Y9 KNOWLEDGE ORGANISER

SEPTEMBER 2024 TO FEBRUARY 2025

"If you are not willing to learn, no one can help you.
If you are determined to learn, no one can stop you."

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Tutor Group: .....

Tutor & Room: .....

Contents

Your Knowledge Organiser and Self-Quizzing Book

Remember!

You **MUST** bring your Knowledge Organiser and Self-Quizzing Book to **EVERY** lesson and place it on your desk at the beginning of each lesson.

You **MUST** keep all of your Knowledge Organisers and Self- Quizzing Books because the fundamental knowledge required in Year 9 will also be required in Years 10-11.

Knowledge Organisers are **NOT** a replacement for revision guides but they include the fundamental knowledge that ALL students in Year 9 require.

Knowledge Organisers

Knowledge Organisers contain critical, fundamental knowledge that you MUST know in order to be successful in Year 9 and subsequent years.

They will help you recap, revisit and revise what you have learnt in lessons in order to move the knowledge within from your short-term memory to long-term memory.

Self-Quizzing Book

This is the book that all Knowledge Organiser homework is to be completed in. You must follow the simple rules as to how they are to be used.

How do I complete Knowledge Organiser homeworks?

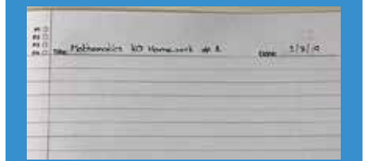
You will be set a MINIMUM of 2 Knowledge Organiser homeworks in every subject each half term

STEP 1

Check SMHW and identify what words/definitions/facts you have been asked to learn.

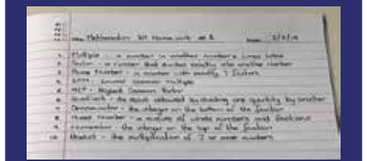
STEP 2

Write today's date and the title from your Knowledge Organiser.



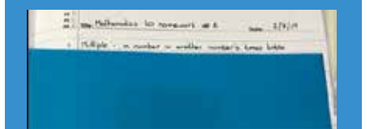
STEP 3

Write out the key words/definitions/ facts you have been set from SMHW in FULL.



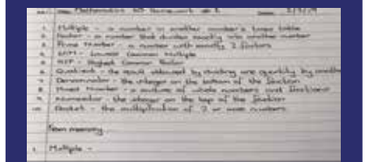
STEP 4

Cover the definitions in your SELF-QUIZZING BOOK, apart from the first. Read it, Cover it, Say it in your head, Check it… REPEAT until confident.



STEP 5

Cover up ALL the definitions/facts and write them out from memory in your SELF-QUIZZING BOOK.



STEP 6

CHECK your answers and correct where required. Repeat Steps 4 to 6 until you are confident.

You will be tested on the 10 words/ definitions/facts as a starter activity in your lesson on the day that the homework is due.

This will be completed in your self-quizzing book and you will mark it in class.

Can I write in paragraphs?

The TIPTOP rule

You move onto a new paragraph when you change **T**ime, **P**lace, **T**opic or **P**erson.

1. I always start an essay with **an introduction** which addresses the question.
2. I finish an essay with **a conclusion** to summarise the main points of my argument and to address the question again.
3. I use **connectives** in each paragraph to link my ideas and to put them in a logical order.

Furthermore	But	Meanwhile
Whereas	Since	Nonetheless
Nevertheless	Yet	However
Alternatively	Therefore	Although
Consequently	Besides	Moreover

Have I used the correct grammar?

I am aware that I must use language that is appropriate to my reader.

- **No slang** that lesson was ~~bangin'~~
- **No informal language** I'm ~~gonna~~ do my homework now

Other things to consider:

- ✓ I am clear about the **purpose** of this piece of writing
- ✓ I know who my **audience** is
- ✓ I will use a suitable **layout** and **text type**

I am proud of my work because...

- I have written clearly so that my reader can understand my writing easily.
- I have checked my **spelling** and corrected any errors.
- I have used full sentences with a subject and a verb.
- I have used correct **punctuation** and **grammar**.
- I have paragraphed my work using **TIPTOP**.
- My writing is suitable for the person I am writing for.

Can I spell familiar words accurately?

Common contractions

We must use an apostrophe to replace any letter(s) we have left out.

11 o'clock	How's	They'd	Where'll
Aren't	I'd	They'll	Where's
Can't	I'll	They're	Who'd
Couldn't	I'm	Wasn't	Who'll
Didn't	Isn't	We'd	Who's
Doesn't	It'd	We'll	Why'd
Don't	It'll	We're	Why'll
Hadn't	It's	Weren't	Why's
Hasn't	Mightn't	What'd	Won't
Haven't	Mustn't	What'll	Wouldn't
He'd	Shan't	What's	You'd
He'll	She'd	When'd	You'll
He's	She'll	When'll	You're
How'd	She's	When's	
How'll	Shouldn't	Where'd	

Can I use different sentence types?

Simple sentences: Contains a subject and a verb and can contain an object

- Sarah likes to read in the library.
- Tom enjoys reading at home.

Compound sentences: Joins two simple sentences using the connectives: *for, and, nor, but, or, yet, so.*

- Sarah likes to read in the library but Tom prefers to read at home.

Complex sentences: A complex sentence contains a conjunction such as *because, since, after, although,* or *when.*

- Because Robert felt tired, he only studied for an hour.
- Although the rain had stopped, the pitch was still water-logged.
- Paul enjoys Music, however, he is more proficient in Art.

Homophones

I have checked that I have not mixed up my homophones.

Affect/effect	One/won
Bare/bear	Passed/past
Brake/break	Peace/piece
Buy/by	Practice (n)/practise (v)
For/four	Read/red
Flour/flower	Sea/see
Grate/great	Sight/site
Hair/hare	Son/sun
Hole/whole	To/too/two
Hour/our	Wait/weight
Knight/night	Weak/week
Know/no	Wear/where
Meat/meet	

Basics:

- Every sentence must start with a capital letter.
- Every sentence must finish with some form of punctuation: .?!
- Proper nouns need capital letters. These are **unique** people, places or things e.g. there are many cities so 'city' doesn't take a capital letter. However there is only one London, therefore it takes a capital letter.

➔ **When writing titles of works such as books, films or plays:**

- Capitalise the first word
- Capitalise any main/important words
- Don't capitalise minor words such as 'and', 'of' or 'the' e.g. The Sound of Music, The Wizard of Oz, Harry Potter and the Goblet of Fire

➔ **When writing speech:**

- Go to a new line when a different person speaks e.g. *"Good morning,"* said the headteacher. *"It's the afternoon!"* replied the student.
- Each person's speech is marked with speech marks e.g. *"Walk on the left,"* said Mr Mathews.

Can I spell accurately?

1. Sound out the word.
2. Think about how it looks.
3. Think about a similar word.
4. Is there a memory sentence for this word? (e.g. big elephants cannot always use small exits).
5. Find the word in a list –
   - Key words list.
   - Frequently used words list.
   - Your own word bank.
6. Look it up in a dictionary/ spellchecker.
7. Ask a friend or teacher.
8. To learn it: look, cover, write, check.
9. Once you've solved it, add the correct spelling to your own word bank.

Can I use punctuation?

The Apostrophe

I always aim to use apostrophes correctly.

There are two main reasons why we use apostrophes: for possession and to replace a letter or letters.

Note: Apostrophes are **NEVER** used to denote plurals

Full stop	.	indicates that a sentence has finished.
Comma	,	indicates a slight pause in a sentence, separates clauses in a complex sentence anditems in a list.
Question mark	?	goes at the end of a question.
Exclamation mark	!	goes at the end of a dramatic sentence to show surprise or shock.
Apostrophe	'	shows that letter(s) have been left out or indicates possession.
Speech marks	""	indicate direct speech, the exact words spoken or being quoted.
Colon	:	introduces a list, a statement or a quote in a sentence.
Semicolon	;	separates two sentences that are related and of equal importance.
Dash / hyphen	-	separates extra information from the main clause by holding words apart.
Brackets	()	can be used like dashes, they separate off extra information from the main clause.
Ellipsis	...	to show a passage of time, to hook the reader in and create suspense.

Can I use punctuation?

Apostrophe for Possession

(To show that something belongs to another)

If a single thing/person owns anything, add an apostrophe + 's'.

- The dog's bone
- The boy's homework
- Jones's bakery
- Yesterday's lesson

However, if it is plural (more than one), an apostrophe comes after the 's'.

- The dogs' bones
- The boys' homework
- Joneses' bakeries (lots of Jones families)
- Many websites' content is educational

There/their/they're

Note: special care must be taken over the use of there, their and they're as they sound the same but are used quite differently:

- **There** shows position Your seat is over there.
- **Their shows that 'they' own something** *Their blazers are navy blue.*
- **They're** is short for **they are** as in *They're revising every day.*

Its

Note: **its**, which shows that something owns something (like our, his etc), **does not** take an apostrophe: the dog ate its bone and we ate our dinner.

Your/you're

Note: special care must be taken over the use of **your** and **you're** as they sound the same but are used quite differently:

- **Your** is possessive as in *this is your pen.*
- **You're** is short for you are as in *you're coming over to my house.*

1. The Formal Elements

- **Line:** Creates shape; the outer edge of something.
- **Tone:** Levels of dark or light on an object, shape or face.
- **Highlight:** The lightest areas on an object, shape or face.
- **Texture:** The feel or appearance of a surface; how rough or smooth it is.
- **Shape and Form:** What is created when a line is enclosed and further techniques are used to make an object, shape or face look 3D.

2. Colour Theory

- **Colour:** When light is reflected off an object, colour is what the eye sees.
- **The Primary Colours** are red, blue and yellow. The primary colours are combined to create secondary colours.
- **The Secondary Colours** are green, purple and orange.
  Red + Blue = Purple.
  Blue + Yellow = Green.
  Yellow + Red = Orange.
- **Warm Colours:** Colours that give the feeling of warmth – red, orange, yellow.
- **Cool colours:** Colours that give a cool feeling – blue, green, purple.
- **Complementary colours:** These colours are *opposite each other* on the colour wheel. When placed together these colours *complement* each other - they contrast and make each other stand out.
- **Harmonious colours:** These colours are *next to each other* on the colour wheel. When these colours are placed together they work in harmony with each other - these colours look similar to each other.
- **Tint:** When *white* is mixed with a colour to make it lighter.
- **Shade:** When *black* is mixed with a colour to make it darker.

3. The Colour Wheel

4. Techniques and Materials: Charcoal and Watercolour Pencil

- **Whisper Lines:** These are ***light*** pencil lines created using ***several strokes*** of the pencil. These are used when planning out a drawing prior to adding tone or colour.
- **Compressed charcoal:** This is a dry, crumbly drawing medium, usually black but can come in various shades of grey right through to white. It can be smudged and blended with other tones. It is difficult to rub out.
- **Willow charcoal:** These are small drawing sticks made from actual willow branches which have been burnt. These are easy to rub out and are good for sketching out initial ideas.
- **Smudging:** This is a shading and blending technique which can be used with charcoal. Your finger is used to smudge the charcoal to disguise the marks, to rub it into the paper and to blend tones together.
- **Watercolour pencils:** Watercolour pencils are a medium that combines drawing with painting. When the lead inside a watercolour pencil becomes wet it turns it into watercolour paint. The watercolour pencil is rubbed on to paper (just like you would if you were colouring with a normal coloured pencil) then water is added with a wet paintbrush.
- **Blending:** When using watercolour pencils, this is where two or more colours are rubbed next to, or over the top of, each other on to the paper and water is added; this blends the colours together.
- **Fade:** This is a ***gradual transition*** from dark to light and is created by ***varying the pressure*** placed on the watercolour pencil. Water is then added over the top with a paintbrush.

5. Other Terms and Techniques Relating to Portraiture

- **Composition:** The arrangement or layout of features, shapes or objects on the page.
- **Proportion:** The size, shape or position of one element of a piece in comparison to another.
- **Foreground, mid-ground, background:** The areas at the front, middle or back of a drawing or painting.
- **Negative Space:** An area of an artwork without detail.
- **Anatomy:** This term relates to the structure of human or animal form/figure/body.

About This Piece

Artist: Vladimir Gvozdev **Date**: 2018

Genre (style): Steampunk **Subject**: Animals Vladimir

Gvozdev is a Russian mixed-media artist born in 1966 in Moscow. Mixedmedia is a type of art where several different techniques and materials have been used in one piece of art. Vladimir fuses various mechanical parts such as gears, wheels and pulleys with the anatomy of animals to create unique creatures. These fantastical steampunk animal illustrations are part of his project called "Machinery".

We can see how this piece falls into the genre of 'Steampunk'. The idea of a mechanical fish is something fantastical and futuristic but the way it has been depicted with its cogs, wheels, pipes and armour is typical of early forms of machinery from the industrial revolution (1760-1840).

The writing surrounding the drawing suggests that this is a design made by a fictitious inventor. This idea is further reinforced by the objects that the artist has left around the piece within the frame: spectacles, wires, tools etc.

About Steampunk

- **Steampunk** is a ***retrofuturistic*** subgenre of science fiction. '***Retrofuturistic***' means being from the past and from the future at the same time. '***Subgenre***' means a type within a type, for example, science fiction is a type of art (books, films, art), steampunk is a type of science fiction.
- It has a ***historical setting*** and typically features designs inspired by 19th-century industrial steam-powered machinery.
- The idea of steampunk can be expressed in many different ways such as ***art, music, films*** and ***fashion***.

Words to describe art works

Element	Associated adjectives
Line	Thick, heavy, thin, light, bold, sharp, loose, crisp, curved,straight, organic.
Tone	Dark, light, mid, flat, uniform, broken, constant, graduated, fade, gradual fade, subtle, contrasting, dramatic.
Texture	Flat, smooth, raised, rough, coarse, pitted, scratched, uneven, uniform, hairy, soft, hard, flowing, movement.
Colour	Natural, unnatural, lively, bright, brilliant, deep, dull, earthy, warm, cold, contrasting, complementary, harmonious.
Composition	Centred, asymmetrical, symmetrical, balanced, unbalanced, lopsided, overlapping, cluttered, chaotic, spacious, empty, negative space.
Shape and Form	2-D, flat, abstracted, simplified, stylised, 3-D, realistic, natural, detailed, distorted, exaggerated, geometric.
Mood	Calm, peaceful, happy, joyful, romantic, gloomy, miserable, sad, sombre, exciting, thought-provoking, dream-like, surreal, mysterious, strange, confusing, playful, childish.

Creative Industries

- To gain employment in any creative industry you need an art based education; this begins with GCSE Art followed by college and possibly university.

Creative industries relating to Steampunk and general cultural awareness

- Film and theatre set design.
- Book, comic and magazine illustration.
- Fashion design, fashion photography and fashion set design.
- Make up artist.
- Tattoo artist.
- Animation.
- Toy and game design.
- Model making.

The Crucible

Context

The Salem Witch Trials (1692)

- The play is a fictionalised account of the famous 17th century witch trials.
- Hysteria began when a group of girls fell ill and it could not be explained why.
- In a Puritan society, anything that could not be explained was said to be the work of the devil.
- Villagers began to accuse each other of witchcraft, which then extended to people with grudges and jealousies.
- Many made accusations as revenge for petty things.
- Within a few weeks, dozens of people were in jail.
- By the end of the trials, twenty innocent men and women were hanged and hundreds were convicted.

McCarthyism (1947-1956)

- An American senator called Joseph McCarthy rose to power by stirring up the nation into becoming terrified of communists.
- Stemmed from the fear and tension between the U.S. and the Soviet Union during the Cold War.
- In 1947, he ordered all employees of the civil service to be screened for 'loyalty' to check they did not have communist sympathies.
- Anyone named as a communist was placed on "blacklists" that prevented them from getting work.
- The McCarthy hearings (also known as the McCarthy trials) ran from April to June 1954.
- Many non-communists confessed to being communists and falsely named others as communists in order to escape punishment.
- Miller was brought before Congress in 1956 and convicted of contempt of Congress for refusing to co-operate (his conviction was later overturned).
- Eventually, McCarthy was condemned and the hysteria died down but the damage caused to the lives of hundreds of people was already done.

Quotations

John Proctor	"But I will cut off my hand before I'll ever reach for you again"	"Oh, Elizabeth, your justice would freeze beer!"	"I have given you my soul; leave me my name!"
Abigail Williams	"There be no blush about my name"	"Give me a word John, a soft word"	" You are pulling Heaven down and raising up a whore!"
Elizabeth Proctor	"bitter woman, a lying, cold, snivelling woman."	"I do not judge you. The magistrate sits in your heart that judges you"	"It needs a cold wife to prompt lechery"
Reputation	"Do you understand i have many enemies?"	"Let Rebecca go like a saint, for me it is a fraud."	"She is blackening my name in the village!"
Honour	"I am not worth the dust on the feet of them that hang."	"I speak my own sins; I cannot judge another."	"There is blood on my head! Can you not see the blood on my head!!"
Honesty	"He have his goodness now."	"My husband is a good and righteous man."	""More Weight"

Writer's intention

- Miller is highlighting how corrupt those in charge can be
- Miller is commenting on the patriarchal nature of society
- Miller is criticising the McCarthy trials
- Miller is highlighting the importance of reputation and honour.
- Miller is highlighting how important forgiveness is

War poetry

Poem forms	
Sonnet	Consists of 14 lines, usually about love. Strict rhyme scheme.
Elegy	A poem of serious reflection, typically a lament for the dead
Free verse	A poem that does not adhere to any particular rules or patterns.

Poet's Intentions
The poets show the horrific reality of war
To highlight patriotic attitudes
To show the devastating impact of war on individuals

Poem forms			
Alliteration	Repetition of the initial consonant sound	**Enjambment**	Where a sentence runs onto the next line.
Caesura	A pause in a line by using punctuation	**Juxtaposition**	Where two contrasting ideas are put together to develop comparisons.
Couplet	Where two lines rhyme with each other	**Metaphor**	A comparison in which one thing is said to be another.
Emotive language	Words used to provoke an emotional response.	**Onomatopoeia**	A word that sounds like its meaning
Personification	Describing objects as though they are alive with their own thoughts and feelings.	**Rhetorical question**	A question asked to make the reader think, not requiring an answer.

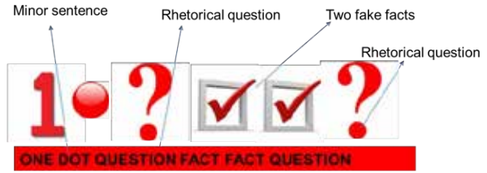
Title	Quotes		
Anthem for Doomed Youth	What passing-bells for these who die as cattle?	Only the stuttering rifles' rapid rattle	The shrill, demented choirs of wailing shells
In Times of Peace	"heavy boots… stepping over bodies" "bubble bath"	"Are ears so tuned to sirens that the closing of wings causes a tremor?"	"How will it begin to deal with skin that threatens only to embrace?"
Sick Leave Seigfried Sassoon	When I'm asleep, dreaming and lulled and warm,- They come, the homeless ones	'Why are you here with all your watches ended? From Ypres to Frise we sought you in the Line.'	Are they not still your brothers through our blood?'
The Soldier Rupert Brooks	That there's some corner of a foreign field That is for ever England.	her flowers to love, her ways to roam, A body of England's, breathing English air	her flowers to love, her ways to roam, A body of England's, breathing English air
We Refugees Benjamin Zephaniah	I come from a musical place Where they shoot me for my song	We can all be refugees Nobody is safe,	We all came here from somewhere
Home Warsan Shire	no one leaves home unless home is the mouth of a shark	no one puts their children in a boatunless the water is safer than the land	no one could take it no one could stomach it no one skin would be tough enough

Transactional Writing

1. Planning the answer

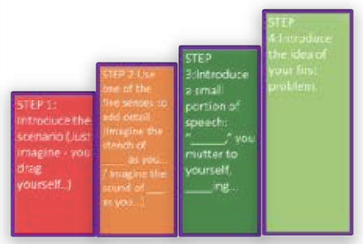
1. Underline the purpose/audience/ form (PAF) in the question.
2. Decide who your speaker is going to be.
3. Plan your ideas before you start – at Least 2 problems you want to solve.
4. Order your ideas to show the examiner that you are attempting to structure and craft your work.
5. Write the techniques for the purpose (DAFOREST) at the top of the page.
6. Write a punctuation list at the top (!?,.;-).

2. Introduction



Form	
Letter	Start with: Dear End with: Yours sincerely : when you know the person's name Yours faithfully : when you don't know the person's name
Article	Start with a headline
Speech	Start by addressing your audience. End by thanking them.

3. Just Imagine



4. Problem paragraph x2

5. Conclusion

Evidence of global warming

Evidence of global warming
(KPI 9.1.1. Can describe the evidence to suggest that the world's climate is changing):

Climate Change

Evidence has shown that Earth's temperature is rising due to an increase in greenhouse gases. This has created and will continue to create a number of negative effects.

Climate Change And Global Warming

The global climate has been changing since time began and will continue to change into the future. The Earth's temperature has fluctuated in the last few hundred years. However, since around 1950 there has been a dramatic increase in global temperatures. This increase is known as global warming.

Thermometer readings - ongoing temperature recordings using thermometers have shown a clear warming of the Earth's temperature over the past few decades. By using this data, scientists have seen an average combined land and ocean surface temperature increase of 0.85°C since the end of the 19th century. In the northern hemisphere, the period between 1983 and 2012 was the warmest 30-year period of the last 1,400 years. The degree to which the climate warms in the future will depend on natural climate variability and the level of greenhouse gas emissions. If greenhouse gas emissions continue then average global temperatures will rise. However, some regions such as the Arctic will warm faster than others.

Glacier retreat - over the past 50 to 100 years, photographic evidence has shown that the world's glaciers have been melting, which has caused them to retreat. The increase in global temperatures is causing glaciers to disappear and is increasing the melting of sea ice in the Arctic.

Ice cores - scientists often use ice cores to detect changes in temperatures. When snow falls it traps air into the ice. When scientists take a sample of ice it reveals the atmospheric gas concentrations at the time the snow fell. This is used to calculate temperature at that time. The ice can reveal the temperature of each year for the past 400,000 years. Scientists that study the ice cores say there is clear evidence that there has been a rapid increase in temperature in the past decades.

Early spring - in recent years there have been signs of a seasonal shift - spring arrives earlier and winters tend to be less severe. These seasonal changes affect the nesting and migration patterns of wildlife.

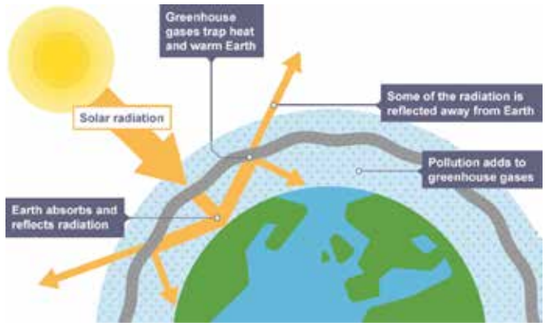
Rising sea levels - between 1901 and 2010, average global sea level rose by 0.19 m.

Causes of climate change

Causes of climate change - human and natural factors (KPI 9.1.2
Can explain the natural and human processes which cause climate change):

A natural function of the Earth's atmosphere is to keep in some of the heat that is lost from the Earth. This is known as the greenhouse effect.

- The atmosphere allows the heat from the Sun (short-wave radiation) to pass through to heat the Earth's surface.
- The Earth's surface then gives off heat (long-wave radiation).
- This heat is trapped by greenhouse gases (e.g. methane, carbon dioxide and nitrous oxide), which radiate the heat back towards Earth.
- This process heats up the Earth.



Human factors increasing global warming

Some human activities increase the greenhouse gases in the atmosphere:

- **Burning fossil fuels, e.g. coal, gas and oil -** these release carbon dioxide into the atmosphere.
- **Deforestation -** trees absorb carbon dioxide during photosynthesis If they are cut down, there will be higher amounts of carbon dioxide in the atmosphere.
- **Dumping waste in landfill -** when the waste decomposes it produces methane.
- **Agriculture -** agricultural practices lead to the release of nitrogen oxides into the atmosphere.

Natural factors increasing global warming

There are also natural factors which contribute to increased global warming:

- **Orbital changes -** the Earth has natural warming and cooling periods caused by Milankovitch cycles or variations in the tilt and/or orbit of the Earth around the Sun (Wobble, roll and stretch theory).
- **Volcanic activity -** during a volcanic eruption carbon dioxide is released into the atmosphere.
- **Solar output -** there can be fluctuations in the amount of radiation from the Sun. If there is high amount emitted there will be an increase in Earth's temperatures.

Impacts of climate change

Impacts of climate change
(KPI 9.1.3 Can discuss the different impacts that climate change will have globally):

Impacts of climate change in the UK

- Sea levels could rise, covering low lying areas, in particular east England
- Scottish ski resorts may have to close due to lack of snow
- Droughts and floods become more likely as extreme weather increases
- Increased demand for water in hotter summers puts pressure on water supplies

Impacts of climate change around the world

- Sea level rise will affect 80 million people
- Tropical storms will increase in magnitude (strength)
- Species in affected areas (e.g. Arctic) may become extinct
- Diseases such as malaria increase, an additional 280 million people may be affected

Managing the impacts of climate change
(KPI 9.1.4 Assess the effectiveness of methods used in response to climate change):

Mitigation strategies

Mitigation means to reduce or prevent the effects of something from happening. Mitigation strategies include:

- **Alternative energy -** using alternative energy such as solar, wind or tidal can reduce the use of fossil fuels. This will reduce the amount of carbon dioxide released into the atmosphere.
- **Carbon capture -** this is the removal of carbon dioxide from waste gases from power stations and then storing it in old oil and gas fields or coal mines underground. This reduces the amount of emissions into the atmosphere.
- **Planting trees -** encouraging afforestation, means that there will be more trees to absorb the carbon dioxide in the atmosphere during the process of photosynthesis.
- **International agreements -** in 2005 the Kyoto Protocol became international law. The countries that signed up to the treaty pledged to reduce their carbon emissions by 5 per cent. However, this ran out in 2012 and its overall impact has been small. The US refused to join and major developing countries like China and India were not required to make any reductions.

Adaptation strategies

Adaptation strategies do not aim to reduce or stop global warming. Instead, they aim to respond to climate change by limiting its negative effects. Strategies include:

- **Agriculture -** farmers will have to adapt as some crops may not be able to grow in a warmer climate. However, other crops (e.g. oranges and grapes) will be able to be planted.
- **Water supply -** water transfer schemes could be used. This is where water is transferred from an area of water surplus to an area of water shortage.
- **Reducing risk from sea level rise -** areas at risk from sea level rise may use sea defences to protect the land from being eroded away.

Geography Command Words	What you need to do
Identify/State/Name	This needs a simple, but accurate, answer. If you revise you will score marks! **'An example of a tectonic hazard is an earthquake…'**.
Label	You need to use a ruler and accurately label a picture, graph or diagram. Read these question thoroughly so you get full marks.
Draw	Produce a drawing, diagram or sketch that is recognisable – it needs to look what has been asked!
Outline	Set out the main points of the answer. **'At a subduction zone the two plates move towards each other, due to the density of the oceanic crust it …'.**
Compare	Identify similarities and/or differences by using factual data or examples. **'The key differences between HIC & LIC urban areas are …'.**
Describe	Use factual information to say what something is, this means you need good subject knowledge and to learn key facts and data. **'The primary effects of a tectonic hazard are that people lose their lives and buildings are destroyed. For example. in Nepal in 2015 there were 8,841 deaths and the historic buildings in the city of Kathmandu were destroyed …'.**
Explain	Give reasons based on fact, **'this means that / this is because / this leads to'.**
To what extent	This is often used with 'assess' and requires you to use information to compare events. **'If I compare the primary and secondary effects of Typhoon Haiyan the evidence shows me that…'.**
Evaluate	When you evaluate you use evidence to formulate your answer. **'When I evaluate the figure showing the positive of the improved transport networks in Lagos it shows that the improvements in infrastructure have…'.**
Discuss	Use key points to open a discussion, it often means that you need to identify positives & negatives of a particular issue or strategy. **'The positives of developing a hot desert are …?..., however a negative is that…?...'.**
Justify	You need to add evidence to build you answer. **'The 3Ps had a significant impact on the 2010 volcanic eruption in Iceland. Evidence to support this is that …'.**

Glaciation

Background

1. Glaciers are important features that have created landscapes all over the world. **(A)**
2. All glaciers have common features that affect how big they are and how they affect the environment around them. **(B, C)**
3. A glacier grows, shrinks, and flows downhill like a very slow river. **(B, C)**
4. Glaciers erode the land and create several distinctive landforms, due to melting and retreating, we can see these landforms today. **(C, D)**
5. When a glacier melts and retreats, it can leave behind several landforms of deposition. **(E)**
6. Glacial landscapes have many uses. **(F)**
7. The Lake District is a glacial landscape that offers opportunities and challenges for living there. **(G)**
8. Glacier National Park is being greatly affected by climate change. **(H)**

A Ice Around The World (3)

Glacier	Large masses of ice that fill valleys or the sides of mountains.
Ice Sheet	Extremely large glacier, only found at the north and south pole. Extends further during ice ages.
Ice In The UK	20,000 years ago ice covered most of Scotland, Ireland and Wales.

B Features Of A Glacier (4)

Accumulation Zone	More snow falls on the glacier than melting occurs. The glacier grows.
Ablation Zone	Melting is faster than new snow can add to the glacier. The glacier shrinks.
Snout	The end of a glacier
Meltwater Stream	Melting ice flowing out of the snout of a glacier.

C Processes That Affect Glaciers (3)

Abrasion	Bits of rock stuck below the glacier scrape the land as it moves downhill.
Plucking	Rocks on the ground freeze into a glacier and are then 'plucked' from the landscape as the glacier advances.
Freeze Thaw Weathering	Water gets into cracks in rocks, freezes and expands. This widens the crack. This repeats until large sections of rock break off.

D - Landforms Of Erosion (5)

Corrie	A hollow cut out of the side of a mountain by a glacier.
Arête	A steep ridge created between two corries.
Pyramidal peak	A pointed mountain peak formed when three or more back-to-back glaciers erode a mountain.
U-shaped valley	Deep valleys with a flat bottom and steep sides carved out by a glacier.
Hanging valley	Formed when a small glacier flows into a bigger one.

E Landforms Of Deposition (3)

Moraine	Frost-shattered rock debris and material eroded from the valley floor and sides, transported and deposited by glaciers.
Drumlin	Egg-shaped hill of moraine material deposited in a glacial trough.
Erratic	Rocks transported and deposited by glacial ice to a different location, often hundreds of kilometres away.

F Economic Uses Of Glacial Landscapes (4)

Farming	Usually sheep or goat farming because the soil is too thin for crops or bigger animals.
Forestry	Trees are planted, grown and harvested. The wood can be used for building or furniture.
Quarrying	Digging rocks out from the ground for use in building, sculptures or in a wide variety of factories and other industries.
Tourism	Skiing, snowboarding, hiking, and mountain climbing are all common activities in glacial environments. Supporting industries like hotels or restaurants benefit from the visitors.

G Example: Human Activity In Glacial Landscapes

Where	Lake Windermere, Lake District

Opportunities (3)

1. Visitors spent over £1 bn in 2014 in the tourism industry.
2. 2,500 people work in farming in the Lake District.
3. People are employed in the last slate mine in the UK.

Challenges (3)

1. Hikers cause footpath erosion.
2. Cars and speed boats cause noise and air pollution.
3. Prices in shops have risen due to tourism.

H - Example: Climate Change Impacts Glacier National Park

Where	Glacier National Park, USA
Evidence Of Shrinking (2):	**Impacts Of Melting (2)**
1. In the last 150 years, the global temperature has increased by 0.8˚C.	1. Rapid melting is causing rockslides, flooding, and avalanches.
2. Out of 150 glaciers, the national park now only has 30 remaining.	2. Meltwater is decreasing, making hydro-electric power plants less effective at making energy so they may close.

Newly Emerging Economies

Newly Emerging Economies

NEE: Newly Emerging Economy (those moving from LIC to HIC).

HIC: Higher Income Country (e.g. Australia/ Canada).

LIC: Lower Income Country (e.g. Somalia/Sierra Leone).

Development: The progress made over time by a country.

Poverty: People living without basic needs or income.

Corruption: Dishonest or wrong doings by those in power.

Quality of life: The social, economic and environmental factors of life (E.g. health, employment, income, building quality etc).

Sanitation: The provision of, and access to, flushing toilets, clean water etc.

India as an NEE

Bollywood: The Indian film industry (the biggest film industry in the world)

Dharavi: The largest slum in Asia, located in Mumbai.

Caste system: The traditional class structure, determined by birth.

Social segregation: The gap between the rich and the poor (seen in many urban areas).

Economic development: The progress that India are making over time.

Industrialisation: The focus of the economy on industry and manufacturing.

Globalisation: The increased interconnectivity of the world, linked to TNCs.

TNCS: Trans-national corporations. Large companies who work on a global scale. E.g. Nike or BT.

Supporting countries to develop

Aid: Help.

Emergency aid: Help given for short term, often after natural disasters or outbreaks of diseases.

Development aid (long-term aid): Help given for a longer time, often focusing on areas of need e.g. health, education.

International aid: Aid sent from abroad. E.g. UK sending international aid to Nigeria.

Bilateral aid: Help given from one country to another. E.g. UK sending aid to India.

Multilateral aid: Help given when organisations work together. E.g. The Disaster Emergency Committee who collected donations from countries to support after Nepal's earthquake.

Self help schemes: Schemes that provide training and materials to encourage people to improve their own standards of living.

Appropriate technology: Providing communities qwith resources that are appropriate for their level of development. E.g. A water pump to an LIC.

Remittances: The money sent home – often from migrants.

Debt relief: The partial or total wiping off of any debts paid (has been given to many Highly Indebted Poor Countries – HIPCS – globally e.g. Ghana, Ethiopia and Haiti

Trade: Transfers of goods and services from one country to another.

Trading agreements: A deal made between countries.

Trading blocs: A group of countries or organisations who work together to create deals for trade.

Investment: Money that is put into a country to support with business etc.

Consequences of the development gap

Inequality: Gap between rich and poor.

Slums: Informal housing, often made from scrap material on undesirable land (also known as shanty towns).

Migration: The movement of people from one area to another (often linked with rural to urban migration in NEEs).

Urbanisation: The growth in the proportion of people who live in urban areas (linked to migration).

Disparities in health: Gaps in health as poorer p

India's Industrial structure

Primary: Work relating to raw materials.

Secondary: Manufacturing and industrial jobs.

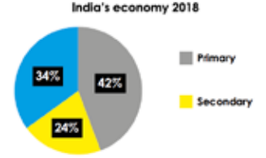
Tertiary: Jobs that provide a service.

Quaternary: Research and development.

Industrial structure: The break down of the economy into each sector (primary, secondary, tertiary, quaternary).

Exports: The goods that are traded out of a country.

Imports: The goods that are traded into a country.



Important Events And Life in Concentration Camps			
Germany is defeated in WWI	After WWI, many Germans were angry; many did not approve of the Treaty of Versailles, which placed blame with Germany. The country was also poor in the post-war era, going through an economic depression.	**When?** 1918 onwards	In the Treaty of Versailles, Germany lost significant land to France, Belgium and Poland.
Hitler Rises to Power	After WWI, many Germans were angry; many did not approve of the Treaty of Versailles, which placed blame with Germany. The country was also poor in the post-war era, going through an economic depression.	**When?** Around 1919-1933	Hitler became Chancellor of Germany in 1933.
Suburbs	Poor and disheartened post-war Germany provided a perfect platform for Hitler to grasp power, promising to make Germany strong again.	**When?** October 1940 - May 1943	There was an average of 9.2 people per room in the Warsaw Ghetto.
The Warsaw Ghetto	The Warsaw Ghetto was the largest of all of the Jewish ghettos in German-occupied Europe during WWII. 400,000 Jews were imprisoned in only 1.3 square metre of space. 392,000 died, either in the ghetto or after being transported to camps.	**When?** Operational between May 1940 and Jan 1945	90% of the prisoners killed in Auschwitz were Jews. The camp was staffed by 7,000 SS soldiers.
Prisoners Arrive at Auschwitxz	Auschwitz was first constructed to house Polish political prisoners, who began to arrive in May 1940. From early 1942, Auschwitz II became a major extermination site. 1.3 million people were sent there, of whom 1.1 million died	**When?** Operational between May 1940 and Jan 1945	About 2/3rds of the total number of Jews killed were already killed before Feb 1943.
The Final Solution	The Final Solution was Nazi Germany's plan for the genocide of all Jews. This resulted in the deadliest phase of the Holocaust, in which 2/3 of the Jews across Europe were killed.	**When?** Late 1944 – Early 1945	Many of the prisoners were so weak that they died trying to digest their first meal.
Camps Liberated	As the Allies advanced across Europe, they found camps of sick, starving prisoners. The first camp liberated was Majdanak in July 1944; Auschwitz wasn't until January 1945.	**When?** 30th April 1945	Many of the prisoners were so weak that they died trying to digest their first meal.
Hitler's Suicide	With the Germans facing defeat, Hitler married his long-time love Eva Braun on 29th April. The next day, they committed suicide, reportedly by gunshot, although historians are unsure.	**When?** 30th April 1945	Some sources believe that Hitler died by poisoning himself
Germany Surrenders	The Allies had gradually forced the surrender of Axis troops across Europe in April and early May, 1945. On 7th May, Germany officially surrendered to the Allies, bringing to an end European fighting in WWII.	**When?** 7th May 1945	VE (Victory in Europe) Day is still held every 8th May.
Deportation and Transportation	Prisoners were treated like cattle, herded onto crowded trains and locked inside for days as they travelled. Most had no light, food or drink, and only a bucket to use as a toilet.	**What?** Prisoners had to stand with their hands above their heads to make space.	Many of the very young, old and sick died because of the inhumane conditions.
Clothes	After being separated from their families and registration, prisoners had their clothes stripped, their heads shaved, and were given a striped uniform and striped cap to wear.	**What?** Prisoners were only allowed to change their clothes once every 6 weeks.	Prisoners reported taking bread from those who had died in the night.
Food	Prisoners, received very little, if any, food. Watery soup was a staple lunch meal, with stale bread sometimes provided for dinner.	**What?** The bread was supposed to last the prisoners for breakfast too.	Prisoners reported taking bread from those who had died in the night.
Work	Most prisoners worked outside doing heavy duty jobs such as factory or construction work. They often had to walk miles to work. Due to the insufficient food they were given, and widespread disease, many became too weak to work. They were then shot by SS soldiers.	**What?** The prisoners provided free slave labour for many German companies.	The life span of those working in the crematoriums was about 4 months.

Holocaust Timeline

- **1933** Adolf Hitler comes to power.
- **1935** The Nuremburg laws took away the rights of Jews.
- **1939** The Germans occupy Poland, and force Jews to leave their homes. WWII begins.
- **1940** Jews put into concentration camps. Mass murder begins.
- **1941** Germany attacks the Soviet Union. Jews across Western Europe are forced into ghettos.
- **1942** Nazis discuss the 'Final Solution' of killing all European Jews.
- **1944** Nazis take over Hungary and begin deporting 12,000 Jews a day.
- **1945** The Nazis are defeated by the Allies to end WW2. The concentration camps are liberated.

World War I

Main Participating Countries

Key People

Archduke Franz Ferdinand (1863-1914)
A high-ranking member of the Habsburg Dynasty, who was the presumed heir to the Austro-Hungarian throne. As was customary of Habsburg men, he had begun his military career young (aged just 12). He rose through the ranks quickly, becoming Inspector General of the armed forces in 1913. This role brought him to Sarajevo in 1914, where he was assassinated alongside his wife, Sophie. The perpetrator was Gavrilo Princip, a member of the Serbian Black Hand secret society. Austria- Hungary's subsequent declaration of war on Serbia prompted a chain of events that led to World War I.

Key People

Kaiser Wilhelm II (1859-1941)
The last German Emperor (Kaiser), reigning between 15th June 1888 until 9th November 1918. Wilhelm was a grandchild of Queen Victoria, and was related to many of the monarchs of Europe, including George V of the UK and Nicholas II of Russia. His support for Austria-Hungary in the crisis of July 1914 was a leading factor in the outbreak of World War I. Many sources suggest that he was not respected as a leader, and as a result, his two leading generals Paul von Hindenburg and Erich Ludendorff dictated most of German policy and strategy during the war. He abdicated in 1918, and fled to the Netherlands.

Woodrow Wilson (1856-1924)
The 28th President of the United States, serving between 1913 and 1921. At the outbreak of World War I, in 1914, the US was neutral, but remained an important supplier to Great Britain and the Allies. However, after 2½ years of war, America declared war on Germany on 6th April 1917, after Germany continued to attack neutral boats and ships. In early 1918, Wilson gave his outline of 14 points that he thought would bring lasting peace. This influenced the eventual Treaty of Versailles. He received the 1919 Nobel Peace Prize for his efforts.

David Lloyd George (1863-1945)
The Prime Minister of the United Kingdom throughout the latter part of the war effort, and in the years following the war. He was integral to reorganising the Allied military strategy to work more cohesively under one military commander. Lloyd George also played an important role after the war, being one of the 'Big Three' (alongside the leaders of France and the US) to negotiate the Treaty of Versailles with Germany. He represented the halfway point between the harsh demands of Clemenceau and the more lenient requests of Wilson.

Tsar Nicholas II (1868-1918)
The last Emperor of Russia, ruling from 1894 until his forced abdication on 2nd March 1917. Throughout his regin, Russia fell from being one of the foremost great powers of the world, to economic and military collapse. These factors, coupled with the perception of Nicholas' weak leadership, led to the events of the Russian Revolution, Nicholas' abdication, and his eventual execution. The Russians' catastrophic losses forced them to leave the war effort before the end of the war, with Russia eventually becoming a part of the communist Soviet Union.

Wilfred Owen (1893-1918)
Owen was a British poet and soldier. He was one of the most prominent World War I poets, detailing the horrors of trench warfare in a similar style to his mentor: Sigfried Sassoon. His poetry brought a sense of realism to public perceptions of war, in stark contrast to the earlier works of poets such as Rupert Brooke. He composed almost all of his poetry in just over a year, from August 1917 to September 1918. Among the most famous are Dulce et Decorum Est and Anthem for Doomed Youth. He was killed one week before the end of the war.

Major Events			
Entangling Alliances	In the early 20th Century, there was no one dominating European country. Consequently, each of the most powerful countries moved to make alliances with one another. Military defensive pacts were held between the allied powers of France, Great Britain, Russia and others, whilst an opposing central alliance was formed including Germany and Austria-Hungary.	**1879-1914**	Defensive pacts stated that participating countries must aid an ally under attack.
Assassination of Archduke Franz Ferdinand	Archduke Franz Ferdinand, the heir to the Austro-Hungarian throne, and his wife Sophie, were assassinated by Gavrilo Princip, a member of the Serbian Black Hand Society. The aim of the assassination was to make the South Slav provinces a part of Yugoslavia.	**28th June 1914**	Earlier, another assassination attempt against the Archduke had failed.
July Crisis	After Serbia's failure to make amends for the assassination, Austria-Hungary declared war on them. Russia (in pact with Serbia) declared war on Austria-Hungary, before Germany consequently declared war on Russia. By the 4th August, all of the European powers from the Allied and Central Powers were at war.	**July-August 1914**	Britain were the last of the powers to declare war, on 4th August 1914.
Trench Warfare	To prevent enemy advances, both sides built large trenches, which stretched from the North Sea, through Belgium and France. As a result, neither side made much ground from late 1914 until early 1918. Attacks involved going across No Man's Land (in the middle) where attackers were open to machine gun fire, mines and shells. Casualties were huge. Life in the trenches were awful, with diseases like trench foot rife. Mustard gas was a war agent used, causing blisters on skin and lungs. It caused excruciating pain and often death.	**From September 1914 until November 1918 (the end of the war)**	The enemy trenches were generally 50 to 250 metres apart. In between, No Man's Land was littered with barbed wire, mines and bodies.
Gallipoli Campaign	The Gallipoli campaign was an unsuccessful attempt by the Allies to control the sea route from Europe to Russia. It included a failed naval attack in February 1915, and a major land invasion on 25th April, which resulted in major losses to the Ottoman Empire.	**19th February 1915 – 9th January 1916**	The Allies eventually evacuated in Dec 1915/ Jan 1916.
Battle of the Somme	The Battle of the Somme was the largest battle of World War I on the Western Front. More than 3 million fought in the battle, with more than 1 million killed or injured. At the end of the battle, the Allies had advanced 6km.	**1st July 1916 – 18th November 1916**	The battle is known for being the first use of the tank.
America Declares War	President Woodrow Wilson declared war on Germany, citing Germany's violation of its pledge to suspend unrestricted German warfare in the Northern Atlantic and Mediterranean. This had caused sinking of US ships.	**6th April 1917**	The arrival of fresh US troops helped to turn the war.
Second Battle of Marne	The Second Battle of Marne was the last major German offensive in the war. They were defeated as the Allies counter-attacked. This triggered the start of the Allied advance which led to the Armistice 100 days later.	**15th July - 6th August 1918**	There were 168,000 German casualties.
Armistice of 11th November	The Armistice of the 11th November 1918 signalled the end of the fighting between the Allies and Germany. Previous armistices had already been agreed with the other central powers. It came into force at 11am. It marked a victory for the Allies and defeat for Germany although was not officially a German surrender.	**11th November 1918**	The fighting ended on the 11th hour of the 11th day of the 11th month in 1918.
The Treaty of Versailles	The Treaty of Versailles was the most important of the peace treaties bringing to an end World War I, ending conflict between Germany and the Allied Powers. It was signed in Versailles, but mostly negotiated in Paris. The most contentious of the requirements in the peace treaty was that Germany had to accept responsibility for all of the loss and damage in the war. They had to make massive repayments to other countries.	**28th June 1919**	Many suggest that the treaty was too harsh on Germany, and created tensions which partially escalated World War II.

Timeline of Major Events

- **28 Jun 1914** – Archduke Franz Ferdinand is killed by a Serbian.
- **28 Jul 1914** – Austria-Hungary declares war on Serbia. Russia steps in to help Serbia.
- **Aug 1-4 1914** – Keeping promises to their allies, Germany, France, and Britain all enter the war.
- **Sep 5-12 1914** – The advancing German army is stopped by British and French forces before Paris. 4 years of trench warfare begins.
- **11 Nov 1914** – The Ottoman Empire declares war on the Allies.
- **25 Apr 1915** – The Ottomans defeat the Allies at the Battle of Gallipoli.
- **1 Jul 1916** – The Battle of the Somme begins. Over 1 million soldiers will be killed or wounded.
- **8 Mar 1917** – The Russian Revolution begins. Tsar Nicholas II is removed from power.
- **6 Apr 1917** – The U.S enters the war, declaring war on Germany.
- **15 Jul 1918** – The Allies decisively win at the Second Battle of Marne.
- **11 Nov 1918** – Armistice signed. The fighting ends.

World War II

Main Participating Countries

Key People

Sir Winston Churchill (1874-1965)

A British politician who served as the Prime Minister between 1940 and 1945 and again from 1951 to 1955. He took over after a disastrous start to the war in which Nazi Germany conquered much of Europe. He did his best to rally the nation in defiance of Adolf Hitler, possessed excellent military knowledge and forged crucial alliances with both the USA and Russia. Churchill is often characterised for his extraordinary leadership throughout World War II – he was bold, brave and tireless in his resolve to take on the might of Nazi Germany.

Key People

Adolf Hitler (1889-1945)

A German politician who was the leader of the Nazi party, Chancellor of Germany from 1933-1945, and the Fuhrer of Germany from 1934-1945. In 1923, Hitler had attempted to seize power via a failed coup, and was arrested. However, he began to gain a loyal following through his populist ideas, powerful speeches and charisma. Hitler's Germany invaded Poland in Sep 1939 to start the war, and he initiated the Holocaust. He is therefore significantly responsible for millions of deaths. He committed suicide on 30th Apr 1945, when the war was clearly lost.

Franklin Roosevelt (1882-1945)

The 32nd President of the United States, from 1933-1945. Not only did Roosevelt guide the USA through most of World War II, but also the Great Depression – when he took office, nearly a third of America's workforce were unemployed. Whilst the USA remained officially neutral at the outset of war, Roosevelt offered diplomatic and financial support to the Allies. After the Japanese attacked Pearl Harbor on 7th December 1941, he declared war on the Axis powers. The US greatly helped the Allies to win the war - he died months before it ended.

Benito Mussolini (1883-1845)

The leader of Italy's National Fascist Party. He was Prime Minister from 1922-1945 – from 1925 onwards, this was not democratically as he established a dictatorship. Italy entered the war on the side of Germany in 1940, but suffered some disastrous losses. In 1943, Mussolini was dismissed as leader and arrested, but was rescued by Hitler's paratroopers. He was later put in charge of a puppet regime called the Italian Social Republic, by Hitler. He was later caught by Italian Communist partisans and executed by firing squad in 1945.

Joseph Stalin (1878-1953)

The Communist leader/dictator of the USSR during WWII. After the death of the Communist Leader Lenin, Stalin won a vicious grapple for power before eventually establishing himself as a totalitarian dictator. His own policies became known as 'Stalinism'. He had signed a non-aggression pact with Germany in August 1939, but in June 1941, Hitler broke it and the Germans invaded. Although initially suffering heavy losses, the USSR's key victories in pushing the Germans back signalled a shift in the war in favour of the Allies.

Anne Frank (1929-1945)

A German-born diarist. As a young Jewish girl, her family were forced into hiding, fleeing Germany for a secret attic in Amsterdam in the Netherlands. She wrote a diary of her time there. After years in hiding, her family was betrayed and arrested, and taken to concentration camps. Anne died of Typhus in Bergen-Belsen concentration camp. The only survivor from her family was Otto, her father, who published her diaries after her death. It has now become one of the most famous and well-read texts in contemporary history.

Important Events And Life in Concentration Camps

WWII Begins	On 1st September 1939, Germany invaded Poland, utilising the 'Blitzkrieg' strategy. Britain and France (Poland's allies) gave a notice period for the Germans to withdraw their troops from Poland. When they did not, Britain and France declared war on 3rd September. Britain initially responded with bombing raids over Germany. Nearly six years of war in Europe was to follow.	**1st – 3rd September 1939**	Hitler claimed to attack Poland to give the German people 'Lebensraum' – living space.
Evacuation of Children	People expected cities to be bombed, as enemy planes tried to hit targets, for example warehouses and factories. This would have put city children (in schools and houses close by) in grave danger, and so thousands were evacuated to the countryside. Many were extremely homesick, but some enjoyed their new lives.	**September 1939 onwards**	About 800,000 children left their homes throughout the war.
The Holocaust	The Holocaust was a genocide committed by Germany and its allies before and during WWII. It involved the systematic murder of 6 million Jews, and millions of 'undesirable' others (around 9-12 million in total). Many were gassed, starved or died of disease in concentration camps. Conditions in the camps were diabolical.	**1933 – 1945**	During the Holocaust, about two thirds of the Jews in Europe were killed
Evacuation of Dunkirk	Large numbers of British, French and Belgian troops were surrounded by German soldiers at the French coastal town of Dunkirk, and seemed set to perish. Remarkably, 338,226 were saved by a fleet of 800 small boats. The event is also known as the 'Miracle of Dunkirk'.	**26th May – 4th June 1940**	Mary was the first queen to rule England in her own right.
Battle of Britain	In the Battle of Britain, the Royal Air Force (RAF) successfully defended the UK against attacks by Nazi Germany's air force: Luftwaffe. It has been described as the first military campaign fought entirely by air forces.	**10th July – 31st October 1940**	This was seen by many as Germany's first major defeat of the war.
Attack on Pearl Harbor	This was a surprise military attack by Japan on the United States naval base at Pearl Harbor. It led to the US joining the Allies in the war. The attack commenced at 7.48am Hawaiian time, and was carried out by 353 Imperial Japanese aircraft.	**7th December 1941**	188 aircraft were destroyed and 2,403 Americans were killed.
D-Day Landings	The Normandy Landings, also known as D-Day, were a series of landing operations by the Allies to claim back Europe. It was the largest seaborne invasion in history. The operation began the liberation of north-western Europe from being under German control.	**6th June 1944**	Between 14,000 and 19,000 men died in the D-Day landings.
Hitler's Suicide	With the Germans facing defeat, Hitler married his long-time love Eva Braun on 29th April. The next day, they committed suicide, reportedly by gunshot.	**30th April 1945**	There is debate as to how they killed themselves.
Germany Surrenders	The Allies had gradually forced the surrender of Axis troops across Europe in April and early May, 1945. On 7th May, Germany officially surrendered to the Allies, bringing to an end European fighting in WWII.	**7th May 1945**	VE (Victory in Europe) Day is still celebrated on 8th May.
America Drops The Atomic Bomb	Japan refused to surrender to the terms of the Potsdam Declaration in July 1945, pledging to fight to the bitter end. The US considered an invasion, but would have lost around 500,000 men. Instead, they dropped atomic bombs on Hiroshima (6th Aug) and Nagasaki (9th Aug).	**6th – 9th August 1945**	It is thought that 135,000 people died in Hiroshima and 70,000 in Nagasaki.
WWII Ends	The surrender of Japan was announced on August 15th 1945. In August 1945, the Occupation of Japan, led by the Supreme Commander for Allied Powers, began. Japan formally signed for surrender on 2nd September 1945, aboard the US Navy battleship USS Missouri. Allied civilians and military celebrated the end of war. The use of atomic bombs to force the surrender is still debated.	**2nd September 1945**	Some rogue Japanese soldiers and pilots refused to surrender even into the 1970s!

Timeline of Major Events

- **1 Sept 1939** – Germany invades Poland- WWII begins.
- **Apr-Jun 1940** – Germany invades Denmark and Norway.
- **May-Jun 1940** – Germany takes over most of Western Europe
- **Jul-Oct 1941** – The battle of Britain.
- **22 Jun 1941** – The Axis attack Russia.
- **7-8 Dec 1941** – Japan attack US. US joins Allies.
- **4 Jun 1942** – Battle of Midway. US beats Japan.
- **3 Sep 1943** – Italy surrenders.
- **6 June 1944** – D-Day – Allies invade Normandy.
- **25 Aug 1944** – Paris liberated from German control.
- **7 May 1945** – Germany surrenders.
- **Aug 1945** – The US Drops atomic bombs on Japan
- **2 Sep 1945** – Japan surrenders – WWII is over.

The Holocaust

Holocaust Overview

What is the Holocaust? The Holocaust was a genocide that took place during World War II, in which up to 17 million people were systematically exterminated by Nazi Germany and its collaborators. Around 6 million Jews were killed, in addition to Romani peoples, ethnic Poles and Slavs, homosexual men, and many other groups. The Holocaust took place in several stages:

Removal of Rights

The Nuremburg Laws (1935) meant that Jews were fired from jobs, forced to wear a yellow Star of David, stripped of German citizenship, and banned from German schools, amongst many other measures.

Segregation

Jews were forced out of their homes and into ghettos. The ghettos were filthy, with poor sanitation, and were extremely overcrowded. Food supplies were low, and so many people starved to death.

Elimination

Victims were sent to concentration camps, where many were forced to work in hellish conditions, and many died. Others were sent to the gas chambers. Later, camps opened for the sole purpose of extermination.

Key People

Adolf Hitler (1889-1945)

Adolf Hitler was a German politician who was the leader of the Nazi party, Chancellor of Germany from 1933-1945, and the Fuhrer of Germany from 1934-1945. As Germany was unstable following World War I, Hitler began to gain a loyal following through his populist ideas, powerful speeches and charisma. He believed that the superior 'Aryan' race was under threat from 'inferior' Jews, disabled people, and other minorities. When he gained power in 1933, Hitler immediately began implementing policies to ensure an 'ethnic cleansing' of Germany - making him the chief initiator of the Holocaust. Seeking 'Lebensraum' (living space) for Germans, he also ordered the invasion of Poland in Sep 1939 which triggered World War II, the most deadly mass conflict in history. As a result, he has become one of the most reviled people to have ever lived. He committed suicide on 30th Apr 1945, with his wife, as the war was lost.

Heinrich Himmler (1900-1945)

Heinrich Himmler was the 'Reichsfuhrer' (Chief of SS police) throughout Hitler's reign, and was considered as his deputy. He was responsible for the formation of both the Nazi death squads and the extermination camps. A committed anti-Semite himself, it is believed that many ideas involving the Holocaust were actually Himmler's. Realising the war was lost, Himmler tried to negotiate with the Allies without Hitler's knowledge. He committed suicide in British custody.

Anne Frank (1929-1945)

Anne Frank was a German-born Jewish girl, who wrote a diary about the time that her family fled Germany and hid in an attic, in Amsterdam in the Netherlands. After years in hiding, they were arrested, and taken to concentration camps. Anne died of Typhus in Bergen-Belsen, only weeks before the concentration camps were liberated. The only survivor from her family, Otto, (her father) published her diary after her death. It has now become one of the most well-read texts in history.

Dr Josef Mengele (1911-1979)

Dr Josef Mengele was an SS officer and physician in Auschwitz concentration camp. He performed many deadly human experiments on prisoners, gaining the nickname 'The Angel of Death'. He was also involved in the selection of prisoners for death, which others reported he 'seemed to enjoy'. At the end of the war, he escaped capture, dying a free man in Brazil years later.

Oskar Schindler (1908-1974)

Oskar Schindler was an industrialist and member of the Nazi party, who is credited with saving 1,200 Jews during the Holocaust. He initially employed Jews in the interests of profit, but soon forged bonds with them, and showed initiative, courage, and dedication to save them. As time went on, he had to give Nazi officials increasing bribes to keep his workers safe.

Cyber Crime

Malware

Malware is a general term that describes lots of different programs that try to do something unwanted to your computer. Malware is made to stop your device from running properly and sometimes to steal your information.

Malware Type	Description
Spyware	Secretly monitors user actions. Sometimes even controls your webcam and microphone.
Virus	Spreads through normal programs and might slow down your computer or modify files.
Trojan Horse	Pretends to be a free, useful and safe program. Trojan horse attacks your computer when you open the program.
Worms	Spread from device to device and copy themselves hundreds of times.
Adware	Displays adverts while it is running. Some can collect information about what the user is doing.
Keylogger	Logs keyboard presses and mouse movement.

Motives for Internet Censorship

The five main reasons for Internet censorship are:

- Political
- Economical
- Social
- Copyright

Keywords

Internet Censorship	The control or suppression of what information can be publicised or viewed on the internet.
Cyber Abuse	Where an individual is tormented, threatened, harassed, humiliated, embarrassed or otherwise targeted by another individual (or group of individuals) through the use of technology. Cyber abuse can take place on social media, online chats, messaging services, texts and online forums.
Online Risks	Online risks are the risk a user can encounter whilst browsing the world wide web. The three Cs are: content, contact and conduct risks.
Content Risks	Content risks refer to situations where an individual may see upsetting, inappropriate or illegal content, for example: violence, hateful materials, self-harm sites, online ads, in-app purchases, gambling, extremism and radicalisation
Contact Risks	Contact risks refer to situations where an individual may be subject to cyber bullying or grooming. These risks are not only posed by strangers but also peers, so often it can be difficult to distinguish between the two.
Conduct Risks	Conduct risks refer to situations where an individual may be involved in the production or uploading of inappropriate content, in the piracy of materials or in hacking. Two significant conduct risks are sexting and downloading media files illegally (copyright infringement).
Online Grooming	Online grooming is an example of a contact risk. It is when someone uses the Internet to trick, force or pressure a young person into doing something sexual (e.g. sending naked pictures/videos of themselves). Someone who is grooming others online will often build trust, ask someone to keep the conversations secret and then exploit them..

CLICK CEOP Internet Safety

In an Emergency: 999

Tell Someone
Click for Anonymous Form

Graphics

Example mood boards

Adobe Photoshop® Important Keyboard Shortcuts

Action	Key Combination
CTRL + C	Copy
CTRL + X	Cut
CTRL + V	Paste
CTRL + D	Deselect
CTRL + T	Transform (resize/rotate)
CTRL + Z	Undo last action
CTRL + ALT + Z	Undo multiple actions

Magazine cover features

Programming

Computatonal Thinking

Computational thinking is a set of problem-solving methods that involve expressing problems and their solutions in ways that a computer could also execute.

Other Computational Methods:

Data Mining	Algorithms	Pattern Recognition
This aims to spot trends and patterns in data.	A rough list of instructions used to solve a problem.	A rough list of instructions used to solve a problem.

Variables and Constants

num1 = int(input("Enter first number")) num2 = int(input("Enter second number"))
num3 = 10
print(num1+num2+num3)

Variables	Constants
A named storage location that is used to store a value that can change at any point during the program. For example, in the code above, num1 and num2 are variables because the input could be different every time the program is run.	A named storage location that is used to store a value that can change at any point during the program. For example, in the code above, num1 and num2 are variables because the input could be different every time the program is run.

Variables and Constants

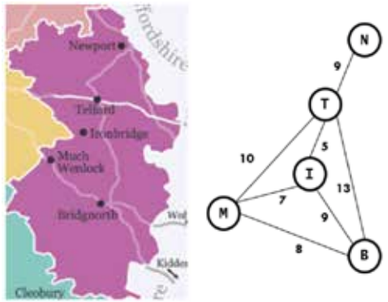
Sequence refers to a logical order of items. In the context of programming, algorithms always use a sequence because it is written line by line.

Selection is the process in which an outcome depends on whether a certain condition is met. In programming, selection (IF) statements are commonly used for this.

Iteration is the process of repeating steps. In programming, there are two common types used: FOR Loops and WHILE Loops

Abstraction

Abstraction is the removal of unnecessary elements so that the important parts remain, thus making the problem easier to solve



Decomposition

Decomposition is the process of taking a problem and breaking it down into smaller chunks (known as sub-tasks).

Programming

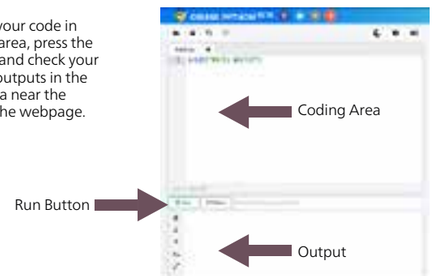
Programming Keywords

Variable	Variables store information and can be compared to a box that stores things, for example: Name = "Claude"
Algorithm	A set of step by step instructions used to solve a problem.
Flowchart	A visual representation of an algorithm.
Assignment	The process of storing a value inside a variable, for example: Password = "OXJ91mau"
Expression	A combination of operators and operands that is interpreted to produce some other value.

Accessing Python Development Environment

To access our Python programming environment, open your web browser and go to **www.online-python.com**

Then, type your code in the coding area, press the run button and check your program's outputs in the outputs area near the bottom of the webpage.



Comparison Operators

Operator	Meaning	Example	Evaluates to
==	Equal to	**7==7**	True
!=	Not equal to	**6!=7**	True
>	Grander than	**7>6**	True
<	Less than	**5>6**	False
>=	Greater than or equal to	**6>=8**	False
<=	Less than or qual to	**7<=7**	True

Arithmetic Operators

Operator	Meaning	Example
+	Addition	**num1 = num2 + num3**
-	Subtraction	**num1 = num2 - num3**
*	Multiplication	**num1 = num2 * num3**
/	Division	**num1 = num2 / num3**

Data Types

Data Type	Example	Description
String	**x = "Hello"**	Stores combinations of any characters – letters, numbers and symbols
Integer	**x = 11**	Stores whole numbers
Float	**x = 11.5**	Stores decimals
Boolean	**x = True**	Stores values True or False

Selection

If Statements

Python	Pseudocode
x = 3 if x == 1: print("x is 1")	store value 3 in variable x if value in x is equal to 1, then: display string "x is 1" on screen

If...else Statements

Python	Pseudocode

x = 3
if x == 1:
print("x is 1")
else:
print("x is not 1")
	store value 3 in variable x
	if value in x is equal to 1, then:
	display string "x is 1" on screen execute if the previous condition is not true
	display string "x is not 1" on screen

if...elif...else statements

Python	Pseudocode

x = 10
if x >= 100:
print("x is >= 100")
elif: x >= 50:
print("x is >= 50")
elif: x >= 10::
print("x is >= 10")
else:
print("x is < 10")
	store value 10 in variable x
	if x is equal to or larger than 100, then:
	display string "x is >= 100" on screen if x is equal to or larger than 50, then:
	display string "x is >= 50" on screen if x is equal to or larger than 10, then:
	display string "x is >= 10" on screen
	execute if the previous conditions are not true
	display string "x is < 10" on screen

Flowchart Symbols

Symbol	Meaning
	Start/End
	Controls the flow of the program
	Input/Output
	Process
	Selection/Decision
	Subprogram

Comments

To write a comment that will be omitted by Python when the program is running, use # symbol, for example:

If x >100: #This is an if statement

Loops

While Loops

count = 0 While count < 9: print("The count is:", count) count = count + 1 print("Thank you")	While loop repeats while the given condition is true. It tests the condition every time.

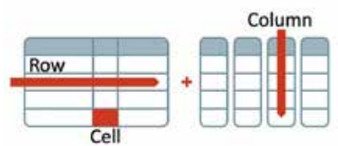
For Loops

Fruits = ["orange","apple","mango"] for i in fruits: print(i) print(i)	For loop repeats a set number of times. In this case, it will happen 3 times – one for each fruit.

Spreadsheet Formulas

Formulas always start with an equals sign (=)		
Function	**Formula**	**Example**
Add up the total	=SUM(Cell range)	=SUM(B2:B9)
Add individual items	=Value1 + Value2	=B2+C2
Subtract	=Value1 – Value2	=B2-C2
Multiply	=Value1 * Value2	=B2*C2
Divide	=Value1 / Value2	=B2/C2
Average	=AVERAGE(Cell range)	=AVERAGE(B2:B9)
Find lowest value	=MIN(Cell range)	=MIN(B2:B9)
Find highest value	=MAX(Cell range)	=MAX(B2:B9)
Do something if true or false	=IF(Logical test, "Value if true", "Value if false")	=IF(K14>J12,"20", "22")
Count cells that with numbers	=COUNT(Cell range)	=COUNT(B2:B9)
Count only if true	=COUNTIF(Cell range, "Criteria")	=COUNTIF(B2:B20, "=M")

Return current date and time	=NOW()
Returns current date	=TODAY()
Merges two text cells into one	=CONCATENATE(Cell1, Cell2)
Return number of characters	=LEN(Cell1)



KPI 9.01 Decimal Manipulation

1) Multiplying decimals	1) Remove the decimal points. 2) Multiply. 3) Insert the same number of decimal points in the answer as in the question. *0.5 x 0.3* *5 x 3 = 15* *0.5 x 0.3 = 0.15*	**2) Dividing a decimal by an integer**	*0.72÷6* → 0.12 / 6|0.72 (1) *0.972÷8* → 0.1215 / 8|0.9720 (17, 14)
		3) Dividing an integer by a decimal	1) Write as a fraction 2) Form an equivalent fraction 3) Divide

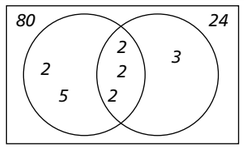
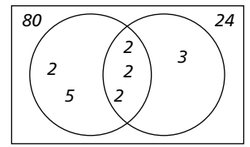
KPI 9.02 Rounding and Estimation

1) ≈	"approximately equal to"	**2) Truncation**	Ignoring all decimal places past a certain point without rounding.
3) Significant figures	The total number of digits in a number, not counting the zeros at the beginning of a number or at the end of a decimal number. *345 000 has 6 significant figures.* *0.3047 has 4 significant figures.*	**4) Estimate**	Find approximate answer by calculating with numbers rounded to one significant figure.
5) Error Intervals	The range of values (between the upper and lower bounds) in which the precise value could be. *least possible value ≤ x < greatest possible value*		

KPI 9.03 Related Calculations

1) Place value	The value of a digit relating to its position in a number. In 1482 the digits represent 1 thousand, 4 hundreds, 8 tens and 2 ones.	**2) Integer**	Whole numbers including zero. *-2, -1, 0, 1, 2, 3, …*	
3) Ascending	Smallest to largest	**4) Descending**	Largest to smallest	
5) Recurring decimals	A decimal that does not terminate.	**6) Using one calculation to perform another**	*19 x 18 = 342* *19 x 180 = 3420* *190 x 18 = 3420* *190 x 180 = 34200* *1900 x 180 = 342000*	*108 ÷ 9 = 12* *1080 ÷ 9 = 120* *108 ÷ 90 = 1.2* *108 ÷ 0.9 = 120* *108 ÷ 0.09 = 1200*
7) Inequality	*a < b a is less than b* *a > b a is greater than b* *a = b a is equal to b* *a ≠ b a is not equal to b*			

KPI 9.04 Factors, Multiples and Primes

1) Prime numbers	A prime number has two distinct factors; 1 and itself. 2 is the only even prime number. 1 is not a prime number. The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23 29		
2) Factor	Any whole number that divides exactly into another number leaving no remainder. Factors of 20 are: 1, 2, 4, 5, 10, 20	**3) Multiple**	The result of multiplying a number with a whole number. (times tables!) The multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70 …
4) HCF - Venn diagram	 *HCF of 80 and 24 = 2 x 2 x 2 = 8*	**5) LCM - Venn diagram**	 *LCM of 80 and 24 = 2 x 2 x 2 x 2 x 3 x 5 = 240*

KPI 9.05 Fractions Calculations

1) Writing one number as a fraction of another	Write £15 as a fraction of £25. $\frac{15}{25} = \frac{3}{5}$	**2) Reciprocal**	Reciprocal of $7 \rightarrow \frac{1}{7}$ Reciprocal of $\frac{2}{3} \rightarrow \frac{3}{2}$
3) Fractions of an amount	Divide the amount by the denominator and then multiply the result by the numerator.		
4) Add/Subtract fractions	Make the denominators the same (find the LCM). Use equivalent fractions to change each fraction to the common denominator. Add/subtract the numerators only.		$\frac{2}{7} + \frac{2}{5} = \frac{10}{35} + \frac{14}{35} = \frac{24}{35}$
5) Multiplying fractions	Multiply the numerators. Multiply the denominators. Simplify where possible.		$\frac{4}{5} \times \frac{3}{8} = \frac{12}{40} = \frac{3}{10}$
6) Dividing fractions	Keep the first fraction the same. Change the second to its reciprocal. Multiply the fractions. Simplify/convert to mixed number where possible.		$\frac{4}{5} \div \frac{3}{8} = \frac{4}{5} \times \frac{8}{3} = \frac{32}{15} = 2\frac{2}{15}$

KPI 9.06 Algebraic Manipulation

1) 2a	*2 x a*	**2) ab**	*a x b*
3) a²	*a x a*	**4) 3a²**	*3 x a x a*
5) a subtracted from b	*b - a*	**6) a less than b**	*b - a*
7) a divided by b	$\frac{a}{b}$	**8) b divided by a**	$\frac{b}{a}$
9) 4 times smaller than a	$\frac{a}{b}$ *or a ÷ 4*	**10) 4 times larger than a**	*4 x a → 4a*
11) 5th power of a	a^5	**12) Variable**	A letter used to represent any number.
13) Coefficient	The number to the left of the variable. This is the value that we multiply the variable by. *4x The coefficient of x is 4.* *x The coefficient of x is 1.*	**14) Term**	A single number, variable or numbers and variables multiplied together.
15) Expression	A mathematical statement which contains one or more terms combined with addition and/or subtraction signs *E.g. 4x + 3y.*	**16) Collecting like terms**	Combining the like terms in an expression. *7x + 3y – 2x is simplified to 5x + 3y.*

KPI 9.07 Indices, Powers and Roots

1) Multiplication law	$a^m \times a^n = a^{m+n}$ *Same base numbers, ADD the powers.*	**2) Division law**	$a^m \div a^n = a^{m-n}$ *Same base numbers, SUBTRACT the powers.*
3) Power to a power	$(a^m)^n = a^{m \times n}$ *MULTIPLY the powers.*	**4) Raising a fraction by a power**	$(ab)^n = a^n \times b^n$ *Raise each number or variable to the same power.*
5) Power of 0	$a^0 = 1$ *Any number or variable to the power of zero equals 1.*	**6) Negative powers (integers)**	$a^{-1} = \frac{1}{a}$ $a^{-2} = \frac{1}{a^2}$ $a^{-n} = \frac{1}{a^n}$ *A negative power represents the reciprocal.*
7) Positive unit fractions	$a^{\frac{1}{2}} = \sqrt{a}$ $a^{\frac{1}{3}} = \sqrt[3]{a}$ $a^{\frac{1}{n}} = \sqrt[n]{a}$	**8) Negative unit fractions**	$a^{-\frac{1}{2}} = \frac{1}{\sqrt{a}}$ $a^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{a}}$ $a^{-\frac{1}{n}} = \frac{1}{\sqrt[n]{a}}$
9) Positive non-unit fractions	$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$	**10) Negative nonunit factions**	$(a)^{-\frac{m}{n}} = \left(\frac{1}{a}\right)^{\frac{m}{n}} = \left(\sqrt{\frac{1}{a}}\right)^m$

KPI 9.08 Expanding and Factorising

1) Expand	Multiply out the bracket(s) in the expression. *E.g. 3(5x + 7) = 15x + 21*	**2) Factorise**	Identify the HCF and rewrite the expression with brackets. *E.g. $6x^2 + 9x = 3x(2x+3)$*
3) Expanding double brackets	Writing two brackets next to each other means the brackets need to be multiplied together. *$(x + 1)(x +2)=(x + 1)\times(x + 2)= x^2 + 3x + 2$* *Note: $(x + a)^2=(x + a)(x + a)$*		
4) Factorising quadratics	To factorise a quadratic, put it back into a pair of brackets. To find the terms that go in each bracket, look for a pair of numbers which multiply to give the constant and add together to give the coefficient of x		
5) Difference of two squares (DOTS)	*a2 – b2 = (a+b)(a –b)*	E.g. $x^2 - 16 = (x + 4)(x - 4)$	

x	*x*	*+1*
x	*x^2*	*+x*
+2	*+2x*	*+2*

KPI 9.09 Expressions and Substitution

1) Substitution	Replace a variable with a given value.	**2) Function machine**	Shows the relationship between two variables, the input and the output.
3) Formula	A mathematical relationship or rule expressed in symbols.		

KPI 9.10 Percentages

1) Multiplier	A percentage written as a decimal is the percentage multiplier.	**2) Percentage of an amount with a calculator**	The percentage multiplier multiplied by the amount.
3) Finding 50%	To find 50% divide by two.	**4) Finding 25%**	To find 25% divide by four.
5) Finding 20%	To find 20% divide by five.	**6) Finding 10%**	To find 10% divide by ten.
7) Finding 5%	To find 5% divide by twenty.	**8) Finding 1%**	To find 1% divide by one hundred.
9) Percentage change	$\frac{difference}{original}$ *x 100*	**10) Reverse percentages**	$\frac{original}{multiplier}$ *= new amount*

KPI 9.11 Proportion

1) Direct proportion	A relationship between two variables where, as one increases, the other also increases.	**2) Unitary method**	To find the value of one unit first.
		3) Exchange rate	Tells us how much of one currency you can exchange for another currency e.g. £1 = $1.39

KPI 9.12 Probability

1) Probability	How **likely** something is to happen. Always given as a **Fraction, Decimal or Percentage**	**2) Probability Scale words**	**Impossible, Unlikely, Even chance, Likely, Certain**
3) Probability Scale numbers	**Impossible = 0, Even chance = 0.5 or ½ or 50%, Certain = 1 or 100%**	**4) Two Way Table**	Used when there are two categories
5) Frequency Trees	Used when there are two or more categories	**6) Sample Space**	Listing all of the possible **outcomes** from two events, for example flipping a coin and rolling a dice
7) Mutually Exclusive Events	**Mutually exclusive events** cannot happen at the same time. **Events** sum to 1	**8) Venn Diagrams**	Comparing 2 or more sets of **data** that share some things in common
9) Element	A list of numbers, objects or outcomes	**10) Universal Set**	Contains all of the **elements** for our question
11) Set notation	**A - all elements in A** **A' - all elements not in A** **B - all elements in B** **B' - all elements not in B**	**12) Intersection**	**A** ∩ **B** all the **elements in both A and B**
13) Union	**A** ∪ **B** all the **elements in A or B or both**	**14) Term**	Used when there are two or more **events** Each pair of **branches** add to 1 (**mutually exclusive**) To find the **probabilities** we **multiply** along the **branches**

KPI 9.13 Linear Equations

1) Solve	Use inverse operations to find the solution of an equation.	**2) Linear Equation**	Contains an equals sign (=) and has one unknown. *E.g. 5x – 2 = 2x + 7*

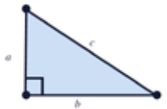
KPI 9.14 Linear Inequalities

1) Representing an inequality on a number lineclosed circle	A closed circle is used to show greater than or equal to (or less than or equal to) the number. 	**2) Representing an inequality on a number line- open circle**	An open circle is used to show greater than (or less than) the number. 

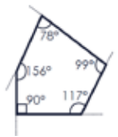
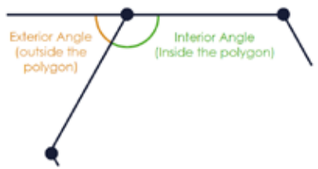
KPI 9.15 Sequences

1) Sequence	A pattern of numbers which fit a certain rule.	**2) Term**	A number in a sequence.
3) Term to term rule	The rule for how to get from one number to the next number in the sequence.	**4) Position**	Where a term is in a sequence.
5) Position to term rule	The rule for how to work out a number in a sequence if you know its position.	**6) Nth term**	Used to find a term in a sequence given its position *E.g. 5n + 3*
7) Linear sequence	The terms increase or decrease by the same amount each time. Also known as an arithmetic sequence. Nth term is written in the form, an + b.	**8) Quadratic sequence**	Nth term is written in the form $an^2 + bn + c$
9) Geometric sequence	A geometric sequence goes from one term to the next by always multiplying or dividing by the same value.	**10) Fibonacci sequence**	The Fibonacci sequence is unique because the next term is found by adding up the two previous terms *1, 1, 2, 3, 5, 8, 13, 21…*

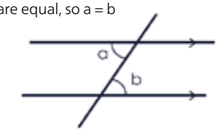
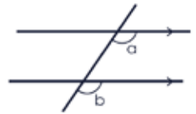
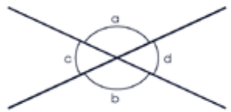
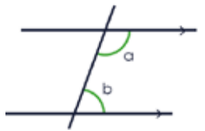
KPI 9.16 Pythagoras

1) Right-angled triangle	A triangle that contains a right-angle (90 degrees).	**2) Hypotenuse**	The longest side - opposite the right-angle.
3) Pythagoras' Theorem	For any right-angled triangle, the area of the square of the longer length (the hypotenuse) is equal to the area of the squares of the shorter lengths added together $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ 		

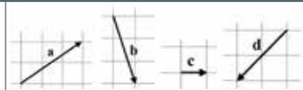
KPI 9.17 Interior and Exterior angles

1) Polygon	A polygon is a two-dimensional shape with 3 or more straight sides. A polygon is either regular or irregular: **Regular** – side lengths are equal, and all angles are equal. **Irregular** – side lengths are unequal, and angles are unequal.	Regular Pentagon 	Irregular Pentagon 
2) Interior angle	The measure of turn between one side length, a vertex, and the next side length. 	**3) Exterior angle**	The measure of turn between a side length, and the next side length extended. Exterior Angle = 360° ÷ Number of sides Sum of Ext. Angles for any polygon = 360° Interior angle + Exterior angle = 180° E.g. exterior angles = 360 ÷ number of sides.

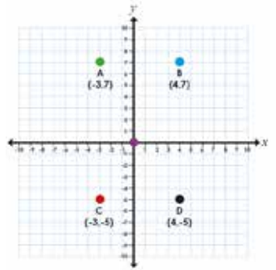
KPI 9.18 Angles in Parallel Lines

1) Alternate angles	Alternate angles are equal, so a = b 	**2) Corresponding angles**	Corresponding angles are equal, so a = b 
3) Vertically opposite angles	Vertically opposite angles are equal, so, a = b and c = d 	**4) Co-interior angles**	Co-interior angles sum to 180°, so a + b = 180° 

KPI 9.19 Basic Vectors

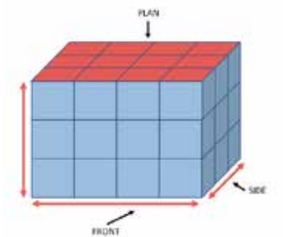
1) Vector	Vectors represent movement of a certain size in a certain direction, they are represented on a diagram with an arrow.		
2) Magnitude	Magnitude is defined as the length of a vector.	**3) Scalar**	A scalar is the number we multiply a vector by.
4) Column vector	$\begin{pmatrix} a \\ b \end{pmatrix}$	a: movement along the x-axis (left/right) b: movement along the y-axis (up/down)	
5) Adding and subtracting column vectors	$\begin{pmatrix} a \\ b \end{pmatrix} + \begin{pmatrix} c \\ d \end{pmatrix} = \begin{pmatrix} a+c \\ b+d \end{pmatrix}$	**6) Multiplying vectors**	To multiply a column vector by a number, we multiply both values in the vector by that number.
7) Resultant vectors	The resultant vector is the vector that results from adding two or more vectors together.		
8) Parallel vectors	Travel in the same or opposite direction. Can be of varying lengths. Must be scalar multiples of one another.	The vectors $\frac{8}{12}$ and $\frac{2}{3}$ are parallel because $\frac{8}{12} = 4\ \frac{2}{3}$	

KPI 9.20 Basic Transformations

1) Origin	The coordinate (0,0), where the x - axis and y - axis intersect.	**2) Axis**	x - axis is horizontal (y = 0) y - axis is vertical (x = 0) The plural of axis is axes.
3) Coordinates	Written in pairs and inside a bracket. The first number is the x - coordinate (horizontal position). The second number is the y - coordinate (vertical position).		**Point A is in the SECOND quadrant** **Point B is in the FIRST quadrant** **Point C is in the THIRD quadrant** **Point D is in the FOURTH quadrant** **The coordinate (0,0) is also known as the ORIGIN**

KPI 9.21 Plans and Elevations

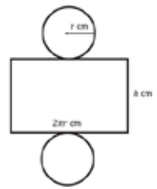
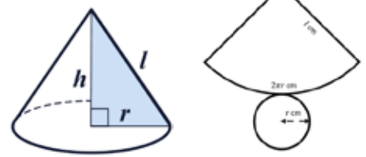
1) Plan	View looking vertically downwards.
2) Side elevation	View looking horizontally from the side.
3) Front elevation	View looking horizontally from the front.



KPI 9.22 Circles

1) Circumference	The perimeter of the circle. $C = \pi d$	**5) Area of a circle**	$A = \pi r^2$
2) Perimeter of a semi-circle	$P = \frac{\pi d}{2} + d$	**6) Area of a semi-circle**	$A = \frac{\pi r^2}{2}$
3) Perimeter of a quarter circle	$P = \frac{\pi d}{4} + 2r$	**7) Area of a quarter-circle**	$A = \frac{\pi r^2}{4}$
4) Perimeter of a three-quarter circle	$P = \frac{3}{4} \pi d + 2r$	**8) Area of a three-quarter circle**	$A = \frac{3\pi r^2}{4}$

KPI 9.23 Surface Area

1) Surface Area	The total area of the surface of a three-dimensional object. For example, the surface area of a cube is the area of all 6 faces added together. It is measured in square units. E.g. square centimetres (cm^2), square metres (m^2).		
2) Cylinder	*Surface Area* $= 2\pi r^2 + 2\pi rh$ 	**3) Cone**	*Surface Area* $= \pi r^2 + \pi rl$ 
4) Sphere	*Surface Area* $= 4\pi r^2$	**5) Hemi-sphere**	*Surface Area of a Hemi-sphere* $= 3\pi r^2$

The Elements of Music

Pitch
How high or low a note is. Pitch increases and decreases by steps of a scale. Scales can be major or minor.

Tempo
Tempo describes the speed of the music. We use Italian terms to describe speed.

Rhythm
Notes have different lengths – some long, some short. When we combine long and short notes it creates a rhythm.

Melody
Melody is the tune.

Structure
Music is often divided into sections. These sections are put together to create the structure.

Texture
Music is made up of layers. There are different names depending on how many layers there are and how they work together.

Timbre
We use the word timbre to describe the different sounds made by the instruments.

Tonality
Whether the piece is major or minor. Major sounds 'happy', minor sounds 'sad'.

Dynamics
Dynamics is volume in music. Varying dynamics makes music more interesting. We use Italian terms to describe dynamics.

Minimalism

Minimalism Key Words

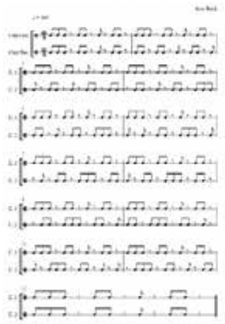
Abstract
Breaking away from traditional representation, exploring different ways of representing it.

Polyrhythms
The use of many different rhythms at the same time, often overlapping to create a thick texture.

Motif/Cell
A short tune or musical figure that forms the basis of minimalist composition.

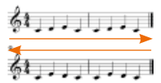
Phase In/Phase Out
The gradual introduction or reduction of a new rhythmic/melodic idea in/out of the texture.

Clapping Music



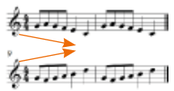
This is a famous example of minimalist music that uses a phase shift.

Retrograde



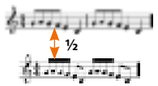
The motif is played backwards.

Inversion



Inversion is a mirror image where the pitches move in the opposite direction.

Diminution



The note value is shortened, usually by half.

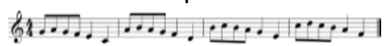
Augmentation

The note values are lengthened, usually doubled.

Phase Shift

The rhythm shifts between parts, so they overlap and go in and out of sync with each other. The example above shows each line starting one crotchet apart.

Sequence



The melody or motif is repeated in a higher or lower pitch. This example shows each note repeated one tone higher each time.

These techniques can be used together – for example, a retrograde inversion; or an augmented retrograde!

Music Technology

The name for a written down piece of music is a score.

Top Tip! Sibelius is used to write composition down at GCSE!

Score Information
Breaking away from traditional representation, exploring different ways of representing it.

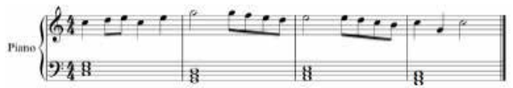
Key and Time Signature
When creating a new score, you can add the key and time signature.

Sibelius
When creating a newscore, you can add the key information such as name and composer.

Keypad
You can use the keypad to input notes, rests and articulation.

Options
Just like Microsoft software, there are options across the top banner for editing/ adding to the score.

Below is what a score looks like and how the music is presented. This is a piano example. However, Sibelius allows you to compose on any instrument. It will play back the score for you so you can hear your composition come to life!



Popular Music

Popular Music Key Words

Bridge
Section that is two thirds of the way through. Usually before the final verse/chorus before the coda.

Accompaniment
Music that accompanies a melody line – the 'backing'.

Coda
Section that brings a piece of music to an end.

Arrangement
A piece of music written in a different way to the original. Often called a 'cover version'..

Chord
A group of two or more pitched notes played at the same time. The choice of notes determines the effect of the chord – i.e. major/minor.

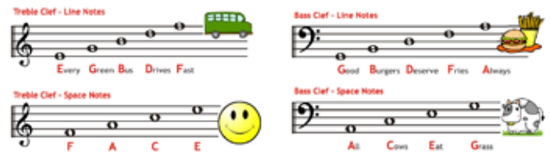
Bassline
Lowest pitch part of a song, often performed by a bass guitar. It provides the harmonies on which the chords and melody are composed.

Chorus
The part of the song that is repeated identically after each verse.

Example of Verse Chorus Structure

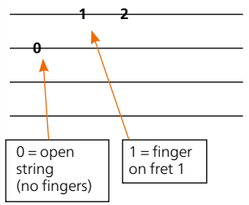
Intro → Verse 1 → Verse 2 → Chorus → Verse 3 → Chorus → Bridge → Chorus → Chorus

Reminder



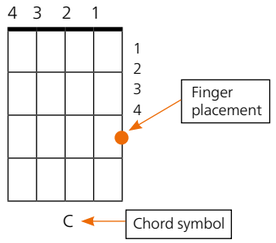
TAB Notation

Fingers on fret number:



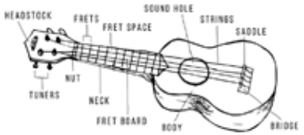
Chord Boxes

Strings:



Ukulele Technique and Construction

Strings are usually tuned to GCEA (4321). C is the lowest in pitch. This is called re-entrant tuning.



Sit up straight with your bottom to the back of the chair

Ukulele flat against your chest

Strumming arm across the ukulele

Neck arm supporting the neck from underneath

Ukulele History

The ukulele originated in the 19th century as a **Hawaiian** adaptation of the Portuguese **machete** (cavaquinho), a small **guitar-like** instrument, which was introduced to **Hawaii** by **Portuguese immigrants**, mainly from **Madeira** and the **Azores**.

It gained great popularity elsewhere in the **United States** during the early **20th century** and from there spread **internationally**.

The **tone** and **volume** of the instrument vary with **size** and **construction**. Ukuleles commonly come in four sizes: **soprano**, **concert**, **tenor**, and **baritone**. You can also get a **bass ukulele** which is tuned like a bass guitar.

Famous Ukulele Players

Cliff Edwards – otherwise known as Ukulele Ike, is considered to be the godfather of the ukulele. He played jazz and pop songs on the ukulele in the 1920s and 30s. He also was the voice of Jiminy Cricket in Disney's Pinocchio!

Israel Kamakawiwo'ole – a Hawaiian ukulele player who became very famous for his ukulele cover of Over the Rainbow. He died in 1997, but is still very popular today.

Jake Shimabukuro – is a ukulele prodigy who performs instrumental versions of popular songs. Feng E – similarly to Jake Shimabukuro,

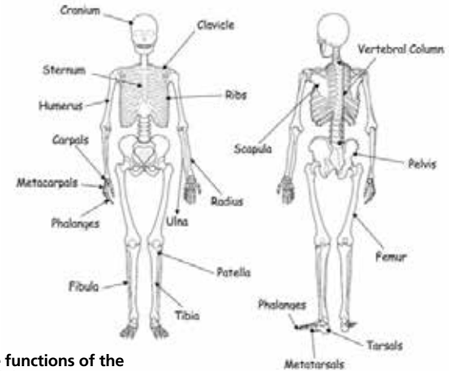
Feng E – performs extremely impressive instrumental covers. The difference is – Feng E is 13 years old!

Grace VanderWall – is a young singer/ songwriter who became famous by appearing on AGT at the age of 12.

Strumming Patterns

On the ukulele strumming patterns are very varied depending on the style of the song. Sometimes just a steady beat on a down strum will work. Other times, you want a more funky rhythm! The rhythm patterns we look at involve down strums and up strums. You can strum with your thumb or your index finger. We use normal musical notation to show the rhythm, and then use D and U to show up or down strums.

Skeletal System



The functions of the skeleton:

1. **Protection of vital organs** Cranium protects the brain when heading a ball.
2. **Muscle attachment** Bones provide anchors for
3. **Joints for movement** Bones act as levers to create movement.
4. **Platelet** Platelets clot blood when we are cut to stop the bleeding.
5. **Blood cell production** Red blood cells carry oxygen. White blood cells fight infection.
6. **Store calcium & phosphorus** Calcium and Phosphorus are stored in the bones to keep them strong.

The role of ligaments and tendons:

A ligament's main function is to join bone to bone. Ligaments help stabilise joints and prevent dislocation.

Tendons attach muscle to bone. Tendons help provide powerful movements such as kicking and jumping.

Muscular System

Classification of muscles:

Voluntary muscles
- Found on the skeleton e.g. biceps, triceps & quadriceps
- Conscious control
- Attach to the skeleton to create movement.

Involuntary muscles
- Found in the stomach, intestines & blood vessels
- Unconscious control
- Contract slowly and rhythmically

Cardiac muscle
- Found in the wall of the heart
- Unconscious control
- Do not tire

Muscle fibres:

Type I (Slow twitch)
- Aerobic events
- Marathon running

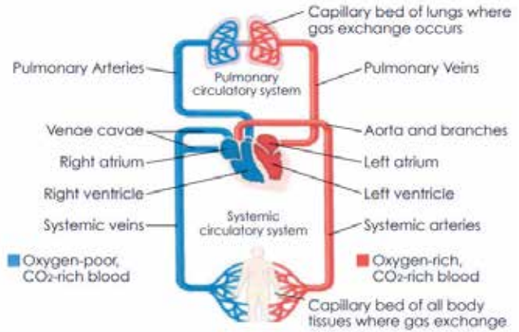
Type IIa (Fast twitch)
- 400m race

Type IIx (Fast twitch)
- Anaerobic events
- 100m sprint

Characteristic	Slow Twitch Type I	Fast Twitch Type IIa	Fast Twitch Type IIx
Force of Contraction	Low	High	Very High
Speed of Contractiom	Slow	Medium	Fast
Resistence to Fatgue	High	Moderate	Low
Aerobic or Anaerobic	Aerobic	Aerobic & Anaerobic	Anaerobic
Myoglobin	High	Medium	Low
Mitochondria	High	Medium	Low
Capillary Network	Good	Moderate	Low

Cardiovascular and Respiratory Systems

The main functions of the cardiovascular and respiratory systems are to deliver oxygen and nutrients to the working muscles and to remove carbon dioxide and lactic acid from the muscles.



The Pulmonary Circulatory system consists of the Trachea, Bronchus, bronchioles, alveoli and diaphragm.

Its main functions are:

- Transport deoxygenated blood from the heart to the lungs.
- Oxygenate the blood through Gas Exchange in the lungs.
- Remove Carbon Dioxide from the blood in the lungs.
- Return oxygenated blood to the heart.

The systemic circulatory system (known as **Cardiovascular**) has 4 main functions:

- Transported Oxygenated blood from the left-hand side of the heart to the muscles.
- Supply Nutrients to the working muscles.
- Transport de-oxygenated blood from the muscles back to the heart.
- Remove Waste products (carbon dioxide and lactic acid) from the muscles.

Cardiac values

Stroke Volume
Volume of blood pumped by the heart per beat.

Heart Rate
Number of beats per minute.

Cardiac Output
Volume of blood pumped by the heart per minute.

SV X HR = CO

All increase during exercise

Breathing Values

Breathing Frequency
Number of breaths per minute.

Tidal Volume
Volume of air inhaled or exhaled per breath.

Minute Ventilation
Volume of air inhaled or exhaled per minute.

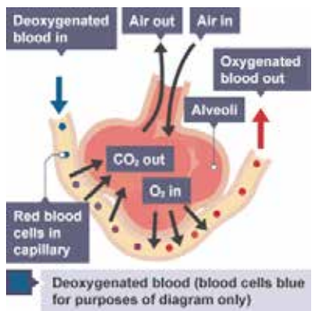
BF X TV = MV

All increase during exercise

Gaseous Exchange

- Diffusion is the movement of gas from an area of high concentration to an area of low concentration.
- In the alveoli, there is a high concentration of oxygen and in the bloodstream, there is a high concentration of carbon dioxide.
- Oxygen diffuses into the blood from the alveoli and carbon dioxide diffuses into the alveoli from the blood.
- Capillaries allow for Gas Exchange as they are 1 cell thick, moist, are close to the alveoli and have a large surface area.

Alveoli



Blood Brothers

Bouncers

Bouncers by John Godber shows a night on the tiles from the point of view of the men on the door. It is a funny, energetic piece of highly theatrical storytelling where the men are at once themselves, and every character they happen to meet on a night at work at the nightclub.

John Godber's Introduction to Plays:1 acknowledges that at the time of writing Bouncers he was dissatisfied with naturalism and had a desire to create a piece of work where the audience were not distracted by the design elements but were engaged with the performances of the actors.

Multirole

Multi-rolling is when an actor plays more than one character onstage.

The differences between the characters are marked by changing of the voice, movement, gesture and body language.

The audience should be able to clearly see that the actor is playing multiple characters.

Key Terminology

Multi-role	When an actor plays more than one character on stage.
Interpretation	A stylistic representation of a creative work or dramatic role.
Gait	A person's manner of walking
Naturalism	A style and theory of representation based on the accurate depiction of detail.
Gesture	A movement of part of the body, especially a hand or the head, to express an idea or meaning.
Sustain	To sustain a role means when an actor gives a consistent performance and does not break character.

Blood Brothers

- Blood Brothers, set in 1960s, is a musical by Liverpudlian playwright Willy Russell, revolves around twin boys (Mickey and Edward) who are separated at birth and brought up in completely different environments in the city.
- Mickey is brought up with his seven older siblings by his struggling single mother, Mrs Johnstone. His twin brother, Edward, however is brought up as the only child of the wealthy Lyons family, who live nearby, after Mrs Lyons persuaded Mrs Johnstone to hand over one of her twins at birth. Mickey and Edward don't meet each other until they're seven years old, but immediately become best friends and blood brothers.
- The bond continues when the boys are teenagers and both live in the countryside, despite them both being in love with Mickey's neighbour Linda. However, as they get older, the huge difference in their backgrounds pulls them apart and eventually leads to their tragic deaths.

Key Terminology

Status	Relative social or professional position; standing.
Summary	A brief statement or account of the main points of something
Naive	Showing a lack of experience, wisdom, or judgement
Subtext	An underlying and often distinct theme in a piece of writing or conversation.

Here are eight practical techniques for learning lines.

1. Read the lines aloud.
2. Ask a friend to help you.
3. Practise, practise, practise.
4. Little and often. Go over them first thing in the morning, a few times during the day and last thing at night.
5. There are several apps which can help with learning lines.
6. Even if you don't use an app you can make a recording of the scene with a smartphone.
7. Move around while you are saying your lines. This has been scientifically proven to aid memory.
8. Learn the cue lines that lead in to each of your lines. Being prompt with your lines will give you and your fellow actors more confidence.

Newsflash

Key Terminology

Reportage	The act or process of reporting news.
Verbatim	Using the exact words of a source, word for word and to include consideration of specific demands of vocal delivery.
Docu-Drama	the genre of theatre in which real events are retold in a performance context.
Split-Stage	A technique in which the acting space is divided into more than one area. Each area runs separately from the other, allowing two scenes to be shown at the same time

Rehearsals

What does an effective rehearsal look like?

What does an effective rehearsal sound like?

What does an effective rehearsal feel like?

Keyword	Definition
Naturalism	Theatre that attempts to create an illusion of reality through a range of dramatic techniques and theatrical strategies.
Impact	Having a marked effect or impact on someone
Multi-role	When an actor plays more than one character on stage
Pantomime	A theatrical entertainment, mainly for children, which involves music, topical jokes, and slapstick comedy and is based on a fairy tale or nursery story, usually produced around Christmas.
Rehearsal	A practice or a trial performance of a play or other work for later public performance.
Stylised	Using artistic forms and conventions to create effects; not natural or spontaneous.
Blocking	The precise staging of actors to facilitate the performance of a play, ballet, film or opera.

Keyword	Definition
Stagnant	Showing no activity, boring or dull.
Surrealism	A 20th-century avant-garde movement in art and literature which sought to release the creative potential of the unconscious mind.
Slapstick	A comedy performance based on deliberately clumsy actions and humorously embarrassing events.
Melodrama	A sensational dramatic piece with exaggerated characters and exciting events intended to appeal to the emotions.
Practitioner	A person actively engaged in an art, discipline, or profession
Symbolism	The use of one or more objects to represent an idea, a feeling, or a physical entity.

Relationships and Families

Adultery: Having a sexual relationship with someone you are not married to, when you are married.

Age of Consent: The age at which a person is considered old enough to be able to have sex, according to the law.

Annulment: The cancellation of a marriage.

Civil Marriage: A non-religious marriage ceremony.

Civil Partnership: The legal union of two people of the same gender.

Commitment: The act of making a promise or pledge.

Celibacy: Choosing not to have sexual relations; to be celibate.

Chastity: Keeping yourself sexually pure, for example, waiting until marriage before having sex.

Cohabitation: Living together as a couple without being married.

Contraception: Precautions taken to prevent pregnancy, and to protect against sexually transmitted diseases.

Contract: A binding agreement between two sides or two people.

Covenant: An agreement based on promises between two sides; often linked with religion, so includes an agreement before and with God.

Divorce: The legal dissolution (ending) of a marriage.

Extended Family: A nuclear family (Mum, Dad and the kids) plus other relatives, usually grandparents, all living in the same place.

Family Planning: Planning when to have a family or how many children to have using birth control/contraceptives.

Gender Discrimination: Treating people differently (often less favourably) because of their gender.

Moral Entrepreneur: A person, group or organisation with the power to create or enforce rules and impose their definitions of deviance.

Gender Equality: The belief that men and women are of equal value and worth.

Heterosexual: Someone physically attracted to the opposite sex.

Homosexual: Someone physically attracted to the same gender.

Monogamy: A marriage exclusively to just one other person.

Nuclear Family: Mum and Dad, plus the child/children.

Polygamy: The practice of a man having more than one wife at the same time (not legal in the UK).

Procreation: The biological process of a couple producing children.

Remarriage: Getting married again after a divorce (not usually to the same person).

Responsibility: A duty, something we feel we have to do, such as looking after a younger brother or sister.

Single Parent Family: A family with either just Mum or Dad with the child/children.

Vow: A sacred promise, such as those made in a wedding ceremony.

Human Rights

Agape: A Greek word meaning selfless or unconditional love. The word used by Jesus and the early church in the New Testament.

Amnesty International: An organisation which aims to protect human rights.

Censorship: When something is banned or removed e.g. books, films or letters.

Community: A group of people who belong together because of a shared characteristic.

Dignity: A person who is worthy of respect and honour.

Discrimination: To treat someone differently because of a personal characteristic. Actions based on prejudice.

Extremism: Having extreme views or opinions in political, religious or other matters.

Golden Rule: Principle found in all major religions – 'treat other people as you would like to be treated'.

Human Rights: The rights that someone is entitled to just because they are human.

Personal Conviction: A strong belief or opinion held by someone.

Prejudice: Pre-judging someone based on a characteristic they have, without having the full facts.

Poverty: Having less than the basic needs of life, so that life is a struggle.

Responsibility: Duty, in this case, to make sure other people's rights are respected.

Scapegoat: To blame an individual or group for something which is not their fault.

Self-esteem: Confidence in your own abilities and value.

Social Justice: Justice (fairness) in terms of wealth and opportunities in a society.

Stereotype: To label someone because of a particular characteristic e.g. wearing a hoodie makes you a criminal.

Stewardship: A duty to look after, in this case, other people and those less fortunate.

Tolerance: To accept that people are different.

Issues of Life and Death

Abortion: Operation or intervention to deliberately end a pregnancy.

Afterlife: The belief that some form of existence continues beyond death.

A Rocha: Christian environmental protection organisation.

Creationist: A Christian believes that the Biblical account of creation is true.

Design Argument: (Teleological Argument) developed by William Paley - the idea that the universe is too complex and purposeful to have happened by chance and must have a designer who religious people refer to as God.

Embryo: Life at the earliest stages of pregnancy, up to 11 weeks.

Euthanasia: Literally 'a gentle and easy death', the idea that a terminally person should have the right to choose how and when to die.

Exploitation: The use or abuse of something e.g. the environment.

The Fall: The disobedience of Adam and Eve and subsequent falling from God's favour.

Foetus: Unborn developing life from 11 weeks of a pregnancy.

Forgiveness: Not to feel angry or blame someone when they have done something to hurt you.

Funeral Rites: Ceremony or celebration to mark a person's death.

Genesis: The first book of the Bible, containing the story of creation.

Heaven: Place after death for those who have lived a good life, can be thought of as physical or spiritual, the sense of being 'with God'.

Hell: Place after death for those who have failed to live a good life, can be thought of as physical or spiritual, the sense of being 'apart from God'.

Immortal: Eternal, everlasting life.

Judgement: The idea that each of us will be judged by God on how well we have lived.

Myth: A story with a moral or deeper meaning e.g. many Christians view the Genesis story as a myth.

Quality of life: How good your life is in terms of health, wealth and happiness.

Purgatory: Roman Catholic belief in a place after death where a soul must atone (make up for) any sins committed.

Redemption: The belief that after forgiveness a person is restored to God's favour.

Resurrection: Returning from the dead.

Sanctity of life: The belief that life is sacred, holy and unique, a gift from God.

Soul: The belief that humans possess a non-physical aspect which survives beyond death.

Stewardship: A duty to look after, in this case, the environment and other living things.

Reactivity

Word Equations to Symbol Equations

- Replace names of each substance's symbols or formula
- Use numbers to balance the equation

Example

Copper + Oxygen → Copper Oxide

2Cu + O2 → 2CuO

Two copper atoms (2Cu) react with **one oxygen molecule (O_2)** to produce **two units of copper oxide (2CuO).**

Typical Properties of Metals

Appearance:	Shiny
State at room:	Solid (except mercury a liquid). temperature
Density:	High
Strength:	Strong
Malleable or brittle:	Malleable
Conduct heat?:	Good
Conduct electricity?:	Good
Magnetic material:	Nickel
Sound when hit:	Make a ringing sound (sonorous)

Pure Metals vs Alloy

Pure Metal

Alloys

The rows of atoms in a pure metal can slide over each other easily. In an alloy, the different sized atoms disrupt the layers so the atoms can't slide. This makes alloys more useful than pure metals.

Bases v Alkalis

A **base** is a substance that can react with acids and **neutralise** them. Many bases are insoluble in water. If a base does dissolve in water it is called an **alkali**.

Bases are usually:

- **Metal oxides**, such as copper oxide
- **Metal hydroxides**, such as sodium hydroxide, or
- **Metal carbonates**, such as calcium carbonate

General word equations for neutralisation reactions:

Metal Oxide + Acid → Salt + Water

Metal Hydroxide + Acid → Salt + Water

Metal Carbonate + Acid → Salt + Carbon Dioxide + water

The lab test for carbon dioxide:

Bubble the gas through lime water and watch for it to turn from colourless to a cloudy milky colour.

Acids and Metals

Acids react with most metals to produce a salt and hydrogen. This is the general word equation :

Metal + Acid Salt + Hydrogen

The lab test for hydrogen:

Place lighted **splint** in the test tube and listen for the gas to burn with a squeaky pop.

Naming Salts

Hydrochloric Acid → Metal Chlorides

Sulphuric Acid → Metal Sulphates

Nitric Acid → Metal Nitrates

Calculating Relative Formula Mass

Formula mass is calculated by adding together the mass number of each atom in a compound's chemical formula.

E.g. $MgCl_2$ Ar Mg = 24 Ar Cl = 35.5

Formula mass = 24 + (2 x 35.5) = 95

There are 2 chlorines in the chemical formula.

Reactivity Series

The reactivity series is a list of elements in order of their reactivity:

Most Reactive

Potassium
Sodium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Tin
Lead
Hydrogen
Copper
Silver
Gold
Platinum

Least Reactive

If a metal loses its outer electrons more easily, it will be more reactive.

Extracting Copper from Copper Oxide

Copper is so unreactive, it does not react with cold or hot water, so it is used for water pipes.

To extract copper:

- Mix copper oxide powder with carbon powder;
- Heat the mixture strongly in a crucible;
- Keep the lid on the crucible, to stop carbon reacting with oxygen in the air;
- The carbon dioxide formed in the reaction escapes into the air;
- Let the crucible cool down, you tip the mixture into cold water;
- Brown copper sinks to the bottom, leaving unreacted powder suspended in the water.

These equations represent the reaction:

Copper Oxide + Carbon
Copper + Carbon Dioxide

2CuO + C → 2Cu + CO2

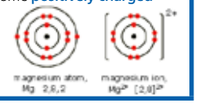
Cont...

Why Do Metals React?

Metals react because they want to gain a full outer shell and become stable. They do this by losing their outer electron(s) to become positively charged ions.

For example:

Magnesium loses its 2 outer electrons to become a +2 ion.

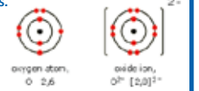


Why Do Non-Metals React?

Non-metals react because they want to gain a full outer shell and become stable. They do this by gaining electrons into their outer shell to become negatively charged ions.

For example:

Oxygen gains 2 electrons into its outer shell to become a -2 ion.



Displacement Reactions

This is when a more reactive metal **displaces** a less reactive metal from its compound.

For example:

Magnesium + Copper Sulphate →
Magnesium Sulphate + Copper

If the more reactive metal is already in the metal compound, nothing happens.

For example:

Magnesium Sulphate + Copper →
No reaction

Carbon and Metal Extraction

Some metals can be extracted from their metal oxides using carbon **if the metal is less reactive than carbon.**

The metal is reduced – it has lost its oxygen

Metal Oxide + Carbon → Metal + Carbon Dioxide

The carbon is oxidised – it has gained oxygen

This works for **zinc, iron, tin, lead** and **copper** because they are **all less reactive** than carbon.

1	**Displacement Reaction**	When a more reactive element replaces a less reactive element.
2	**Reactivity Series**	Most Reactive Potassium Sodium Calcium Magnesium Aluminium Carbon Zinc Iron Tin Lead Hydrogen Copper Silver Gold Platinum Least Reactive
3	**Salt**	• The substance made in a neutralisation reaction. • The name of the salt depends on the acid and the alkali/ metal used.
4	**Extract**	To remove a metal to get it in its pure form.
5	**Ore**	A rock containing enough metal compound to make it worthwhile extracting the metal from.
6	**Formulae used in this topic**	• Carbonate: CO_3 • Sulphate: SO_4
7	**Properties**	• Characteristics of a substance. • These can be chemical such as reactivity. • These can be physical such as melting and boiling point.
8	**Ductile**	• A property of some metals. • Can be shaped into a wire.
9	**Lustrous**	A property of metals meaning 'shiny'.
10	**Malleable**	• A property of some metals. • Can be hammered or bent into shape without cracking.
11	**Sonorous**	• A property of some metals. • They can produce a ringing sound when hit.
12	**Chemical Reaction**	In a chemical reaction reactants turn into products and a new product is formed.
13	**Reactants**	The substances which react together in a chemical reaction.
14	**Products**	The new substance(s) formed in a chemical reaction.
15	**Naming Salts**	The name of a salt has two parts: • The first part comes from the metal in the alkali used. • The second part comes from the acid that was used.
16	**Hydrochloric Acid**	Makes salts that end in chloride.
17	**Sulphuric Acid**	Makes salts that end in sulphate.
18	**Nitric Acid**	Makes salts that end in nitrate.

Forces in Action

Hooke's Law

Hooke's Law says that **the extension of an elastic object is directly proportional** to the force applied. In other words:

- The extension doubles, if the force is doubled;
- There is no extension, if no force is applied.

You can investigate Hooke's Law using a spring:

- Hang the spring from a stand and clamp;
- Measure its length with a ruler;
- Hang a mass from the spring and measure the new length of the spring;
- Work out: **extension = new length – original length;**
- Keep adding more masses, measuring the new length each time;
- Work out extension for each mass.

You can then plot a force-extension graph:

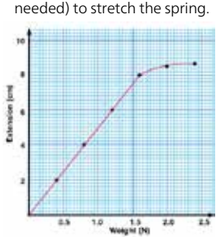
- Plot force on the vertical (y) axis.
- Plot extension on the horizontal (x) axis.

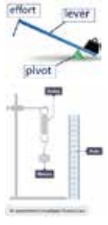
Force Applied (N) = Spring Constant (N/m) x Extension (m)

Using Hooke's Law

In a force-extension graph:

- The steeper the line, the stiffer the spring;
- The area under the line is the **work done** (energy needed) to stretch the spring.





Moments

- A **moment** is a turning effect of a force.
- Forces can make objects turn if there is a **pivot**.
- When the turning forces are **balanced** - the moments are **equal and opposite**.

Calculating Moments

To calculate a moment, you need to know:

- The distance of the force from the pivot;
- The size of the force.

Moment (Nm) (Ncm)	=	Force (N)	×	Perpendicular Distance (m) (cm)

Force Multipliers

- Increasing the distance will increase the moment for the same force;
- This is why a longer spanner will loosen a tight nut;
- And a crowbar or long lever can be used to lift heavy objects.

Work Done (J) = Force (N) x Distance (m)

Deformation

Elastic materials:

- **Change shape** when a force is exerted on them;
- **Return to their original shape/size** when the force is removed.

Deformation is a change in shape. There are two types of deformation:

- **Stretching** is when the object/material is pulled;
- **Compression** is when the object/material is squashed.

The greater the force exerted, the greater the amount of deformation. If the force is large enough, the object/material may no longer return to its original size. Until you reach this point, a special case called **Hooke's Law** applies.

Simple Machines

Examples of simple machines are **see-saws, wheelbarrows** and **forceps. Simple machines give a bigger force but with a smaller movement.**

See–saw

A force is exerted in one place, causing movement and a force at another place in the see-saw. A see saw will **balance** when:

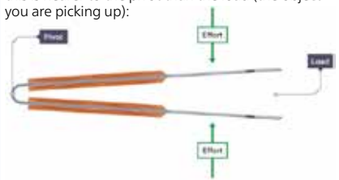
Clockwise Moment = Anticlockwise Moment Force (N) x Distance (cm) = Force (N) x Distance (cm)

Wheelbarrows

A wheelbarrow is a simple machine with the load near the pivot (the wheel) and the effort on the handles far from the pivot.

Forceps

With forceps, fingers provide the effort force, and this is nearer to the pivot than the load (the object you are picking up):



- Some machines give a smaller force but with a bigger movement.

This is the opposite to the see-saw and wheelbarrow, but again if you multiply the force by the distance travelled, you get the same value for the effort and for the load.

Forces in Action (Definitions)

1	**Force**	• Push or pull. • Always act in pairs with each force acting in the opposite direction. • Contact or non-contact.
2	**Contact Force**	• When a force is exerted the objects are touching. • Examples include tension, push and air resistance.
3	**Non-Contact Force**	• The objects do not need to be touching for the force to be applied. • Examples include weight, magnetism and electrostatic.
4	**Moment**	• The turning effect of a force around a pivot.
5	**Principle of Moments**	• When something is balanced about a pivot then total clockwise moment = total anticlockwise moment.
6	**Pivot**	• Central point on which something balances or turns.
7	**Moment Equation**	• M = F x d • Moment = Force x distance
8	**Elastic Material**	• Will change shape when a force is applied but will return to its original shape when the force is removed.
9	**Non-Elastic Material (Plastic)**	• Will change shape when a force is applied but will stay in its new shape when the force is removed.
10	**Hooke's Law**	• The extension of an elastic object is directly proportional to the force applied to it.
11	**Hooke's Law Equation**	• F = k e • Force = Spring Constant x Extension

12	**Law of Conservation of Energy**	• Energy is neither created nor destroyed, only transformed from one type to another.
13	**Different Energy Stores**	• Thermal, gravitational potential, elastic potential, nuclear, chemical, kinetic.
14	**Deformation**	• Changes in an object's shape due to a force being applied.
15	**Resultant Force**	• The overall force acting on an object.
16	**Velocity**	• How quickly an object is moving.
17	**Constant Velocity**	• Moving at the same, steady speed.
18	**Stationary**	• Not moving.
19	**Balanced Forces**	• A pair of forces that are equal in size.
20	**Unbalanced Forces**	• A pair of forces where one force is larger than the other force.
21	**Limit of Proportionality**	• The point at which an elastic material will not return to its original shape.

Energetics and Rates

Rate of Reaction

Reacting particles must **collide** with a minimum amount of energy (**activation energy**) for a chemical reaction to happen.

How quickly a reaction happens is called the **rate of reaction**, and always involves a **time measurement.**

We can increase reaction rate by:

- Increasing the concentration of liquid reactants as it increases the frequency of collisions.
- Increasing the surface area of solid reactants as it increases the frequency of collisions.
- Using a catalyst as it decreases the energy that particles need to collide with for a successful reaction.

Some ways to measure the rate of a reaction:

- Time taken for a reactant to disappear.
- Time taken for the reaction mixture to change colour.
- Measure the number of bubbles produced in a certain time.
- Measure the volume of gas produced in a certain time.
- Measure the change in mass in a certain time.

Exothermic and Endothermic Reactions

- **Exothermic reaction –** **releases** energy to the surroundings.
- Causes a **rise** in temperature (**positive** temperature change).
- **Endothermic reaction –** **take in** energy from the surroundings.
- Causes a **drop** in temperature (**negative** temperature change).

Catalysts

- Speed up reactions.
- Are not used up during reactions.
- Are chemically unchanged after the reaction completes.
- Work by reducing the energy needed to start a reaction (**activation energy**).

In industry, using catalysts often results in **lower temperature** being used in industry, **saving money** and **cutting** the use of fossil fuels and their subsequent **emissions**.

Car exhausts have **catalytic converters.**

- They reduce the amount of toxic gases released.
- They contain platinum and rhodium as catalysts.

Oxidation

In oxidation reactions, a substance **gains oxygen.** Metals and non-metals can take part in oxidation reactions (be **oxidised**).

Examples:

- Magnesium reacts with oxygen to produce magnesium oxide:

Magnesium + Oxygen → Magnesium Oxide

$2Mg + O_2 \rightarrow 2MgO$

- Carbon reacts with oxygen to form carbon dioxide:

Carbon + Oxygen → Carbon Dioxide

$C + O_2 \rightarrow CO_2$

Identification Tests

Lime water – colour change from colourless to **cloudy - carbon dioxide present.**

Glowing splint – will relight when placed in **oxygen**.

Blue cobalt chloride paper – colour change from blue to pink with **water**.

Cobalt chloride paper – colour change from blue to pink with **water**.

Combustion

- **Combustion** is another name for burning fuels.
- It is an **exothermic** reaction.
- It is an example of an **oxidation** reaction

Complete Combustion

- **Fuels** contain **hydrocarbons** which react with oxygen when they **burn**.
- With enough oxygen, **complete combustion** happens:
- The hydrogen atoms combine with oxygen to make water vapour, H_2O.
- The carbon atoms combine with oxygen to make carbon dioxide, CO_2.
- The **maximum amount of energy** is released.

The equations for the complete combustion of **methane**.

Methane + Oxygen → Water + Carbon Dioxide

$CH_4 + 2O_2 \rightarrow 2H_2O + CO_2$

Incomplete Combustion

- Happens when there is **not enough oxygen.**
- Water vapour and carbon dioxide are still produced.
- Two other products are also produced:
- **Carbon monoxide**, CO; colourless toxic gas.
- Particles of **carbon** (soot/smoke); causes breathing problems.
- The **maximum amount of energy** is **NOT released.**

Thermal Decomposition

This is the **breaking down of a substance using heat**, to form two or more products. Many **metal carbonates** take part in thermal decomposition reactions.

For example, copper carbonate:

Copper carbonate is green; copper oxide is black.

Copper Carbonate

Copper Oxide + Carbon Dioxide

$CuCO_3$ $CuO + CO_2$

Other metal carbonates decompose in the same way. When they do, they follow this equation:

Metal Carbonate Metal Oxide + Carbon Dioxide

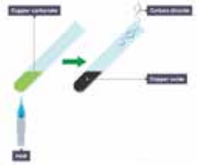
For example, calcium carbonate:

Calcium Carbonate

Calcium Oxide + Carbon Dioxide

$CaCO_3$ $CaO + CO_2$

Thermal decomposition is an example of an **endothermic** reaction. Energy must be supplied **constantly** for the reaction to keep going.



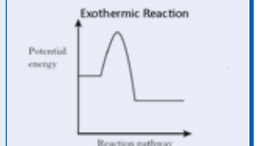
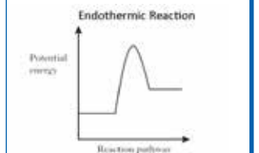
Conservation of Mass

Atoms are not destroyed nor created during chemical reactions, so in any reaction:

Total Mass of Reactants =

Total Mass of Products

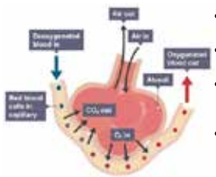
1	**Atom**	• The smallest unit that makes up matter. • Contains protons, neutrons and electrons.
2	**Element**	• Substance made up of only one type of atom.
3	**Compound**	• Two or more elements chemically bonded together.
4	**Mixture**	• Different elements, compounds or molecules mixed together but not chemically bonded.
5	**Law of Conservation of Mass**	• In a chemical reaction, atoms are not created or destroyed only re-arranged.
6	**Thermal Decomposition**	• A chemical reaction where a substance is broken down by heating.
7	**Combustion**	• A reaction between a fuel and oxygen, the scientific name for burning.
8	**Oxidation**	• A reaction where oxygen is added to a reactant.
9	**Rate of Reaction**	• The speed at which reactants turn into new products.
10	**Effect of Temperature on the Rate of Reaction**	• The higher the temperature, the faster the rate of reaction.
11	**Effect of Concentration on the Rate of Reaction**	• The higher the concentration, the higher the rate of reaction.
12	**Chemical Reaction**	• In a chemical reaction reactants turn into products and a new product is formed.

13	**Reactants**	• The substances which react together in a chemical reaction.
14	**Products**	The new substance(s) formed in a chemical reaction.
15	**Effect of Surface Area**	• The greater the surface area, the higher the rate of reaction.
16	**Catalyst**	• Substance that speeds up the rate of a reaction without being used up or changed in the reaction.
17	**Endothermic Reaction**	• A reaction that takes in energy.
18	**Exothermic Reaction**	• A reaction that releases energy.
19	**Activation Energy**	• The amount of energy needed to start a chemical reaction.
20	**Reaction Profile**	• A diagram which compares the amount of energy stored in the reactants and products of a chemical reaction.
21	**Exothermic Reaction Profile**	
22	**Endothermic Reaction Profile**	

Biology - Biological systems and processes

The human gas exchange system

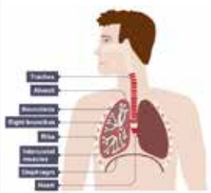
- Oxygen is needed for respiration;
- Carbon dioxide produced in respiration needs to be removed;
- **Gas exchange** is moving oxygen from the air into the blood, and removing waste carbon dioxide from the blood into the air.
- The respiratory system contains the organs that allow us to get the oxygen we need and to remove the waste carbon dioxide we do not need:
- Air passes from the mouth into the **trachea** (windpipe);
- The trachea divides into two **bronchi** - one for each lung.
- Each bronchus divides into smaller tubes called **bronchioles.**
- At the end of each bronchiole, there are air sacs **(alveoli)**



Features of the alvioli

- Increase surface area of lungs;
- Moist, thin walls (just one cell thick);
- A lot of tiny blood vessels called **capillaries**
- The gases move by **diffusion** (from **a high concentration to a low concentration**):

- Oxygen diffuses from the air into the blood; carbon dioxide diffuses from the blood into the air.



Ventilation

- Ventilation is another word for breathing;
- It involves movements of the ribs, intercostal muscles and diaphragm to move air in and out of the lungs:
- **Inhale** – breathing in; **Exhale** – breathing out;

Aerobic respiration

Energy is needed for:

- growth and repair
- movement
- control of body temperature in mammals/ birds

The equation for aerobic respiration is:

glucose + oxygen → carbon dioxide + water

- Glucose and oxygen react to produce carbon dioxide and water and release energy;
- It is **aerobic** respiration because oxygen is used;
- Respiration happens in all living cells, including plant and animal cells;
- Takes place in the **mitochondria** of the cell;
- Energy is released from glucose;
- **Do not** confuse respiration with breathing (which is called **ventilation**).

	Inhaling	Exhaling
Diaphragm	Contracts and moves downwards	Relaxes and moves upwards
Intercostal muscles	Contract, moving the ribs upwards and outwards	Relax, letting the ribs move downwards and inwards
Volume of ribcage	Increases	Decreases
Pressure inside the chest	Decreases below atmospheric pressure	Increases above atmospheric pressure
Movement of air	Moves into the lungs	Moves out of the lungs

Anaerobic respiration

In humans:

The equation for anaerobic respiration in humans is:

glucose → lactic acid

- Lactic acid builds up in the muscles;
- Causing pain and tiredness (fatigue);
- Can lead to cramp;
- Lactic acid is broken down when you start aerobic respiration again.

Fermentation

The equation for anaerobic respiration in yeast is:

glucose → ethanol + carbon dioxide

- Anaerobic respiration happens in microbes (e.g. bacteria);
- They need to release energy from glucose;
- Yeast (unicellular fungi) can carry out an anaerobic process called **fermentation**;
- Ethanol (alcohol) is produced;
- The ethanol is used to make beer and wine;
- The carbon dioxide helps bread rise.

	Aerobic	Anaerobic
Needs oxygen?	Anaerobic	No
Needs glucose?	Yes	Yes
Product(s) formed	Carbon dioxide and water	Lactic acid
Energy released	More	Less

Impact of exercise

Exercise causes an increase in:

- Breathing rate;
- Tidal volume (volume of air breathed in/out in one breath);

Regular exercise can increase the:

- Strength of the **diaphragm** and **intercostal muscles;**
- Vital capacity (volume of air that can be forcibly exhaled**after inhaling fully).**

Biology - Biological systems and processes

Smoking

Smoking is very harmful to health. Smoke contains harmful substances.**These include:**

- Tar
- Nicotine
- Carbon monoxide

Tar

- Causes cancer of the lungs, mouth and throat;
- Coats the inside of the lungs causing coughing;
- Damages the alveoli, making gas exchange difficult.

Smoke

- Cells in the trachea, bronchi and bronchioles produce **mucus;** Mucus traps dirt and microbes;
- Cells with **cilia** move the mucus out of the lungs;
- Smoke and tar damages the cilia;
- Smokers cough to move the mucus and are more likely to get bronchitis.

Nicotine

- Nicotine is **addictive**;
- Nicotine increases heart rate and blood pressure, and makes blood vessels narrower;
- This can lead to **heart disease.**

Carbon monoxide

- Carbon monoxide takes the place of oxygen in red blood cells;
- This reduces amount of oxygen that the blood can carry; It means the circulatory system has to work harder, causing heart disease.

Smoking and pregnancy

Smoking can damage the foetus during gestation.

For example, it can:

- Increase the risk of complications in pregnancy and birth;
- Make it less likely to have a healthier pregnancy and a healthier baby
- Increase the risk of stillbirth;
- Make it more likely to be born too early;
- Be more likely to be born underweight

Drugs

Drugs are a substance that has an effect on the body.

They can be:

- **Medicines** are drugs that treat pain or disease;
- **Recreational drugs** are taken because people like the effects they have on their bodies.
- Some recreational drugs are legal, eg **caffeine, tobacco & alcohol;**
- Most recreational drugs are illegal, eg **cannabis, ecstasy and heroin;**
- Recreational drugs can be classified as a depressant or a **stimulant**;
- Most recreational drugs can be **addictive**.

Asthma

- Asthma affects the bronchioles;
- Airways can become inflamed, swollen and constricted (narrowed);
- Excess mucus is produced.

During an asthma attack:

- The lining of airways becomes inflamed;
- Fluid builds up in the airways;
- Muscles around bronchioles contract, which constricts airways.

Symptoms are:

- Wheezing, tight chest and difficulty breathing.
- Treated using drugs called relievers which relax and open up the airways.

Relievers are often administered using an inhaler, to breathe the medicine in directly into your lungs.

Stimulants

Stimulants speed up messages in the brain and along the nerves.

Legal Stimulants

- Nicotine and caffeine are legal stimulants;
- Caffeine is found in cola drinks, coffee and tea;
- Caffeine makes you feel more alert, but it can cause insomnia (difficulty in sleeping), headaches and nervousness;

Illegal Stimulants

- Cocaine, ecstasy and amphetamines are all illegal stimulants;
- Cocaine, ecstasy and amphetamines make you feel more energetic and confident, but damage the liver and heart;
- They cause loss of memory and concentration, and increase risk of mental illness;

Depressants

Depressants slow down messages in the brain and along the nerves;

- **Alcohol, heroin and solvents** are depressants

Here are some of the typical effects depressants have on the body:

- Feelings of well-being;
- Lowered inhibition;
- Slowed thinking;
- Slowed muscular activity;
- A distorted view of the world, or hallucinations.

Long-term effects of depressants:

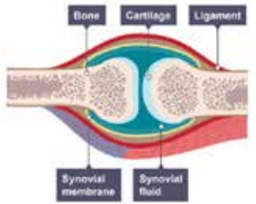
- Damage to the liver, brain and heart;
- Alcohol can cause weight gain;
- Solvent abuse causes a rash around the nose and mouth;
- Loss of memory and concentration;
- Increased risk of mental illness.

- Any drug that is misused can cause damage to the body, as well as personal and social problems.
- Injecting drugs with syringes that someone else has used may lead to diseases such as **HIV** and **hepatitis**.

Biology - Biological systems and processes

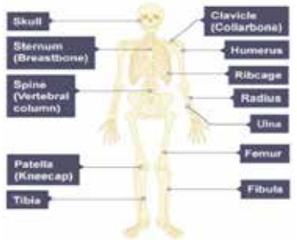
Joints

- Most joints allow parts of the skeleton to move;
- The human skeleton has joints called **synovial joints.**



The synovial joint

- The ends of the bones in a joint are covered with a tough, smooth substance called **cartilage**.
- This is kept slippery by a liquid called **synovial fluid.**
- Tough **ligaments** join the two bones in the joint;
- If two bones moved against each other, without cartilage they would eventually wear away;
- This is called **arthritis.**



The Skeleton

Bone is a living tissue with a blood supply.

- It is constantly being dissolved and formed.
- It can repair itself if a bone is broken.
- Calcium and other minerals make bone strong but slightly flexible.

Four functions of the skeleton:

1. **Support the body**
   - The skeleton supports the body. For example, without a backbone we would not be able to stay upright.
2. **Protection of vital organs**
   - The skull protects the brain.
   - The ribcage protects the heart and lungs.
   - The backbone protects the spinal cord.
3. **Movement**
   - Bones are linked together by joints;
   - Some are **fixed joints** – e.g. in the skull;
   - Some are **flexible joints** – e.g. the knee;
   - Muscles move bones attached by joints.
4. **Making blood cells**
   - Two main types of blood cell:
   - **Red blood cells**, which carry oxygen;
   - **White blood cells**, which destroy **harmful microbes** (pathogens);
   - Both are made in the **bone marrow** - soft tissue inside large bones protected by the hard part of the bone around it.

Muscles and movement

- Muscles work by getting shorter - they **contract**;
- Muscles are attached to bones by strong **tendons**.
- During muscle contraction, it pulls on the bone, moving it.

Antagonistic muscles

- Muscles can **only** pull, **they cannot push;**
- Muscles work in pairs, called **antagonistic muscles;**

Your elbow joint has two muscles that move your forearm up or down. These are the **biceps** and the **triceps:**

- To raise the forearm, the biceps contracts and the triceps relaxes;
- To lower the forearm again, the triceps contracts and the biceps relaxes.

- Muscles exert a force on bones when they contract.
- You could work out the force exerted by the biceps muscle using the idea of **moments.**
- The way in which muscles and bones work together to exert forces is called **biomechanics**.

Type of joint	Examples	Movement allowed
Hinge joint	Knee, elbow.	The same as opening and closing a door, with no rotation (turning).
Ball and socket	Hip, shoulder.	Back and forth in all directions, and rotation.

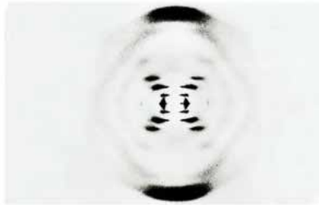
Biology - Biological systems and processes (DNA)

Structure of DNA

Genetic information is passed from one generation to the next. This is called **heredity** and why we resemble our parents.

The genetic information itself is contained in a complex molecule called **DNA**.

Scientists worked out the structure of DNA in the 1950s. Rosalind Franklin made 'X-ray diffraction' images of DNA.



An X-ray diffraction image of DNA

James Watson and Francis Crick used information from one of her images to work out a model for the structure of DNA.

Work by Maurice Wilkins, a colleague of Franklin, supported their model.

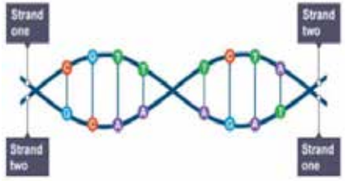
Watson and Crick were able to work out how DNA was arranged.

They worked out that:

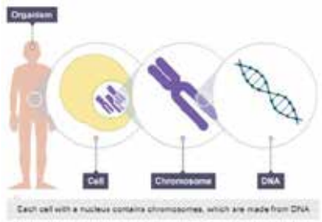
- DNA has two strands;
- The strands are twisted to form a **double helix;**
- The strands are held together by **bonds** between **base pairs.**

Key Terms and Definitions

1	**Base Pair**	The pair of nitrogenous bases that connects the (complementary) strands of DNA;
2	**Bond**	The chemical link that holds molecules together;
3	**Chromosome**	Strands of DNA;
4	**DNA**	Deoxyribonucleic acid. The chemical carrying the genetic code;
5	**Double helix**	The shape of DNA molecule, two strands twisted in a spiral;
6	**Gene**	A section of DNA which we inherit from our parents, and which controls part of a cell's chemistry (protein production);.
7	**Heredity**	Genetic information that determines an organism's characteristics, passed on from one generation to another.
8	**Nucleus**	Controls what happens inside the cell, and contains chromosomes



A DNA molecule showing its base pairs, G–C and A–T



Each cell with a nucleus contains chromosomes, which are made from DNA

Chromosomes, DNA and genes

The DNA in all of your cells is approximately two metres long, except for:

- Red blood cells which have none;
- Sperm or eggs only have about one metre.
- It is coiled into structures called chromosomes.
- Chromosomes are found in the nucleus of each cell.
- Human body cells each contain **23 pairs of chromosomes;**
- Half of which are from each parent; Human gametes (eggs and sperm) each contain 23 chromosomes;
- When an egg is fertilised by a sperm, it becomes a cell with 23 pairs of chromosomes;
- We each have half of our chromosomes and DNA come from each parent;
- DNA makes up genes, which makes up chromosomes. One copy of all your chromosomes is called your **genome**.

Biology - Biological systems and processes (Definitions)

1	Skeleton Functions	• Protection of vital organs. • Support. • Making blood cells in the bone marrow. • Movement.
2	Muscles	• Are attached to bones with tendons. • Muscle contracts causing the bone to move
3	Antagonistic Muscle Pairs	• A pair of muscles that work against each other. • When one muscle contracts, the other relaxes.
4	Joint	• Structure between bones
5	Hinge joint	• Movement is backwards and forwards in one direction. • Examples include the knee and the elbow.
6	Ball and Socket joint	• Full movement through 360°. • Examples include the hip and the shoulder.
7	Fixed joint	• The bones are fused together so no movement • Examples include the skull and the pelvis
8	Pivot joint	• Rotation movement around a fixed point. • The neck is an example.
9	Tendon	• Fibres made of collagen which attach muscle to bone.
10	Ligaments	• Fibres made of collagen which hold bones together with joints.
11	Diffusion	• The movement of particles from an area of high concentration to a low concentration.
12	Drug	• A chemical that affects how the body works.
13	Recreational drug	• A drug which is not taken for medical reasons.
14	Medicinal drug	• A drug which is taken for medical reasons, such as paracetamol.
15	Tar	• A chemical found in cigarette smoke which paralyses cilia in the airways.
16	Cilia	• Tiny hairs on cells in the airways which move mucus away from the lungs (help keep dust and bacteria out of the lungs).
17	Carbon Monoxide	• Toxic chemical found in cigarette smoke which binds with red blood cells, meaning they carry less oxygen around the body.
18	Nicotine	• An addictive chemical found in cigarette smoke. • Causes blood vessels to become narrower, which increases blood pressure.
19	Foetus	• A developing baby in the mother's uterus.
20	Placenta	• An organ that connects the foetus to the wall of the uterus. • Substances such as drugs can cross the placenta.
21	Nucleus	• Part of a cell that controls cell activity.
22	Chromosomes	• Long lengths of tightly-coiled DNA.
23	DNA	• Chemical that genes are made of. • Made of two strands twisted into a double helix.
24	Gene	• Section of DNA that codes for one particular protein.
25	Crick and Watson	• Scientists that first built a model of DNA.
26	Wilkins and Franklin	• Provided the data that helped the model of DNA to be developed.
27	Inheritance	• Passing on genes from parents that determine our characteristics
28	Characteristics	• The features that we have, e.g. eye colour or an inherited disorder.

Grammar & Key Vocabulary

The present tense – regular verbs

Take the ending off the infinitive and replace it with the correct ending for the person you want to talk about:

	-ar	-er	-ir
I (yo)	-o	-o	-o
You (tú)	-as	-es	-es
He/She/It (él/ella)	-a	-e	-e
We (nosotros)	-amos	-emos	-imos
You pl (vosotros)	-áis	-éis	-ís
They (ellos/ellas)	-an	-en	-en

Ejemplo: hablar = to speak so hablo = I speak (as it is an -ar verb).

Stem Changing Verbs

Some Spanish verbs change a bit at the start of the verb as well as the end **except for the we and you pl forms:**

	jugar (to play)	quere (to want)	poder (to be able to)
I (yo)	juego	quiero	puedo
You (tú)	juegas	quieres	puedes
He/She/It (él/ella)	juega	quiero	puede
We (nosotros)	jugamos	queremos	podemos
You pl (vosotros)	jugáis	queries	podéis
They (ellos/ellas)	juegan	quieren	pueden

Irregular verbs

Some verbs don't follow the pattern above and you just have to learn these ones. These are some of the most common irregular verbs:

	tener (to have)	ser (to be)	ir (to go)	hacer (to do/make
I (yo)	tengo	soy	voy	hago
You (tú)	tienes	eres	vas	haces
He/She/It (él/ella)	tiene	es	va	hace
We (nosotros)	temenos	somos	vamos	hacemos
You pl (vosotros)	tenéis	sois	vais	hacéis
They (ellos/ellas)	tienen	son	van	hacen

Some verbs in present tense are only irregular in the 'I' Form

hacer (to do) hago (I do)
salir (to go out) salgo (I go out)
ver (to see/watch) veo (I watch/see)

The Preterite Tense -regular verbs

This is used to describe a single, completed action in the past (i.e. not a repeated action) Take the ending off the infinitive and replace it with the correct ending for the person you want to talk about:

	-ar	-er	-ir
I (yo)	-é	-í	-í
You (tú)	-aste	-iste	-iste
He/She/It (él/ella)	-ó	-ió	-ió
We (nosotros)	-amos	-imos	-imos
You pl (vosotros)	-astais	-isteis	-isteis
They (ellos/ellas)	-aron	-ieron	-ieron

Ejemplo: hablar = to speak so hablo = I speak (as it is an -ar verb).

Preterite tense - Irregular verbs

Some verbs don't follow the regular pattern and you just have to learn these ones. These are some of the most common irregular verbs:

	tener (to have)	ser (to be)	ir (to go)	hacer (to do/ make
I (yo)	tuve	fui	fui	hice
You (tú)	tuviste	fuiste	fuiste	hiciste
He/She/It (él/ ella)	tuvo	fue	fue	hizo
We (nosotros)	tuvimos	fuimos	fuimos	hicimos
You pl (vosotros)	tuvisteis	fuiteis	fuiteis	hicisteis
They (ellos/ellas)	tuvieron	fueron	fueron	hacieron

The **imperfect tense** is another past tense. One of the ways it is used is for descriptions in the past. These are the key verbs you need to know to describe someone or something in the past:

era – it/he/she was
estaba – it/he/she was (for location or mood)
tenía – it/he/she had

The near future tense – going to do something. Use the right form of 'ir' (to go), put 'a' in the middle and add an infinitive.

I'm going - Voy a
You're going - Vas a
He'she/its is going - Va a
We're going - Vamos a
You (pl) are going - Vais a
They're going - Van a

+ infinitive (jugar, salir, ir, ser, montar, hacer, comer, vivir etc)
E.g. voy a jugar = I'm going to play, vamos a salir = we're going to go out

Other ways of talking about future hopes and plans:

I hope	Espero (+ infinitive)	I want	Quiero (+ infinitive)
I would like	Me gustaría (+ infinitive)	I want	Tengo ganas de (+ infinitive)
I intend	Tengo la intenciÃ³n de (+ infinitive)	I am thinking of	Pienso (+ infinitive)

Comparatives – these are phrases that are used to compare things or people. This is how you form them:

mas (adjective) que...	more **(adjective)** than...	e.g. más **interesante** que – more interesting than…
menos (adjective) que...	less **(adjective)** than...	e.g. menos **interesante** que – less interesting than…
tan (adjective) como...	as **(adjective)** as...	e.g. menos **interesante** que – less interesting than…
mejor que	better than...	
peor que	worse than...	

Superlatives – This is how you say something is **the most, the least, the best or the worst.** To form these you need the word 'the' in front of the words used for comparatives. Remember you will need to use the right word for 'the' depending on whether the noun you are talking about is masculine **(el)**, feminine **(la)**, masculine plural **(los)** or feminine plural **(las)**.

el/la/los/las más (+ adjective)	the most (+ adjective)	(e.g. el más importante – the most important)
el/la/los/las menos (+ adjective)	the least (+adjective)	
el/la mejor	the best	
los/las mejores	the best (plural)	
el/la peor	the worst	
los/las peores	the worst (plural)	

The Future Tense

This is used to say **'will** do something' (I **will** go, we **will** play etc.) To form the future tense you do not take the ending off the infinitive abut you need to add the following endings which are the same for -ar, -er and -ir verbs:

I (yo)	-é
You (tú)	-ás
He/She/It (él/ella)	-á
We (nosotros)	-emos
You pl (vosotros)	-éis
They (ellos/ellas)	-án

Some verbs have irregular stems in the future tense (the start of the verb) but the endings are the same as in the table above.

	Infinitive	Stem change
to say	decir	**dir- (diré – I will say)**
to do/ make	hacer	**har-**
to be able to	poder	**podr-**
to put	poner	**pondr-**
to leave/ go out	salir	**saldr-**
to have	tener	**tendr-**
to come	venir	**vendr-**

The Conditional tense

This is used to say 'would' do something. It works the same as the future tense but the endings are different. The irregular verbs are the same as the future tense irregulars.

I (yo)	-ía
You (tú)	-ías
He/She/It (él/ella)	-ía
We (nosotros)	-íamos
You pl (vosotros)	-íais
They (ellos/ellas)	ían

hay there is/are
había there was
habrá there will be

Reflexive verbs- These verbs have an extra bit. The infinitives have a '**-se**' on the end and lots of daily routine verbs are reflexive verbs. (e.g. lavar**se** = to get washed etc.). They describe actions that you do to yourself.

First you have to **take off the '-se'** and then treat the verb the same as any other – **change the ending for the right person.**
Then, for this type of verb, you need to add **an extra bit in front of the verb** depending on the person you are referring to.

	ducharse (to have a shower)
I (yo)	**me** ducho
You (tú)	**te** duchas
He/She/It (él/ella)	**se** ducha
We (nosotros)	**nos** duchamos
You pl (vosotros)	**os** ducháis
They (ellos/ellas)	**se** duchan

Some reflexive verbs are also stem-changing:
acostarse (to go to bed) - me acuesto
despertarse (to wake up) - me despierto
vestirse (to get dressed) - me visto

Talking about what could, should or must be done:

Se puede + infinitive	you can (ejemplo: se puede **ahorrar** energíá – you can **save** energy)
Se debe + infinitive	you must/should (e.g. se debe **reciclar** más – you should **recycle** more)
deberíamos/debemos + infinitive	we should/must
tenemos que + infinitive	we have to
podemos + infinitive	we can

Ser and Estar

Both of these verbs mean **'to be'.** You need to choose the right one depending on what you want to use it for.

Ser is used for:
Description
Origin:(where someone is from)
Character
Time
Occupation

Estar is used for:
Position
Location
Action
Condition
Emotion

	Ser	**Estar**
I (yo)	soy	estoy
You (tú)	eres	estás
He/She/It (él/ella)	es	está
We (nosotros)	somos	estamos
You pl (vosotros)	sois	estáis
They (ellos/ellas)	Son	están

Connectives

y - and
pero - but
porque - because
o - or
también - also
además - moreover
luego - later
sin embargo - however
no obstante - however
sino - if not/but
así que - so (that)
Por eso - therefore
por lo tanto - therefore
aunque (+ subjunctive) - although/even if

Opinions**

en mi opinión - in my opinion
personalmente - personally
lo bueno es - the good thing is
lo malo es - the bad thing is
a mi parecer - in my opinion
pienso que - I think that
creo que - I believe that
Lo que más me gusta es - what I like most is
Lo que menos me gusta es - what I like least is
me parece que - it seems to me that
desde mi punto de vista - from my point of view
lo mejor es… - the best thing is…
lo peor es… - the worst thing is…
lo más importante es… - the most important thing is…
lo menos importante es… - the least important thing is…
lo que me interesa es… - what interests me is…

**** see also opinion phrases in other units (I like etc)**

Frequency

generalmente - generally
normalmente - normally
siempre - always
a veces - sometimes
cada día - every day
a menudo - often
todos los días - every day
de vez en cuando - from time to time
(casi) nunca - (almost) never
en mi tiempo libre - in my free time
el fin de semana - at the weekend
una vez a la semana - once a week

Comparatives and Superlatives

es más (importante) que - it's more (important) than
es menos (importante) que - it's less (important) than
Es tan (importante) como… - it's as (important) as…
El/la mejor – the best
El/la peor – the worst
El/la más (importante)… - the most (important)…
El/la peor (importante)… - the least (important)…

Exclamations

¡Qué horror! How horrible!
¡Qué bien! Great!
¡Qué chulo! Cool!
¡Qué guay! How cool!
¡Ni en broma! No way!
¡Qué lastima! - What a shame!
¡Qué rollo! - What a pain/bore!
¡Qué desastre! - What a disaster!
¡Qué asco! - How disgusting!

Time fillers

a, sí, sí - yes, yes
ya - yeah
bueno - well
pues - so
a ver - let's see
plural déjame pensar - let me think

Sequencers

por la mañana - in the morning
por la tarde - in the afternoon
por la noche - in the evening
primero - firstly
luego - then
después - next
por fin - at last
finalmente - finally
el primer día - the first day
más tarde - later
antes - before
después - after
para empezar - to begin

Agreeing/disagreeing

claro que sí/no - of course (not)
opino lo mismo - I think the same
es cierto - it's certain
¿Estás loco/a? - Are you mad?
(no) tienes razón - you're right, wrong
(no) estoy de acuerdo - I (dis)agree
comparto tu punto de vista - I share your point of view
también me parece que - it also seems to me that
tampoco me parece que - neither does it seem to me that
te equivocas - you're wrong/mistaken
Por un lado…por otro lado - on the one hand… on the other hand

Justifying opinions

porque (no) es… - because it is (not)
ya que es - as it is
dado que es - given that it is
puesto que es - since it is
según (mis padres) es… - according to (my parents) it is…
parece - it seems
debido a - due to
a causa de - because of
una ventaja es - an advantage is…

Time markers

El presente
el lunes - on Monday
los jueves - on Thursdays
ahora - now
hoy - today
hoy en día - nowadays
El pasado
ayer - yesterday
anoche - last night
la semana pasada - last week
en aquella época - in that time
desde/hace dos años - two years ago
cuando tenía cinco años - when I was 5 years old
El futuro
mañana - tomorrow
en el futuro - in the future
el fin de semana próximo - next weekend
El año que viene - next year
dentro de seis meses - in six months' time

Questions

¿Qué? - What?
¿Quién? - Who?
¿(A)dónde? - Where (to)?
¿Cómo? - How?
¿Cuál? - Which?
¿Cuándo? - When?
¿Por qué? - Why?
¿A qué hora? - At what time?
¿Qué piensas de..? - What do you think about..?
¿Cuál es tu opinión? - What is your opinion?
¿Cuál es la diferencia? - What is the difference?
¿Qué hay? - What is there?
¿Por qué dijiste eso? - Why did you say that?

Impressive Phrases

Si fuera rico/a me gustaría (visitar)… If I were rich I would like (to visit)
Si tuviera la oportunidad me gustaría (ir)… If I had the oppurtunity I would like (to go)
Cuando sea mayor + future…- when I am older

Relationships

La familia	Family
Mi/mis	My
Su/sus	His/her
Padre	Father
Madre	Mother
Padrastro	Step-father
Madrastra	Step-mother
Hermano	Brother
Hermana	Sister
Hermanastro	Step-brother
Hermanastra	Step-sister
Abuelo	Grandfather
Abuela	Grandmother
Tío	Uncle
Tía	Aunt
Primo	Male cousin
Prima	Female cousin
Sobrino	Nephew
Sobrina	Niece
Marido	Husband
Mujer	Wife
Hijo	Son
Hija	Daughter
Nieto	Grandson
Nieta	Granddaughter
Mayor / menor	Older / younger

¿Con qué frecuencia..?	How often…?
Todos los días	Every day
Todos los sábados	On Saturdays
Los fines de semana	On a weekend
A menudo	Often
De vez en cuando	From time to time
Una vez a la semana	Once a week
Dos veces al mes	Twice a month
Una vez al año	Once a year
Rara vez	Rarely
Casi nunca	Almost never
Nunca	Never

¿Cómo es? What is he/she like?	
Tiene los ojos…	He/she has… eyes
Azules	Blue
Verdes	Green
Marrones	Brown
Grises	Grey
Grandes	Big
Pequeños	Small
Tiene el pelo…	He/she has… hair
Moreno	Dark-brown
Castaño	Mid-brown, chestnut
Rubio	Blond
Rojo	Red
Corto	Short
Largo	Long
Rizado	Curly
Liso	Straight
Ondulado	Wavy
Tiene…	He/she has…
Pecas	Freckles
Lleva…	He/she wears…
Gafas	Glasses
Barba	A beard
Bigote	A moustache
Es…	He/she is…
Alto/a	Tall
Bajo/a	Short
Delgado/a	Slim
Gordito/a	Chubby
Gordo/a	Fat
Calvo/a	Bald
Moreno/a	Dark-haired
Rubio/a	Fair-haired
Castaño/a	Brown-haired
Pelirrojo/a	Red-haired
No es ni gordo/a	He/she is neither
Ni delgado/a	Fat nor thin

¿Cómo es de carácter?	What is he/she like as a person?
Como persona, es…	As a person, he/she is…
Optimista	Optimistic
Pesimista	Pessimistic
Trabajador(a)	Hard-working
Perezoso/a	Lazy
Hablador(a)	Chatty
Tímido/a	Shy
Divertido/a	Fun
Serio/a	Serious
Gracioso/a	Funny
Generoso/a	Generous
Fiel	Loyal
Molesto/a	Annoying
Travieso/a	Naughty
Estricto/a	Strict
Malhumorado/a	Bad tempered/moody
Cariñoso/a	Loving/affectionate
Alegre	Cheerful
Enérgico/a	Energetic
Animado/a	Lively
Pensativo/a	Thoughtful
Egoísta	Selfish
Comprensivo/a	Understanding

¿Cómo sería tu novio/a/pareja ideal?	What would your ideal boy / girlfriend / partner be like?
Mi (pareja) ideal…	My ideal (partner)…
(No) sería…	Would(n't) be
(No) tendría…	Would(n't) have…
Sería alguién que…	Would be someone who…

+ Information from descriptions boxes on this page (physical appearance and personality)

En el futuro, ¿te gustaría casarte/ tener una familia?	In the future would you like to get married/ have a family?
(No) me gustaría casarme	I would(n't) like to get married
(No) me gustaría tener niños	I would(n't) like to have children
Sería	I/it/he/she would be
Tendría	I/it/he/she would have
Enamorarme	To fall in love
Comprometerme	To get engaged
Casarme	To get married
Conocer	To meet/get to know
Estar…	To be…
Casado/a	Married
Separado/a	Separated
Soltero/a	Single
Divorciado/a	Divorced

¿Te llevas bien con tu familia y tus amigos?	Do you get on well with your family and friends?
Me llevo bien con…	I get on well with…
No me llevo bien con…	I don't get on well with…
Me divierto con…	I have a good time with…
Me peleo con…	I argue with…
¿Cómo es un buen amigo / una buena amiga?	What is a good friend like?
Un buen amigo / una buena amiga es alguien que…	A good friend is someone who…
Te ayuda	Helps you
Te apoya	Supports you
Te conoce bien	Knows you well
Te acepta	Accepts you
Te hace reír	Makes you laugh
Te dice la verdad	Tells you the truth
Conocí a…	I met…
Mi mejor amigo/a	My best friend
Hace (cuatro) años	(Four) years ago
Tenemos mucho en común	We have a lot in common

¿Qué aplicaciones usas?	What apps do you use?
Uso… para…	I use… (in order) to…
Subir y ver vídeos/ películas	Upload and watch videos/films
Compartir fotos/videos	Share photos/videos
Pasar el tiempo	Pass the time
Organizar las salidas con mis amigos	Organise to go out with friends
Contactar con mi familia	Contact my family
Descargar música	Download music
Chatear	Chat
Aprender idiomas	Learn languages
Controlar mi actividad física	Monitor my physical activity
Hacer mis deberes	Do my homework
Es / no es…	It is / it isn't…
Cómodo/a	Handy / convenient
Divertido/a	Fun
Peligroso/a	Dangerous
Práctico/a	Practical
Rápido/a	Quick
Fácil de usar	Easy to use
Popular	Popular
Útil	Useful
Gratis	Free
Adictivo/a	Addictive
Mi red social preferida	My favourite social network
Una pérdida de tiempo	A waste of time
La mejor app	The best app
Estoy enganchado/a a…	I am hooked on…

Use the vocabulary and the grammar pages to write as much as you can for the following:
- A description of your family (real or imaginary)
- A description of one member of your family
- What a good friend is
- What you do with family/friends in your free time
- What technology you use
- What you did last weekend
- What you used to do when you were little
- What your relationship plans/hopes are for the future
- What your ideal partner would be like

Use the PINAFORES checklist to see how you could extend and improve your responses.

¿Qué haces (con tu familia/ amigos)?	What do you do (with family/ Friends)?
Cuando tengo tiempo…	When I have time…
Después del insti…	After school…
Los fines de semana…	At weekends…
Los (lunes)…	On (Mondays)…
Por la mañana / tarde…	In the morning / afternoon /
Por la noche…	At night…
Cocino	I cook
Juego al futbolín / al squash	I play table football / squash
Monto en bici / monopatín	I ride my bike / skateboard
Toco la guitarra / la trompeta	I play the guitar / trumpet
Voy / vamos…	I go / we go…
Al polideportivo / al centro comercial / a la pista de hielo / a la bolera	To the sports centre / to the shopping centre / to the ice rink / to the bowling alley
Suelo…	I tend to / I usually…
Descansar	Rest
Escuchar música / la radio	Listen to music / the radio
Hacer deporte	Do sport
Ir al cine	Go to the cinema
Leer libros / revistas / periódicos	Read books / magazines / newspapers
Salir con amigos	Go out with friends
Usar el ordenador	Use the computer
Ver la tele	Watch TV
Es divertido / sano	It's fun / healthy
Soy…	I am…
Activo/a / creativo/a	Active / creative
Sociable / adicto/a a…	Sociable / addicted to…
Me hace reír / relajarme	It makes me laugh / relax
Necesito estar…	I need to be…
Al aire libre	Outdoors
En contacto con otra gente	In contact with other people

Checklist - PINAFORES
Past
Impressive language
Now/**N**ormally
Adjective*s (more than 1)*
Future
Opinion*s (more than 1)*
Reason*s (more than 1)*
Exclamations
Someone else

¿Qué hacías (cuando eras pequeño/a?	What did you used to do when you were little?
Cuando era más joven…	When I was younger…
Jugaba	I used to play
Leía	I used to read
Veía	I used to watch
Salía	I used to go out
Escuchaba	I used to listen (to)
Tocaba	I used to play (instrument)
Hacía	I used to do/make
Iba	I used to go
Antes era…	Before I used to be…
Ahora soy…	Now I am…
(Bastante / muy) deportista	(Quite / very) sporty
Miembro de un club / un equipo	A member of a club / a team
Aficionado/a de…	A fan of…
Un(a) fanático/a de…	A… fanatic
Jugaba al…	I used to play…
Baloncesto / balonmano	Basketball / handball
Críquet / fútbol	Cricket / football
Hockey / ping-pong	Hockey / table tennis
Rugby / tenis / voleibol	Rugby / tennis / volleyball
Hago…	I do…
Hice…	I did…
Hacía…	I used to do…
Atletismo / ciclismo	Athletics / cycling
Equitación / escalada	Horseriding / climbing
Gimnasia / judo	Gymnastics / judo
Kárate / natación	Karate / swimming
Patinaje sobre hielo	Ice skating
Piragüismo	Canoeing
Ya no (juego)… (I)	no longer (play)…
Entreno	I train
Ayer / esta mañana…	Yesterday / this morning…

El fin de semana pasado…	Last weekend…
Usé	I used
Jugué	I played
Fui a	I went to
Visité	I visited
Fue/era	It was

See the grammar pages for a reminder on how to form the preterite tense.

Festivals and Traditions

La comida	Food
El desayuno	Breakfast
La comida / el almuerzo	Lunch
La merienda	Tea (meal)
La cena	Dinner / evening meal
Desayunar	To have breakfast
Comer	To have lunch
Merendar	To have tea
Cenar	To have dinner
Tomar	To have (food / drink)
Desayuno…	I have breakfast…
Temprano / tarde	Early / late
A las…	At… (time)
Desayuno / como…	For breakfast / lunch I have…
Meriendo / ceno…	For tea/evening meal I have…
Huevos	Eggs
Un yogur	A yogurt
Un pastel	A cake
Un bocadillo	A sandwich
Una hamburguesa	A hamburger
Bistec	Steak
Café /té/chocolate	Coffee/tea/chocolate
Una infusión	Herbal tea
Chorizo	Spicy chorizo sausage
Marisco	Seafood
Pescado	Fish
Pollo	Chicken
Un zumo de naranja	An orange juice
Carne	Meat
Ensalada	Salad
Fruta	Fruit
Leche	Milk
Sopa	Soup
Tortilla	Omelette
Cereales	Cereals
Churros	Fried doughnut sticks
Galletas	Biscuits
Patatas fritas	Chips
Tostadas	Toast
Verduras	Vegetables
(No) tengo hambre.	I'm (not) hungry.
(No) tengo sed.	I'm (not) thirsty.
Es / son…	It is / they are…
Picante(s) / rico/a(s)	Spicy / delicious
(Mal)sanos/a(s)	(Un)healthy

Mi plato favorito	My favourite dish
Me gustaría probar…	I would like to try…
La paella	A Spanish rice dish
La tortilla española	Potato omelette
Tapas	Tapas
El gazpachlo	Cold tomato soup
Los calamares	Squid (often in rings)
Es un plato típico de…	It's a typical dish from…
Contiene(n)…	It contains / they contain…
Aceite de oliva	Olive oil
Ajo	Garlic
Arroz	Rice
Azúcar	Sugar
Pan	Bread
Queso	Cheese
Cerveza	Beer
Vino (blanco/tinto)	(White/red) wine
Carne de cerdo / cordero / ternera	Pork / lamb / beef
Harina	Flour
Mantequilla	Butter
Guisantes	Peas
Pepinos	Cucumbers
Pimientos	Peppers
Plátanos	Bananas
Refrescos	Fizzy drinks
Tomates	Tomatoes
Cebollas	Onions
Judías (verdes)	(Green) beans
Manzanas	Apples
Naranjas	Oranges
Salchichas	Sausages
Zanahorias	Carrots

Una fiesta o día especial en el pasado	A festival or special day in the past
Un día especial	A special day
Una fiesta que visitaste	A festival that I visited
Fui	I went
Visité	I visited
Vi	I saw/watched
Fue/era	It was
Comí	I ate
Bebí	I drank
Salí	I went out

(See also the *preterite tense* on the grammar pages for how to use other verbs and talk about other people in the past).

Festivales y celebraciones	Festivals and celebrations
La navidad	Christmas
La semana santa	Holy week (Easter week)
El día de los muertos	The Day of the Dead
La tomatina	A tomato-throwing festival
Los sanfermines	A bull-running festival
Mi cumpleaños	My birthday
Una tradición	A tradition
Una fiesta	A party/festival
Un festival	A festival
Correr	To run
Comer	To eat
Visitar	To visit
Hacer	To do/make
Participar	To participate
Beber	To drink
Disfrazarse	To dress up
Lanzar	To throw
Ver	To see/watch
Llevar	To wear
Celebrar	To celebrate
Ir	To go
Disparar	To throw
Quemar	To burn
Salir	To go out
Bailar	To dance
Cantar	To sing
Fuegos artificiales	Fireworks
Regalos	Gifts
Fiestas	Parties
Desfiles	Processions/parades
Una batalla	A battle
El encierro	The bull run
Una corrida de toros	A bull fight
La calle	The street

Narrating an event in the past

You need to use the preterite tense to describe what happened but you should also use sequencers (words that put events in an order).

El primer día	(On) the first day
Otro día	Another day
El ultimo día	(On) the last day
El lunes	On (the) Monday
Primero	Firstly
Luego	Then
Después	Afterwards
Más tarde	Later

Festivals and Traditions

Mi rutina diaria	My daily routine
Me levanto	I get up
Me ducho	I have a shower
Me afeito	I have a shave
Me visto	I get dressed
Me lavo los dientes	I clean my teeth
Me acuesto	I go to bed
Salgo de casa	I leave home
Vuelvo a casa	I return home
Temprano	Early
Tarde	Late
Enseguida	Straight away
A veces	Sometimes
De vez en cuando	From time to time
Cada día	Each/every day

La Tomatina

This festival takes place in Buñol near Valencia. It takes place on the last Wednesday in August. It starts at 10am with the 'Palo Jabón', a greased pole with a ham at the top that people try to climb to get the ham! Trucks then arrive full of tomatoes and the people have a huge tomato fight in the street. At exactly 11am it finishes and the fire brigade arrive to clean up the streets and the people! There are a few rules that you must follow: squash the tomatoes before throwing them, only throw tomatoes, wear eye protection and wear clothes that you don't mind getting ruined!

Have a look for Tio Spanish on YouTube for some short videos about these and other well-known festivals!

¿Cómo se compara con (las tradiciones en tu país)? **How does it compare with traditions in your country?**

You can change the verbs from the 'festivals and celebrations' box to the 'we' and 'they' form to describe what we do here and what they do in Spain/another Spanish-speaking country during different celebrations. You need to change the endings using this table:

	We (nosotros)	They (ellos)
-ar verbs	- amos	- an
-er verbs	- emos	- en
-ir verbs	- imos	- en

Ejemplo: com**emos** (**we** eat), com**en** (**they** eat)
Have a go at changing some of the verbs from the 'festivals and traditions' box above to the 'we' or 'they' form. Can you add any extra detail to the sentences (ejemplo – comemos pavo – we eat turkey, comen pescado – they eat fish)? You can also use **comparatives** and **superlatives** to give your opinions about the differences and similarities – see the information on the grammar/key vocab pages.

El Día de los Muertos

This Mexican festival takes place on 1st and 2nd November and is a happy celebration to honour ancestors and family members who have died. The souls of the dead come back to visit and families go to graves with picnics and there are musicians playing and offerings laid on the graves. They also have altars in their houses to remember the dead. Pan de Muerto (a sweet bread) and Calaveritas de azúcar (sugar schools) are traditional foods. People also dress up. Some good films to watch about this are **'The Book of Life'** and **'Coco'**.

¿Qué festival te gustaría visitar?	What festival would you like to visit?
Me gustaría ver/visitar…	I'd like to see/visit…
Si fuera rico/a iría a (méxico).	If I were rich I would go to (Mexico).
Me gustaría ir a la fiesta 'el día de los muertos'.	I would like to go to the 'Day of the Dead' festival
Si tuviera la oportunidad me encantaría ir a La Tomatina.	If I had the opportunity I would love to go to La Tomatina.
Cuando sea mayor visitaré…	When I am older I will visit…
Porque/dado que/ya que	Because/as…
Sería…	It would be
Parece…	It seems
Interesante	Interesting
Bonito	Beautiful
Precioso	Beautiful
Emocionante	Exciting
Animado	Lively
Guay	Cool
Impresionante	Impressive
Entretenido	Entertaining
Fascinante	Fascinating
Maravilloso	Marvellous
Pero pienso que es/puede ser…	But I think that it is/can be…
Peligroso	Dangerous
Cruel	Cruel
Ruidoso	Noisy
Aburrido	Boring
Horroroso	Awful
Caro	Expensive
Asqueroso	Disgusting
Una tontería	Nonsense
Una perdida de tiempo	A waste of time
Una perdida de dinero	A waste of money
Me gustaría ver/participar en…	I would like to see/take part in…
Ya no (juego)…	(I) no longer (play)…
Entreno	I train
Ayer / esta mañana…	Yesterday / this morning…

Los sanfermines

This famous and controversial festival takes place in Pamplona for the festival of San Fermín from 6th -14th July. The most famous part of the festival is the daily bullrun (el encierro) where lots of people run through the streets with the bulls to the bullring. It can be dangerous! It is traditional to wear white with a red neckerchief. There are processions, music and other celebrations throughout the week. At the end of the week's celebrations they sing the traditional song 'Pobre de Mí'.

Notes

Notes

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