 9. Gender Equality

- Gender equality means that men and women should be given the same rights and opportunities as each other. Gender prejudice and sexual stereotyping often prevents equality between genders.
- Traditionally, men held more positions of power and had more rights than women. Christians believe that both men and women are created in the image of God, however, each have different gifts. Women have the role of rearing children. 'With painful labour you give birth to children. Your husband will rule over you.'
- Muslims respect women both before and after marriage and place high value on the mothers role in raising children and educating them in the ways of Islam. 'You were created a single man and single woman and created into races and tribes.'

Tier 3 Vocab	
<b>Adultery</b>	Voluntary sexual intercourse between a married person and a person who is not their husband or wife
<b>Cohabitation</b>	Living together with a partner in a sexual relationship but not married
<b>Polygamy</b>	When an individual marries multiple spouses (husbands or wives).
<b>Procreation</b>	Reproduction. The production of offspring.
<b>Bigamy</b>	Illegally marrying someone whilst already married to another person.






## Year 10 History Autumn Term- Peacemakers and the Treaty of Versailles

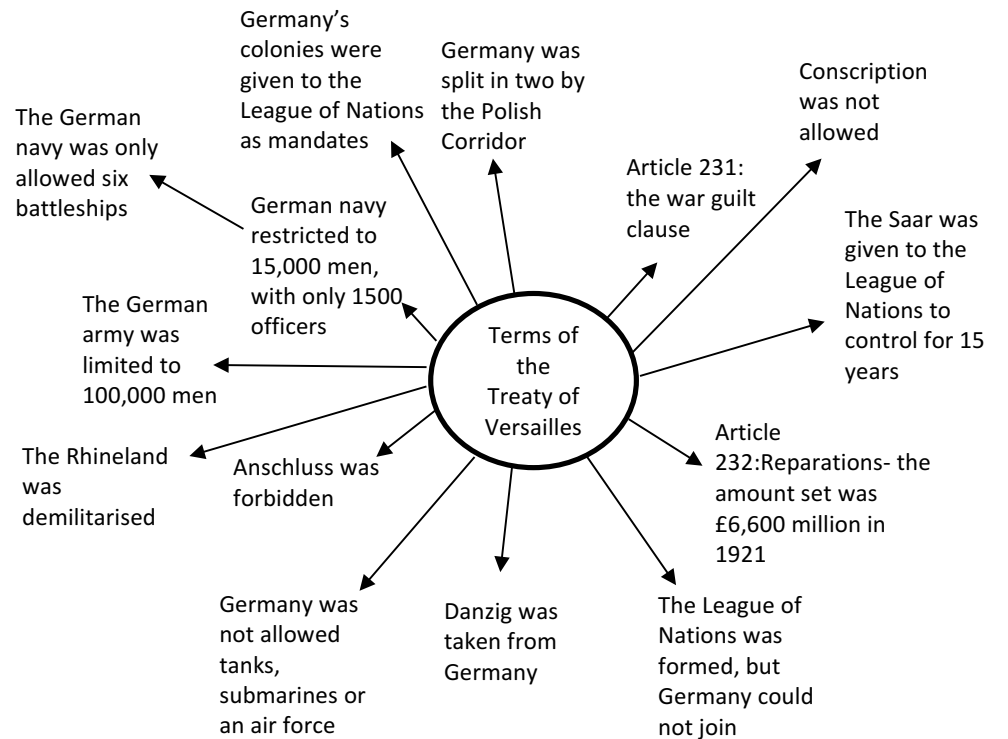
The First world war devastated Europe. 8 Million soldiers and a further 8 million civilians lay dead. Towns railways and farms had been destroyed. The world would never be the same again. When the leaders of the winning countries met at the Paris peace conference they had to decide the terms of the final peace treaties. There was a great deal of pressure of the Big Three to make a lasting peace, however each had their own aims.

The Treaty of Versailles was signed on the 28<sup>th</sup> June 1919. The final treaty was a Diktat, meaning that Germany were not allowed to negotiate terms. The Germans were unhappy with the final treaty, however the Big Three were also not satisfied with it.

11 November 1918	Signing of armistice led to the end of WW1
January 1919	Paris peace conference
June 1919	Signing of the Treaty of Versailles

Leader	Country	Aims
Georges Clemenceau 	France	<ul style="list-style-type: none"> <li>Wanted Germany to pay reparations to rebuild areas of France badly affected by war</li> <li>Wanted revenge for all the lives lost</li> <li>Aimed to weaken Germany so it could never attack again</li> <li>Wanted to push German borders back to the Rhine so French people would feel safer</li> </ul>
Davis Lloyd George 	Britain	<ul style="list-style-type: none"> <li>Wanted a cautious approach: The British public wanted to see Germany punished, but Lloyd George feared this would lead to Germany wanting revenge</li> <li>Wanted to keep Germany strong so it could trade with Britain and act as a buffer to Communism</li> <li>Aimed to gain German colonies to add to the British Empire</li> <li>Wanted Naval supremacy by reducing Germany's navy</li> </ul>
Woodrow Wilson 	USA	<ul style="list-style-type: none"> <li>Wanted a fair peace, so Germany would not seek revenge</li> <li>Proposed the Fourteen points, including foundation of a League of Nations, Self determination and freedom of the seas; but the American public didn't want the USA to get involved in European affairs again.</li> </ul>

Key Word	Definition
Demilitarise	Remove all military from the area
Allies	A group of countries that work together
Diktat	A forced treaty – Germany called the Treaty of Versailles a diktat or dictated peace
Big Three	Representatives of the most powerful winning countries – Britain, France and the USA
Conscription	Compulsory military service
Paris Peace conference	Meeting held at the Palace of Versailles in France at the end of the first World War, to decide how to punish the countries that had lost the war.



**Year 10 History**  
**Autumn Term- Reactions to the Treaty of Versailles**

The Treaty of Versailles was signed and it immediately became international law. However not everyone was satisfied with the terms of the treaty. The Big Three had contrasting views on how Germany should be punished. Germany was outraged by the harsh terms they had been dealt.  
The Treaty of Versailles dealt with Germany, however Germany had allies during the war. Austria-Hungary, Bulgaria and Turkey all had to be dealt with as well at the Paris peace conference

Key Word	Definition
Isolationism	A policy in which a country does not get involved in Foreign affairs
Ratify	Agree with, make official
Abdicate	To give up the throne of a country
Weimar Republic	The democratic government that ruled Germany from 1918-1932

Country	Opinion on the Treaty of Versailles
<b>Germany</b>	<ul style="list-style-type: none"> <li>Germany was in turmoil at the end of the First World War, the Kaiser had fled to Holland after abdicating the throne.</li> <li>The people of Germany were furious over the Treaty of Versailles. They perceived that the treaty would lead to financial ruin for Germany.</li> <li>The Germans called the treaty a Diktat as they felt it had been dictated to them and they had been forced to sign.</li> <li>The war guilt clause meant that Germany had to accept responsibility for starting the war.</li> <li>They had been told they were winning the war, so felt like they had been stabbed in the back and betrayed by the government. People called those who had signed the armistice the November Criminals.</li> <li>Germany felt like the treaty had left them vulnerable, without a large army to defend themselves they could be easily attacked.</li> <li>13% of land was lost to other countries, this left 6 million German people no longer living in Germany.</li> </ul>
<b>Britain</b>	<ul style="list-style-type: none"> <li>Lloyd George was pleased about Britain having naval supremacy over Germany and the British empire gaining more colonies.</li> <li>Lloyd George was unhappy about the harsh reparations meaning Britain would lose trade with Germany. He was also concerned about the threat of possible future war.</li> <li>British people generally thought the treaty was fair, and could even have been harsher.</li> <li>Lloyd George was hailed as a hero, and newspapers said Britain would never be threatened by Germany again.</li> </ul>
<b>France</b>	<ul style="list-style-type: none"> <li>Clemenceau was pleased about France gaining Alsace-Lorraine and that Germany had no army present in the Rhineland.</li> <li>Clemenceau was unhappy about the reparations, he wanted Germany to pay more. He was also unhappy that Germany was allowed to have an army at all, even if it was a small one. Clemenceau had wanted the whole of the Rhineland to be taken away from Germany not just demilitarised.</li> <li>Many people in France were furious – they believed that the treaty was nowhere near harsh enough and that Germany should suffer as much as France had done during the war.</li> <li>The French people felt that Clemenceau had not done enough to get revenge and he was voted out at the next election.</li> <li>There were a few terms that the people of France liked, such as gaining control of the Saar and its coalfields for 15 years.</li> </ul>
<b>USA</b>	<ul style="list-style-type: none"> <li>Woodrow Wilson was pleased that the League of Nations was created.</li> <li>Woodrow Wilson was unhappy that his Fourteen points were ignored in the treaty terms and the harshness of the treaty terms.</li> <li>The USA had only joined the war in 1917 and no fighting took place in the USA, Americans did not want revenge in the same way as Britain and France.</li> <li>Many people including Wilson thought the treaty was too harsh.</li> <li>The USA wanted to follow a policy of isolationism. The US Senate refused to approve the treaty or to allow the USA to join the League of Nations.</li> </ul>

Country	Austria	Bulgaria	Hungary	Turkey
<b>Name of Treaty</b>	Treaty of St Germain	Treaty of Neuilly	Treaty of Trianon	Treaty of Sevres
<b>Date</b>	10 <sup>th</sup> September 1919	27 <sup>th</sup> November 1919	4th June 1920	10 <sup>th</sup> August 1920
<b>Land</b>	Land taken to create new countries Czechoslovakia and Yugoslavia	Land lost to Yugoslavia and Greece	Land lost to Romania, Czechoslovakia, Yugoslavia and Austria	Split up the Turkish Empire so Turkey lost nearly all its land in Europe
<b>Reparations</b>	Agreed in principal, but the amount was never fixed	£100 million	Agrees in principal, but the amount was never fixed	None
<b>Military restrictions</b>	30,000 in army, no conscriptions; no navy	20,000 in army; no conscriptions; no air force; only four battleships	30,000 in army; no conscription; only three patrol boats	50,000 in army; seven sailboats; six torpedo boats
<b>Other terms</b>	Forbidden to unite with Germany	None	None	Dardanelles and Bosphorus straits were opened to other countries

**Year 10 History**  
**Autumn Term- League of Nations formation and 1920s**

During the First World War, many people wanted to set up an organisation that would encourage countries to work together when they had problems and work out their differences, rather than resorting to fighting. At the end of the war US president Woodrow Wilson wanted to set up the League of Nations. What was the League of Nations and why did it have limited powers?

**The League had Two Main Aims**

- 1) **To maintain peace** — using three different methods:
  - **Disarmament** involved reducing the number of weapons that each country had.
  - **Arbitration** meant helping countries to **talk** about their disputes rather than fight.
  - **Collective security** meant that if one country attacked another, League members would **act together to control** the aggressor.
- 2) **To encourage cooperation** — and help solve **economic** and **social** problems, such as disease, slavery, and poor working and living conditions.

**The League was made up of Various Parts**

All the members of the League followed a **Covenant** (agreement) of 26 Articles (rules). Articles 1 to 7 set up the structure of the League:

**The Assembly**  
The Assembly met once a year to discuss matters like the membership of the League, as well as efforts to maintain world peace. Every country in the League had one vote at the Assembly. Decisions could only be made if everyone agreed on them.

**The International Labour Organisation**  
This part of the League discussed and made suggestions to improve working conditions. It was made up of government officials, employees and workers from different countries.

**The Council**  
The Council met at least four times a year. It had permanent members (Britain, France, Italy, Japan and later Germany) and temporary members. It dealt with international affairs and aimed to settle disputes. All members had a vote, but permanent members could veto (reject) Council decisions.

**The Permanent Court of International Justice**  
This was made up of fifteen judges from different member countries. They were asked to settle international disputes.

**The Secretariat**  
Carried out the work of the League, like a civil service.

Everyone hoped this would avoid another major war.

- 1) **42** countries **joined** the League at the start. In the **1930s**, about **60** countries were members. This made the League seem **strong**.
- 2) The League also had a range of **agencies** and **commissions**, which worked on specific **humanitarian issues**. These included a **health** organisation, a commission for **refugees**, and a commission for **women's rights**. These commissions did some valuable work (see p.26).

Key Word	Definition
Council	Members of the League of Nations who met once a year to discuss and vote on matters of international importance
Covenant	An agreement. This was set up to determined what could be expected of the League and its members
Unanimous	When everyone agrees
Veto	The right to reject a proposal

Problems with the League of Nations
The USA didn't join the League of Nations. Wilson was ill and the senate rejected it.
Germany were not allowed to join the League because they lost the war. The USSR were not allowed to join because they were communist
Britain and France were in charge but neither were strong enough to do the job properly
The league could introduce sanctions but only if powerful countries applied them.
The League relied on the armies of member states, this made it difficult to act on threats.
The league was a large organisation but it was also complicated. Everyone had to agree in the assembly and council before anything happened. It made it difficult to get anything done.
Economic sanctions were frequently undermined by the USA's non membership and the unwillingness of Britain and France to enforce

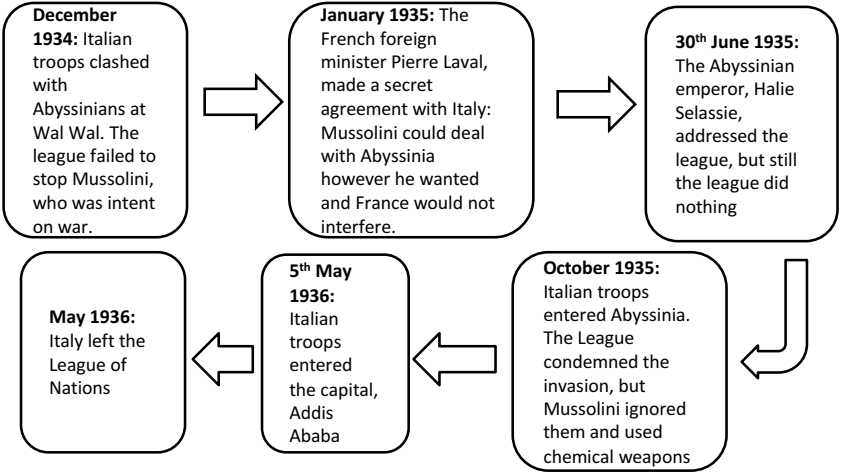
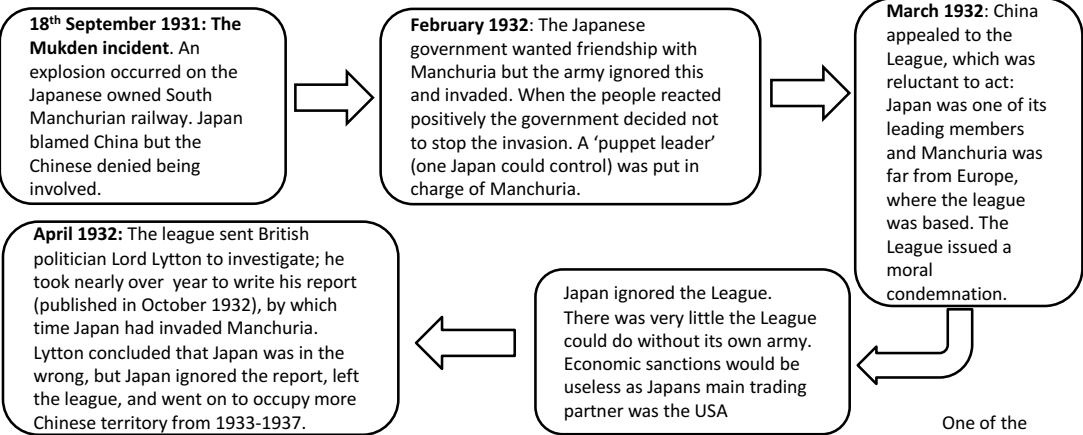
The League of Nations resolved disputes in the 1920s:	The League of Nations struggled to resolve disputes in the 1920s:
<b>Upper Silesia</b> was a region with valuable industry. A referendum was held for citizens to choose whether to be ruled by Poland or Germany, but the result was too close to be decisive. In 1921, the League suggested dividing the area between the two countries, which both sides (and most citizens) accepted.	<b>Corfu</b> , a Greek island was occupied by Italy in 1923 in response to an Italian diplomat being shot dead in Greece. At first, the League told Italy to leave and fined the Greeks. Italy ignored this and demanded compensation from Greece. The League changed its mind and agreed that Greece should give money to Italy and apologise. Greece obeyed and Italy withdraw its troops.
<b>The Aaland Islands</b> sit almost exactly halfway between Sweden and Finland. They belonged to Finland, but most people there wanted to be ruled by Sweden. In 1921, the League decided that the islands should remain Finnish, and both sides accepted this.	<b>Vilna</b> was chosen as the capital of the newly-formed Lithuania after the First World War, but most of the population were Polish. Poland seized Vilna in April 1919 and refused to give it up when told to do so by the League. On this occasion, the League was powerless to stop military aggression.
<b>Bulgaria</b> was invaded by Greece in 1925 after border disputes. The league ordered Greece to withdraw, and it obeyed.	<b>The Ruhr</b> (an industrial region of Germany) was invaded and occupied by France in 1923 after Germany had failed to keep up its reparation payments. The French began shipping its products back to France. The League of Nations didn't intervene. The USA helped resolve the situation with the Dawes plan.

## Year 10 History Autumn Term- League of Nations in the 1930s

The League of Nations faced one of its biggest tests so far in September 1931. The Japanese army staged the Mukden incident and used it as an excuse to invade the region of Manchuria in China. The league was also challenged by Italy and Mussolini. In 1935 he invaded Abyssinia in North – East Africa. Both countries were permanent members of the League and had gone against the covenant.

- Causes of the Manchurian crisis:**
- 1929 Wall street crash started the Great depression. Japan suffered greatly its main export was silk, a luxury many could not afford.
  - Japan became more militaristic- the government looked for land to invade, thinking it could give them more natural resources. Manchuria was rich in natural resources.
  - Japan already had industry and a railway there so it looked like an ideal place to invade.

- Causes of the Abyssinia crisis:**
- Mussolini wanted to rebuild the Roman Empire, by invading other countries
  - There was natural resources in Abyssinia, which would be useful for Italy during the Depression.
  - In 1896, Italy had tried to invade Abyssinia and had been humiliated when the country defeated them, Mussolini wanted revenge.
  - In 1935, Britain and France signed an agreement with Italy to form the Stresa Front. Mussolini did not think Britain and France would endanger the new agreement by trying to stop him in Abyssinia.



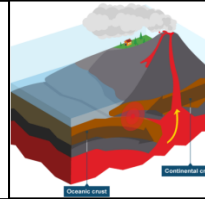
## Paper 1: Living with the Physical Environment Section A: Natural and Tectonic Hazards

### What is the definition of a Natural Hazard?

A natural hazard is a natural event such as an earthquake, volcanic eruption, tropical storm or flood that poses risk of death, injury or damage to people and property.

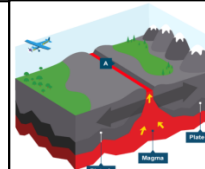
#### What are the processes at Destructive Plate Margins?

This is where two plates are moving towards each other. The oceanic dense plate subducts beneath the less dense continental plate. Friction between the plates causes earthquakes. As the oceanic plate moves downwards it melts. The magma here is very viscous (like jam) and forces its way to the surface to form steep sided composite volcanoes such as those found on the west coast of South America where the Nazca plate subducts beneath the South American plate. Eruptions are often very violent and explosive. COLLISION IS 2 CONTINENTAL PLATES COMING TOGETHER.



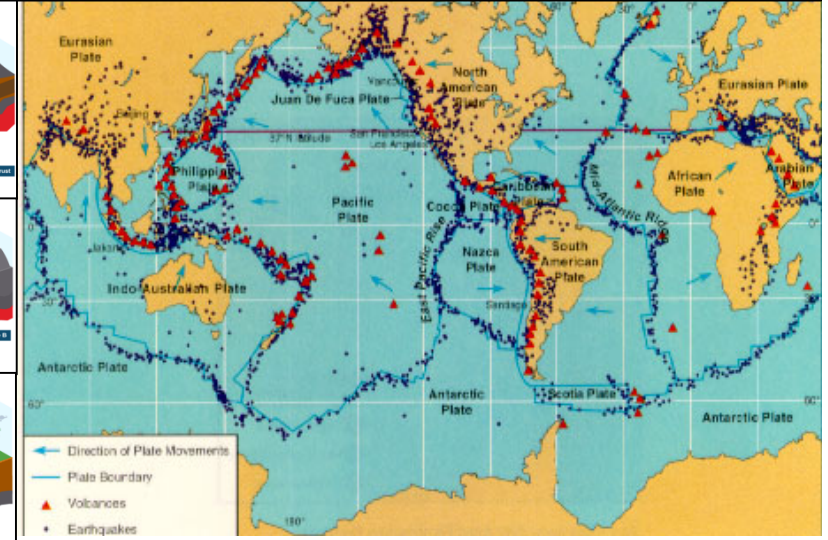
#### What are the processes at Constructive Plate Margins?

This is where two plates are moving apart like what is happening at the Mid-Atlantic Ridge where magma forces its way to the surface along the Mid-Atlantic Ridge. As it breaks through the overlying crust it causes earthquakes. On reaching the surface it forms volcanoes such as Eyjafjallajokull in Iceland. The magma here is very hot and fluid, it will flow a long way before cooling, resulting in typically broad and flat shield volcanoes.



#### What are the processes at Conservative Plate Margins?

This is where two plates are sliding alongside each other such as the San Andreas Fault in California. The faster-moving Pacific Plate is sliding in the same direction next to the slower North-America Plate. Friction between the two plates then causes earthquakes as stresses gradually build up over many years, they are released suddenly when pressure builds up and plates slip or shift. There are no volcanoes here.



#### How can we manage and reduce the effects of a Tectonic Hazard?

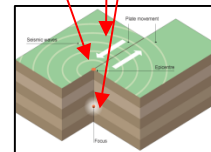
##### Monitoring and Prediction

##### Protection

##### Planning

- Seismometers are used to measure tremors before a main earthquake.
- Monitoring the water table (water tends to fluctuate before an earthquake).
- Satellites monitor ground deformation.
- Designing buildings and roads to withstand earthquakes.
- Increasing awareness.
- Earthquake drills.
- Seismic maps can be made.
- Prepare emergency supplies.

The point directly above the focus where the seismic waves reach first, is called the epicentre. Seismic waves travel out from the focus, which is the point at which pressure is released.



#### What are the reasons why people continue to live in areas at risk from a Tectonic Hazard?

People living in poverty ridden areas have more important things to think about like food, money, security and family. Plate margins often coincide with very favourable areas for settlement, such as coastal areas where ports have developed. Fault lines associated with earthquakes allow water supplies to reach the surface. This is important in dry desert regions. Better building design can withstand earthquakes so people feel less at risk. Volcanoes can bring benefits such as fertile soils, rocks for building, rich mineral deposits, hot water and geothermal energy. More effective monitoring of volcanoes and tsunamis waves enable people to receive warnings and evacuate before events happen.



# Paper 1: Living with the Physical Environment

## Section A: Weather Hazards

### How can Tropical Storms be Managed?

Monitoring  
Protection

Satellites monitor cloud patterns associated with tropical storms.  
NASA monitor weather patterns using unmanned drones called Global Hawk.  
Reinforce buildings - hurricane shutters on windows and doors.  
Develop coastal flood defences.

Create 'no-build zones' in low lying areas.

Prediction

Planning

Supercomputers give 5 days' warning and predict a location within 400km.  
Track forecast cones plot the tropical storms path. Approx. 70% occur within the cone.  
Those living where it will hit can prepare disaster supply kits and ensure their car is fully fuelled.  
People should know where evacuation centres are.



### What is the global distribution of tropical storms?

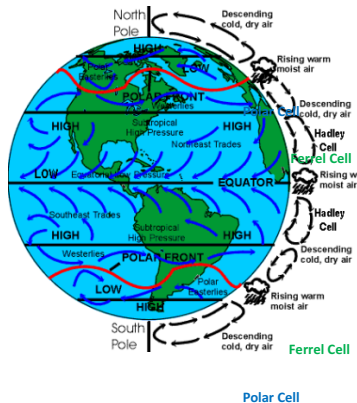
Tropical storms are a natural hazard. They have different names depending on their location. They occur between 5° and 30° north and south of the Equator, between the tropic of Cancer and the tropic of Capricorn. This provides areas of intense low-pressure so that warm, moist air rises rapidly to reach high altitudes where it begins to spin (Coriolis effect). They don't occur on the equator because there is not enough spin from the rotation of the Earth. In the USA and Caribbean tropical storms are called Hurricanes. In south-east Asia and Australia, they are called cyclones, but in Japan and the Philippines they are called typhoons.

### What are the Causes and Formation of a Tropical Storm?

1. The sun's rays heat large areas of the ocean in the summer and the autumn. When ocean temperatures reach 27°C, warm, moist air rises upwards drawing water vapour up from the ocean surface. This is a low-pressure system.
2. This evaporated air cools as it rises and condenses to form towering thunderstorm (cumulonimbus) clouds.
3. As the air condenses it releases heat which powers the storm and draws up more and more water from the ocean.
4. Several smaller thunderstorms join, to form a giant spinning storm. When surface winds reach an average 120km per hour (75mph) the storm officially becomes a tropical storm.
5. The storm now develops an eye at its centre where air descends (sinks) rapidly. The outer edge of the eye is the eyewall where the most intense weather conditions (strong winds and heavy rain) are felt.
6. As the storm is carried across the ocean by the prevailing winds, it continues to gather strength.
7. On reaching land the storm's energy supply (evaporated water) is cut off. Friction with the land slows it down and it begins to weaken as it approaches land. If the storm reaches warm seas after crossing the land, it may pick up strength again.

### What is Global Atmospheric Circulation?

The atmosphere - the air above our heads - is a complex swirling mass of gases, liquids and solids. These include water droplets, water vapour, ash, carbon dioxide and oxygen - just to mention a few. Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth. It involves many circular movements called *cells*. These cells all join to form the overall circulation of the earth's atmosphere.



Air at the equator is heated strongly so it rises in **low pressure** conditions. The air flows towards the North and South Poles. As warm air rises it cools and condenses. **Low pressure** therefore brings clouds and rain.

The air sinks at 30° north and south of the Equator under **high pressure**. **High pressure** weather brings dry and clear skies. This forms a convection (circular movements) cell called the Hadley cell.

Air at the polar latitudes is colder and denser (heavier) so the air sinks towards the ground surface under **high pressure** conditions. This air flows towards the Equator. The air warms as it reaches about 60° and again rises under **low pressure** conditions. This forms the **Polar Cell**. Located between the Hadley cell and the Polar cell is the **Ferrel Cell**.

### Is the UK Weather becoming more Extreme?

Extreme Weather is not new to the UK. However, the frequency of extreme weather in the UK is increasing. Since the 1980s, UK's temperatures have increased by about 1°C and winter rainfall has increased. There have been more weather records broken in recent years than ever before.

#### Extreme Weather Records



#### Temperature

#### Rainfall

December 2010 coldest on record for 100 years.

Warmest April was 2011.

Highest temperature was 38.5°C in Kent in August 2003.

Lowest temperature was -27°C in Scotland in 1995.

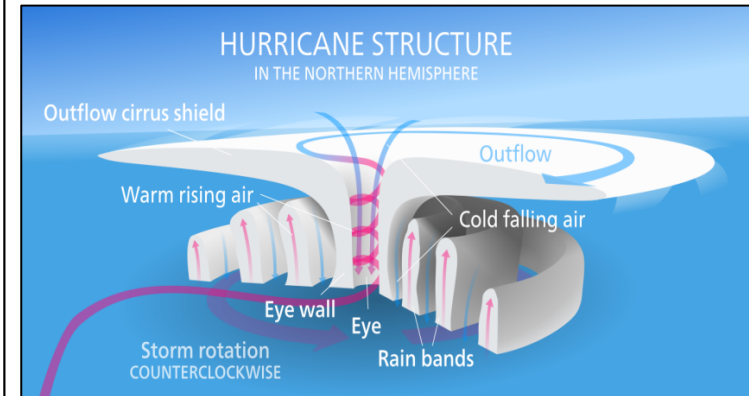
Highest two-day record of rainfall (405mm) was in 2015.

Highest three - four-day rainfall records were both in 2009.

Highest monthly total rainfall was 1296mm in 2015.

Serious flooding has become more frequent in winters.

### What is the structure and the features of a tropical storm?



### What are future predictions for UK Weather?

Precipitation is expected to become more frequent.

Some rivers are expected to flood more frequently in winters.

Air temperature is expected to increase, causing more drought.

Climate change cannot be responsible for individual extreme weather events, yet scientists say it can be responsible for increased frequency in such events.

# Paper 1: Living with the Physical Environment

## Section A: Climate Change

### What are the possible Causes of Climate Change?

Climate change is the **long-term** change in weather. Global climate change occurs very slowly over thousands of years. Evidence of climate change occurring before humans existed means climate change must be natural as well as human enhanced. Natural causes alone cannot account for the significant temperature increase since the 1970s. A thicker layer of greenhouse gases (carbon dioxide 77%, methane 14%, nitrous oxide 8% and CFCs 1%) caused by human activity means less of the Sun's energy is able to escape the Earth's atmosphere, so the temperature increases.

### What is the evidence for Climate Change?

Since 1914 the Met Office has reliable climate change data collected using weather stations, satellites, weather balloons, radar and ocean buoys. Evidence includes:

- An increase in the average surface air temperature by 1°C over the past 100 years.
- The warmest ocean temperatures since 1850.
- A 19cm rise in sea levels since 1900.
- Arctic sea ice has thinned by 65% since 1975.



Natural records like tree rings, ice cores (spanning 800, 000 years) and ocean sediments (spanning beyond the quaternary period), help estimate climate. The period of timeline that spans from **2.6 million years ago to the present day** is called the **Quaternary Period**. This period marks a time when there was a **global drop in temperature** and the most recent ice age began.

Ice cores are cylinders of ice drilled out of an ice sheet or glacier. The ice encloses small bubbles of air that contain a sample of the atmosphere - making it possible to measure the past concentration of gases in the atmosphere. Antarctic ice cores show us that the concentration of CO<sub>2</sub> was stable until the early 19th century.

### How will Climate Change affect People and the Environment?

- Less ice in the Arctic Ocean increases shipping and extraction of gas and oil reserves (because we can reach it).
- Droughts reduce food and water supplies in sub-Saharan Africa.
- Water scarcity in the south and south east of the UK.
- 70% of Asia at increased risk of flooding.
- Sea level rise increases flooding and coastal erosion.
- Ice melts so wildlife declines such as Adelie penguins on the Arctic peninsula and polar bears in the Arctic.

### How can we Manage Climate Change?

The burning of fossil fuels to produce electricity, fuels vehicles and power industry contributes 87% of all human-produced CO<sub>2</sub> emissions. The rest comes from land uses changes such as deforestation (9%) and industrial processes such as making cement (4%).

**Alternative Energy Provision:** To help reduce carbon emissions many countries are turning to alternative sources of energy such as: hydro-electricity, nuclear power, solar, wind and tidal. These do not emit large amounts of CO<sub>2</sub>. Some are also renewable and will last into the future. Nuclear power uses uranium to generate electricity but it does not emit CO<sub>2</sub> as a by-product. At current, in 2016, renewables produce more than 20% of the UK's electricity.

**Carbon Capture and Storage:** Coal is the most polluting of all fossil fuels. China gets 80% of its electricity from burning coal, India 70% and the USA 50%. Carbon capture and storage (CCS) uses technology to capture CO<sub>2</sub> produced from the use of fossil fuels in electricity generation and industrial processes. It is possible to capture up to 90% of the CO<sub>2</sub> that would otherwise enter the atmosphere. Once CO<sub>2</sub> is captured, the carbon gas is compressed and transported by pipeline to an injection well. It is injected as a liquid into the ground to be stored in suitable geological reservoirs such as sedimentary rock as this prevents it from escaping. The UK is the world leader in CCS.

**Planting Trees:** Trees act as carbon sinks, removing CO<sub>2</sub> from the atmosphere by the process of photosynthesis. They also release moisture into the atmosphere. This has a cooling effect by producing more cloud, reducing incoming solar radiation. Tree planting is well established in many parts of the world. Plantation forests can absorb CO<sub>2</sub> at a faster rate than natural forests and can do so effectively for up to 50 years. The UK has a £24.9 million project to reduce deforestation and increase reforestation in Brazil. It aims to tackle climate change by reducing 10.71 million tons of CO<sub>2</sub> emissions over 20 years by recovering 41,560 hectares of degraded forests.

**International Agreement:** Paris Agreement 2015 -

- 195 adopted the first ever universal and legally binding global climate deal.
- To peak greenhouse gas emissions as soon as possible and achieve a balance between sources and sinks of greenhouse gases in the second half of this century (2050-2100).
- To keep global temperature increase below 2°C and limited to 1.5°C above pre-industrial levels.
- To review progress every 5 years.
- \$100 billion a year to support climate change initiatives in developing countries by 2020, with further finance in the future.
- There have been criticisms that many of these agreements are 'promises' or aims and not firm commitments.

<b>Conservative Plate Margin</b>	Tectonic plate margin where two tectonic plates slide past each other.	<i>Earthquakes are caused by conservative plate margins.</i>
<b>Constructive Plate Margin</b>	Tectonic plate margin where two tectonic plates slide past each other.	<i>Shield volcanoes are formed by constructive plate margins.</i>
<b>Destructive Plate Margin</b>	Tectonic plate margin where two tectonic plates slide past each other.	<i>Volcanoes and earthquakes are found on destructive plate margins.</i>
<b>Immediate Response</b>	The reaction of people as the disaster happens and in the immediate aftermath.	<i>An immediate response to the hazard was evacuation.</i>
<b>Long-term Response</b>	Later reactions that occur in the weeks, months and years after the event.	<i>A long term response to the hazard was improving infrastructure.</i>
<b>Monitoring</b>	Recording physical changes, such as earthquake tremors around a volcano, to help forecast when and where a natural hazard might strike.	<i>Seismologists are able to predict future earthquakes by monitoring seismic activity.</i>
<b>Prediction</b>	Attempts to forecast when and where a natural hazard will strike, based on current knowledge. This can be done to some extent for volcanic eruptions (and tropical storms), but less reliably for earthquakes.	<i>Seismologists are able to predict future earthquakes by monitoring seismic activity.</i>
<b>Planning</b>	Actions taken to enable communities to respond to, and recover from, natural disasters, through measures such as emergency evacuation plans, information management, communications and warning systems.	<i>We can reduce the impacts of tectonic hazards by planning ahead.</i>
<b>Protection</b>	Actions taken before a hazard strikes to reduce its impact, such as educating people or improving building design.	<i>Strengthening buildings and infrastructure adds protection to communities in the event of an earthquake, and can reduce the effects.</i>
<b>Primary Effects</b>	The initial impact of a natural event on people and property, caused directly by it, for instance the ground buildings collapsing following an earthquake.	<i>A primary effect of an earthquake is the collapse of buildings.</i>
<b>Secondary Effects</b>	The after-effects that occur as indirect impacts of a natural event, sometimes on a longer timescale, for instance fires due to ruptured gas mains resulting from the ground shaking.	<i>A secondary effect of an earthquake is homelessness, because your home collapsed, or unemployed because your place of work collapsed.</i>
<b>Climate Change</b>	A long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature.	<i>The burning of fossil fuels in one of the most significant causes of climate change.</i>
<b>Mitigation</b>	Action taken to reduce or eliminate the long-term risk to human life from natural hazards, such as building earthquake-proof buildings or making international agreements about carbon reduction targets.	<i>Mitigation strategies include the use of alternative energies, and adopting a plant based diet.</i>
<b>Adaptation</b>	Actions taken to adjust to natural events such as climate change, to reduce potential damage, limit the impacts, take advantage of opportunities, or cope with the consequences.	<i>Adaptation strategies include the building of flood defences and water transfer schemes.</i>
<b>Orbital Changes</b>	Changes in the pathway of the Earth around the Sun.	<i>Orbital changes modify the total amount of sunlight reaching the Earth by up to 25%.</i>

## Life at School and College: GCSE Foundation Tier Spanish Knowledge Organiser

### Key Ideas

- Las reglas del colegio.
- Los problemas escolares.
- Las diferencias entre los institutos de España y los de Inglaterra.
- Mi instituto ideal.
- Mi uniforme escolar.
- Los deberes.



### Key Vocabulary

#### Los sustantivos

el acoso (escolar)	(school) bullying
el alumno	pupil, student
los apuntes	notes
la biología	biology
el bolígrafo	pen
la clase	classroom
el comportamiento	behaviour
los deberes	homework
la escuela	school
el examen	examination
el permiso	permission
el recreo	break, recess, playtime, recreation
la rutina	routine

los vestuarios	changing rooms
----------------	----------------

#### Los adjetivos

desobediente	disobedient
educativo/a	educational
obligatorio/a	compulsory
privado/a	private
sobresaliente	outstanding

#### Los verbos

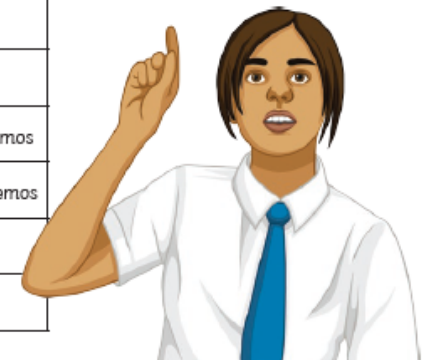
aprender	to learn
aprobar	to approve, to pass (an exam)
comportarse	to behave

charlar	to chat
entender	to understand
explicar	to explain
preguntar	to ask a question
suspender	to fail (exam/subject)



### Key Verbs

Infinitivo	Presente	Pasado (Pretérito)	Futuro
hacer – to do	yo hago ; él/ella hace ; nosotros/as hacemos	yo hice ; él/ella hizo ; nosotros/as hicimos	yo haré ; él/ella hará ; nosotros/as haremos
ser – to be	yo soy ; él/ella es ; nosotros/as somos	yo era ; él/ella era ; nosotros/as éramos	yo seré ; él/ella será ; nosotros/as seremos
estar- to be	yo estoy ; él/ella está ; nosotros/as estamos	yo estuve ; él/ella estuvo ; nosotros/as estuvimos	yo estaré ; él/ella estará ; nosotros/as estaremos
tener – to have	yo tengo ; él/ella tiene ; nosotros/as tenemos	yo tuve ; él/ella tuvo ; nosotros/as tuvimos	yo tendré ; él/ella tendrá ; nosotros/as tendremos
deber – to have to	yo debo ; él/ella debe ; nosotros/as debemos	yo debí ; él/ella debía ; nosotros/as debíamos	Yo deberé ; él/ella deberá ;
saber- to know (a fact)	yo sé ; él/ella sabe ; nosotros/as sabemos	yo supe ; él/ella supo ; nosotros/as supimos	nosotros/as deberemos



**Key Phrases**

hay que/no hay que + infinitivo	it is necessary to/you should; it is not necessary to/you shouldn't
se debe/no se debe + infinitivo	one must/one must not
está prohibido + infinitivo	it is forbidden
no tengo confianza en mí mismo/a	I do not have confidence in myself.
estoy a favor del uniforme escolar	I am in favour of the school uniform.
estoy en contra del uniforme escolar	I am against the school uniform.
tengo la razón	I am right.
me equivoco	I am wrong.
los problemas más serios son	the most serious problems are
mejor	better
por	worse
excepto	except
temprano/tarde	early/late
más.... que/menos.... que	more ... than/less ... than



**Tricky Pronunciation: Practise these with your teacher!**

hay que	it is necessary to	Make sure you don't pronounce the 'h'
---------	--------------------	---------------------------------------

**False Friends**

el director/la directora	headteacher
aprobar un examen	to pass an exam
la jornada escolar	school day
durar	to last



**Tricky spellings**

el comportamiento	behaviour	
el exámen	exam	Check the accent on the 'a'.
está prohibido	it is forbidden	Check the "h" between the first 'o' and the first 'i'.

**Key Questions**

- ¿Tienes demasiados deberes?  
Do you have too much homework?
- Describe las reglas de tu colegio.  
Describe the school rules.
- Para ti, ¿cuáles son los problemas más serios de tu colegio?  
What are the most serious problems at school, in your opinion?
- ¿Estás a favor o en contra del uniforme escolar?  
Are you for or against school uniform?
- Describe tu instituto ideal.  
Describe your ideal school.
- ¿Cuáles son las principales diferencias entre la rutina escolar de España y la de Inglaterra?  
What are the main differences between school life in Spain and school life in England?

**Useful Grammatical Structures**

- Be aware of grammatical markers which help you to work out whether a noun is singular or plural. Most plurals add '-s' at the end of the noun.
- Use the infinitive after these key constructions: hay que (you should); no hay que (you shouldn't); se debe/ no se debe (one must/one mustn't); está prohibido (it is forbidden to).
- Use relative pronouns to link sentences together e.g. que (that/which); donde(where); cuando (when).
- Use negatives to negate a sentence. Place them before the verb e.g. no juego a fútbol (I don't play football); nunca juego a fútbol (I never play football).



## Travel and Tourism GCSE Foundation Tier Spanish Knowledge Organiser

### Key Ideas

- Por qué me gusta ir de vacaciones
- Los destinos de vacaciones: normalmente/ el año pasado/el año que viene
- Los tipos de vacaciones que me gustan
- Quedarse en Inglaterra o viajar al extranjero
- Las ventajas y los inconvenientes de los diferentes tipos de alojamiento/ transporte
- Las actividades que se hacen de vacaciones (opiniones)
- ¿Cómo son las vacaciones de tus sueños?

Los verbos	
alojarse	to lodge, to stay
bañarse	to bathe, to swim
caminar	to walk
descansar	to rest
esquiar	to ski
estar de vacaciones	to be on holiday
llevar	to take
pasar	to spend time, to go through, to pass
reservar	to book, to reserve
sacar fotos	to take photos
tomar el sol	to sunbathe
viajar	to travel

### Key Vocabulary

Los sustantivos	
el aeropuerto	airport
la agencia de viajes	travel agent's
el aire acondicionado	air conditioning
el albergue juvenil	youth hostel
el alojamiento	accommodation
el avión	airplane, aeroplane
el barco	boat
el billete (de ida/de ida y vuelta)	(single/return) ticket
la cama de matrimonio	double bed
la cámara de fotos	camera
el camping	camp site, camping
el coche	car
el crucero	cruise
la maleta	suitcase
el mar	sea
la media pensión	half board
la montaña	mountain
la playa	beach
la pensión completa	full board
la tienda de campaña	tent
el viaje	trip, journey
el vuelo	flight

Key Phrases	
Me gusta/No me gusta ir de vacaciones porque...	I like/dislike going on holiday because...
Encuentro las vacaciones relajantes/ estresantes.	I find holidays relaxing /stressful.
No me gusta ir de vacaciones con mi familia.	I don't like going on holiday with my family.
Personalmente prefiero las vacaciones culturales.	Personally, I prefer cultural holidays.
Normalmente nos quedamos en una casa de alquiler.	Usually, we stay in a holiday home.
Alojarse en una casa de alquiler te da más libertad.	Staying in a holiday home gives you more freedom.
Durante las vacaciones de verano...	During the summer holidays, ...
Hizo mucho calor todos los días.	It was hot every day.
La ventaja de coger un vuelo es que es más rápido.	The advantage of taking the plane is that it's fast.
Visité muchos lugares turísticos y saqué muchas fotos.	I visited lots of tourist spots and I took lots of photos.
Probé la comida local.	I sampled the local cuisine.
Para mis vacaciones ideales me gustaría ir a...	For my dream holiday, I would like to go to...

Infinitivo	Presente	Pasado (Pretérito)	Futuro
hacer - to do	yo hago ; él/ella hace ; nosotros/as hacemos	yo hice ; él/ella hizo ; nosotros/as hicimos	yo haré ; él/ella hará ; nosotros/as haremos
ser - to be	yo soy ; él/ella es ; nosotros/as somos	yo era ; él/ella era ; nosotros/as éramos	yo seré ; él/ella será ; nosotros/as seremos
estar- to be	yo estoy ; él/ella está ; nosotros/as estamos	yo estuve ; él/ella estuvo ; nosotros/as estuvimos	yo estaré ; él/ella estará ; nosotros/as estaremos
tener - to have	yo tengo ; él/ella tiene ; nosotros/as tenemos	yo tuve ; él/ella tuvo ; nosotros/as tuvimos	yo tendré ; él/ella tendrá ; nosotros/as tendremos
ir- to go	yo voy ; él/ella va; nosotros/as vamos	yo fui ; él/ella fue ; nosotros/as fuimos	yo iré ; él/ella irá ; nosotros/as iremos
viajar- to travel	yo viajo; él/ella viaja; nosotros/as viajamos	yo viajé ; él/ella viajó ; nosotros/as viajamos	yo viajaré ; él/ella viajará ; nosotros/as viajaremos



Los adjetivos	
aburrido/a	boring
bonito/a	beautiful
cansado/a	tiring
emocionante	exciting
estresante	stressful
interesante	interesting
lento/a	slow

## Travel and Tourism GCSE Foundation Tier Spanish Knowledge Organiser

Key Questions	
1. ¿Te gusta ir de vacaciones?	Do you like going on holiday?
2. ¿Cuáles son las ventajas y los inconvenientes de... a) los diferentes tipos de alojamiento? (los hoteles/los albergues, etc.) b) los diferentes tipos de transporte? (el avión/el coche) c) los diferentes destinos? (la ciudad/el campo, etc.)	What are the advantages and disadvantages of... different types of accommodation (hotels/holiday homes)? different means of transport (plane/car)? different destinations (town/countryside)?
3. ¿Dónde vas de vacaciones normalmente?	Where do you normally go on holiday?
4. ¿Prefieres quedarte en Gran Bretaña o viajar al extranjero?	Do you prefer staying in Great Britain or going abroad?
5. Describe un día típico.	Describe a typical day.
6. ¿Qué hiciste el año pasado en las vacaciones de verano?	What did you do last year during the summer holidays?
7. Háblame de las vacaciones de tus sueños.	Talk to me about your dream holiday.

### Useful Grammatical Structures

- Use modifiers to modify an adjective. Examples include: bastante (quite); un poco (a bit)
- Use intensifiers to intensify an adjective. Examples include: realmente (really); muy (very); particularmente (particularly); totalmente (totally); completamente (completely)
- Use connectives and conjunctions to make longer sentences. Examples include: porque (because); ya que (as/because); pero (but); sin embargo (however); cuando (when), although (aunque)

### Tricky Spellings

el avión	airplane, aeroplane	Check the accent
la cámara de fotos	camera	Check the accent

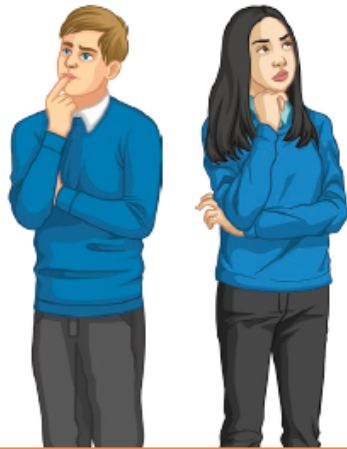
Tricky Pronunciation	Practise these with your teacher!
alojarse	to lodge, to stay
bañarse	to bathe, to swim
llevar	to take



## Life at School/College GCSE Foundation Tier French Knowledge Organiser

### Key Ideas

- Règlements scolaires
- Problèmes scolaires
- Différences entre la journée scolaire en France et la journée scolaire en Angleterre
- Mon collège idéal
- L'uniforme scolaire
- Les devoirs



### Key Vocabulary

#### Les noms

les affaires (f)	belongings/possessions
l'ambiance (f)	atmosphere
les bijoux (m)	jewellery
le bruit	noise
la coiffure	hairstyle
l'intimidation (f)	bullying
le maquillage	make-up
la mode	fashion
le prix	prize
la punition	punishment
la récompense	reward
les règlements (m)	rules
la rentrée	start of the new school year
la retenue	detention

le souci	worry
le temps libre	free time
les vêtements (m) de marque	designer clothes

#### Les adjectifs

bruyant (e)	noisy
démodé(e)	old-fashioned
faux / fausse	false
pénible	annoying/painful
propre	clean
sale	dirty
stressant(e)	stressful
vrai(e)	true

#### Les verbes

écrire	to write
faire de son mieux	to do one's best
mâcher	to chew
porter	to wear
savoir	to know (a fact)
se moquer de	to make fun of



### Key Verbs

Infinitif	Présent	Passé	Futur
faire – to do	je fais; il / elle fait; nous faisons	j'ai fait; il / elle a fait; nous avons fait	je ferai; il / elle fera; nous ferons
être – to be	je suis; il / elle est; nous sommes	j'ai été; il / elle a été; nous avons été	je serai; il / elle sera; nous serons
avoir – to have	j'ai; il / elle a; nous avons	j'ai eu; il / elle a eu; nous avons eu	j'aurai; il / elle aura; nous aurons
savoir – to know (a fact)	je sais; il / elle sait; nous savons	j'ai su; il / elle a su; nous avons su	je saurai; il / elle saura; nous saurons
devoir – to have to	je dois; il / elle doit; nous devons	j'ai dû; il / elle a dû; nous avons dû	je devrai; il / elle devra; nous devrons



**Key Phrases**

- **il faut / il ne faut pas + infinitive** - it is necessary to/it is not necessary to
- **on doit / on ne doit pas + infinitive** - on must/one mustn't
- **il est interdit de + infinitive** - it is forbidden to
- **je n'ai pas de confiance en moi** - I have no confidence in myself
- **je suis pour l'uniforme scolaire** - I am for the school uniform
- **je suis contre l'uniforme scolaire** - I am against the school uniform
- **j'ai raison** - I'm right
- **j'ai tort** - I'm wrong
- **les problèmes les plus graves sont ...** the most serious problems are...
- **mieux** - better
- **pire** - worse
- **sauf** - except
- **tôt / tard** - early/late
- **plus ... que / moins ... que** - more ... than/less ... than



**Tricky Pronunciation: Practise these with your teacher!**

en retard	late	Don't pronounce the last letter.
il faut	it is necessary to	Make sure this is distinct from 'il fait'.
on doit / la coiffure	one must/ hairstyle	Check the 'oi' sound.
le prix / mieux /	price/better/ jewellery	Don't pronounce the 'x'.
l'avantage	advantage	No 'd' in French.
le temps libre	free time	Don't pronounce the 'ps'; check the nasal vowel.
bien équipé	well-equipped	Pronounce the final 'é'.

**False Friends**

le directeur/la directrice	headteacher
passer un examen	to take an exam
réussir un examen	to pass an exam
la journée scolaire	school day
sale	dirty
durer	to last



**Tricky spellings**

il faut	it is necessary to	Make sure this is distinct from 'il fait'.
régulièrement	regularly	Check the accents.

**Key Questions**

1. **Tu as trop de devoirs ?** Do you have too much homework?
2. **Décris les règlements scolaires.** Describe the school rules.
3. **Quels sont les problèmes les plus graves au collège, à ton avis ?** What are the most serious problems at school, in your opinion?
4. **Tu es pour ou contre l'uniforme scolaire ?** Are you for or against school uniform?
5. **Décris ton collège idéal.** Describe your ideal school.
6. **Quelles sont les différences principales entre la vie scolaire en France et la vie scolaire en Angleterre ?** What are the main differences between school life in France and school life in England?

**Useful Grammatical Structures**

- Be aware of **grammatical markers** which help you to work out whether a noun is singular or plural. Most plurals add 's'; however, there are exceptions, e.g. le bateau / des bateaux; une souris / des souris.
- Use the **infinitive** after these key constructions: **il faut** (you should); **il ne faut pas** (you shouldn't); **on doit / on ne doit pas** (one must/one mustn't); **il est interdit de** (it is forbidden to).
- Use **relative pronouns** to link sentences together, e.g. **qui** (who/which); **que** (that/which); **dont** (whose); **où** (where).
- Use **negatives** to negate a sentence. Place them around the verb, e.g. **je ne joue pas** au foot (I don't play football); **je ne joue jamais** au foot (I never play football).



## Travel and Tourism GCSE Foundation Tier French Knowledge Organiser

### Key Ideas

- Pourquoi on aime partir en vacances
- Les destinations de vacances – normalement / l'année prochaine / dernière
- Les types de vacances qu'on aime
- Rester en Angleterre ou partir à l'étranger
- Les avantages et inconvénients de différents types d'hébergement / transport
- Les activités qu'on fait en vacances (opinions)
- Comment sont tes vacances de rêve ?

### Key Phrases

<b>J'aime / je n'aime pas aller en vacances parce que...</b>	I like/dislike going on holiday because...
<b>Je trouve les vacances relaxants / stressantes</b>	I find holidays relaxing/stressful.
<b>Je n'aime pas aller en vacances en famille</b>	I don't like going on holiday with my family.
<b>Personnellement je préfère les vacances culturelles</b>	Personally I prefer cultural holidays.
<b>D'habitude on reste dans un gîte</b>	Usually we stay in a holiday home.
<b>Dans un gîte on a plus de liberté</b>	Staying in a holiday home gives you more freedom.

<b>Pendant les grandes vacances...</b>	During the summer holidays...
<b>Il faisait chaud chaque jour</b>	It was hot every day.
<b>L'avantage de prendre l'avion est que c'est rapide</b>	The advantage of taking the plane is that it's fast.
<b>J'ai visité plusieurs sites touristiques et j'ai pris beaucoup de photos</b>	I visited lots of tourist spots and I took lots of photos.
<b>J'ai goûté la cuisine locale</b>	I sampled the local cuisine.
<b>Pour mes vacances de rêve je voudrais aller au Maroc</b>	For my dream holiday I would like to go to Morocco.

### Key Verbs

Infinitif	Présent	Passé	Futur
<b>faire</b> – to do	je fais/ il fait/ elle fait	j'ai fait/ il a fait/ elle a fait/nous avons fait/ ils ont fait/ elles ont fait	je ferai/ il fera/ elle fera nous ferons/ ils feront/ elles feront
<b>être</b> – to be	je suis/ il est/ elle est	j'ai été/ il a été/ elle a été nous avons été/ ils ont été/ elles ont été	je serai/ il sera/ elle sera nous serons/ ils seront / elles seront
<b>avoir</b> – to have	j'ai/ il a/ elle a nous avons/ ils ont/elles ont	j'ai eu/ il a eu/ elle a eu nous avons eu/ils ont eu/ elles ont eu	j'aurai/ il aura/ elle aura nous aurons/ ils auront / elles auront
<b>aller</b> – to go	je vais/ il va/ elle va	je suis allé(e)/ il est allé/ elle est allée nous sommes allé(e)s/ ils sont allés/elles sont allées	j'irai/ il ira/ elle ira nous irons/ils iront /elles iront
<b>prendre</b> – to take	je prends; il/elle prend; nous prenons	j'ai pris; il/elle a pris; nous avons pris	je prendrai; il/elle prendra; nous prendrons

### Key Vocabulary

#### Les noms

<b>à l'étranger</b>	abroad
<b>l'aéroport</b>	airport
<b>l'avion</b>	aeroplane
<b>le camping</b>	campsite
<b>la crème solaire</b>	suncream
<b>un coup de soleil</b>	sunburn
<b>la cuisine locale</b>	the local cuisine
<b>le gîte</b>	holiday home
<b>l'hôtel</b>	hotel
<b>le maillot de bain</b>	swimwear
<b>la plage</b>	beach
<b>le séjour</b>	stay
<b>le temps</b>	the weather
<b>les vacances (f)</b>	holidays
<b>la voiture</b>	car
<b>le voyage</b>	journey

#### Les adjectifs

<b>beau / belle</b>	beautiful
<b>ennuyeux / ennuyeuse</b>	boring
<b>fatigant(e)</b>	tiring
<b>intéressant(e)</b>	interesting
<b>lent(e)</b>	slow
<b>passionnant(e)</b>	exciting
<b>stressant(e)</b>	stressful

#### Les verbes

<b>nager</b>	to swim
<b>bronzer</b>	to sunbathe
<b>faire chaud / froid</b>	to be hot/cold (weather)
<b>perdre</b>	to lose
<b>rester</b>	to stay
<b>voyager</b>	to travel

**Key Questions**

- |   |  |
|---|--|
| 1. Aimes- tu aller en vacances ?  | Do you like going on holiday ?                           |
| 2. Quels sont les avantages et inconvénients                                | What are the advantages and disadvantages of:            |
| a) des différents types d'hébergement ?                                     | different types of accommodation (hotels/ holiday homes) |
| (les hôtels / les gîtes etc.)   |  |
| b) des différents moyens de transport ? (l'avion / la voiture)              | different means of transport (plane/car)                 |
| c) des différentes destinations ? (la ville / la campagne etc.)             | different destinations (town/countryside)                |
| 3. Où vas-tu en vacances normalement ?                                      | Where do you normally go on holiday?                     |
| 4. Préfères- tu rester en Grande-Bretagne ou aller à l'étranger ?           | Do you prefer staying in Great Britain or going abroad?  |
| 5. Décris-moi une journée typique.  | Describe a typical day.                                  |
| 6. Qu'est-ce que tu as fait pendant les grandes vacances l'année dernière ? | What did you do last year during the summer holidays?    |
| 7. Parle-moi de tes vacances de rêve.                                       | Talk to me about your dream holiday.                     |

**False Friends**

l'Amérique	the continents of North and South America (not just the USA)
une journée	a day
la location	the rental
rester	to stay

**Useful Grammatical Structures**

- Use **modifiers** to modify an adjective.
- Use **intensifiers** to intensify an adjective. Examples include: vraiment (really); très (very); particulièrement (particularly); totalement (totally); complètement (completely); si (so).
- Use **comparatives** to compare two or more items. Examples include: plus/moins/aussi sain que... (more/less/as healthy as...)
- Use **connectives and conjunctions** to make longer sentences. Examples include: parce que (because); car (as/because); mais (but); cependant (however); quand (when).

- Use the **perfect tense** with avoir or être to describe past events. Examples include: je suis allé(e) (I went); j'ai visité (I visited); j'ai fait (I did); j'ai dormi (I slept); j'ai bu (I drank).

**Tricky Pronunciation**

ennuyeux / ennuyeuse	boring
je préfère	I prefer
le gîte	holiday home
le temps	weather
le maillot de bain	swimwear
un coup de soleil	sunburn

**Tricky Spellings**

les vacances	holidays	Make sure that this is feminine. It is always plural.
ennuyeux / ennuyeuse	boring	Make sure that this is feminine. It is always plural.
passionnant(e)	exciting	Check the double 's', double 'n' and ending.
préfér��(e)	favourite	Check the accents.



