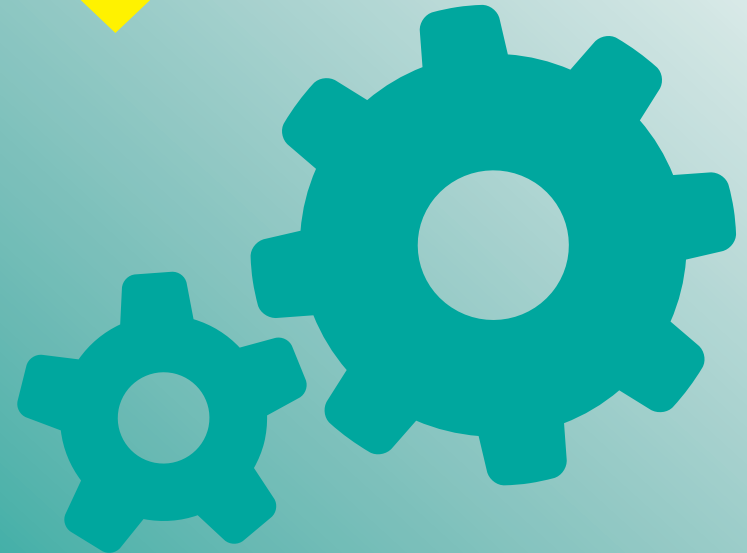# Hartford Church of England High School
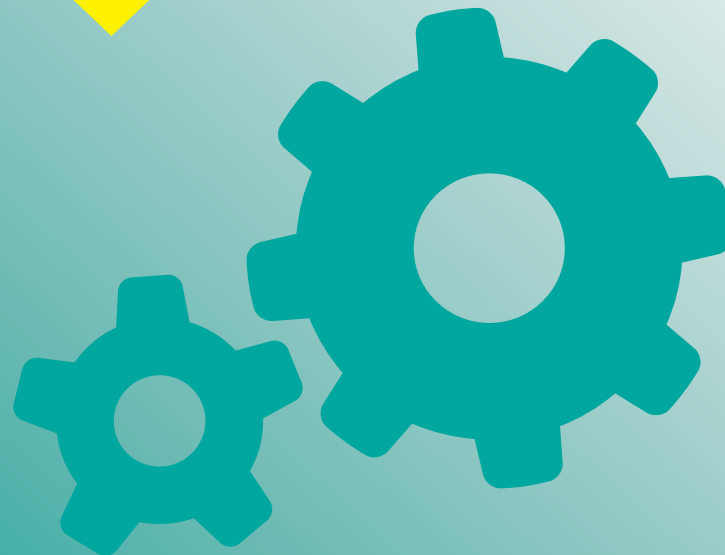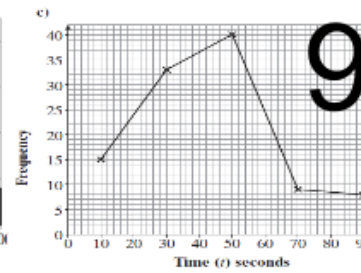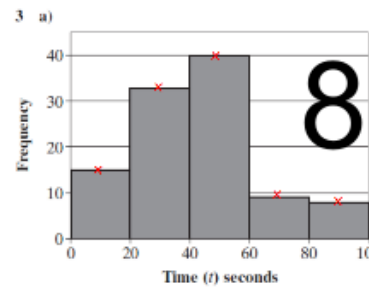
CARITAS ET VERITAS

Year 10
Knowledge
Organiser

Contents

Maths
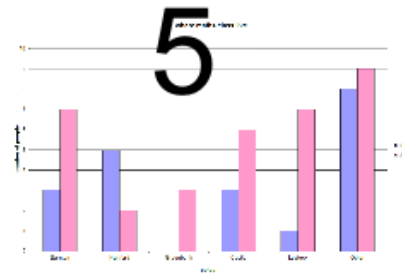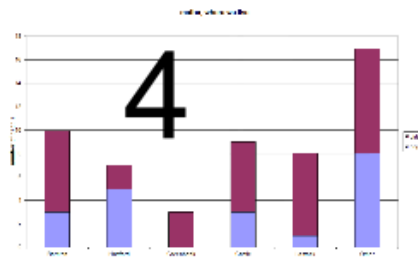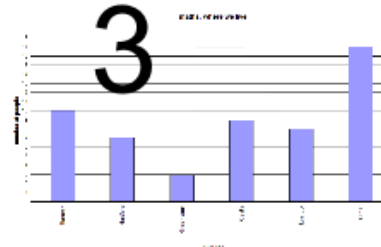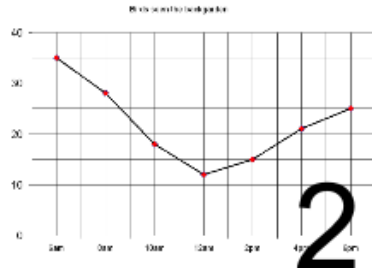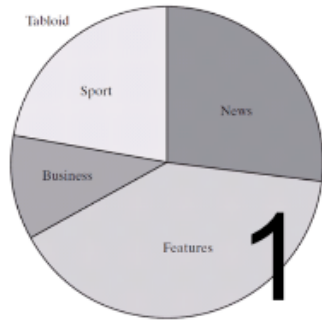
	Chart
1	Pie Chart
2	Time Series
3	Bar Chart
4	Composite Bar
5	Comparative (Dual) Bar Chart
6	Pictogram
7	Stem and Leaf
8	Histogram
9	Frequency Polygon

Calculating Basic Probability:

$$P(event) = \frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$$
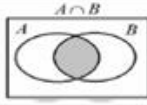
$$P(event \textbf{ not } happening) = 1 - P(event \ happening).$$

$$P(rolling\ a\ 6) = \frac{1}{6}$$

$$P(not\ rolling\ a\ 6) = 1 - \frac{1}{6} = \frac{5}{6}$$

Key Word	Definition / Rule	Example
Probability	Used to describe the chance of something happening.	The probability it will rain this month is very high
Probability scale	All probabilities lie between 0 and 1	0 ... 0.5 ... 1 / Impossible Evens Certain

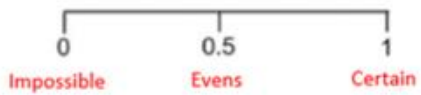| Key Word	Definition / Rule	Example
Sample space	In the space diagram …. P(4) = 3/16 There are three ways of getting a number 4 from a possible 16 outcomes	× 1 2 3 4 1 1 2 3 4 2 2 4 6 8 3 3 6 9 12 4 4 8 12 16
Venn Diagrams	Outcomes are listed inside each circle – This venn diagram shows outcomes that fulfil set A and set B – the intersection	$A \cap B$
Tree diagrams	These help determine probabilities from INDEPENDENT events – we MULTIPLY outcomes as we move from left to right	

Key Word	Definition / Rule	Example
Theoretical probability	Theoretical probabilities predict what SHOULD happen – It can be expressed as a fraction / decimal / percentage	1 A 2 B 3 C 4 D 5 E P(picking number) = 3/10 (0.3 or 30%) P(picking a vowel) = 2/10 (0.2 or 20%)
Experimental probability	Experimental probabilities are based on the results of an experiment	I survey 100 cars and 24 of them are blue. The experimental probability of the next car being blue is 24/100 (24%).
Independent event	When the probability of one event does not depend on the outcome of another event	Rolling a 6 on a dice does not change the probability of a coin landing on heads or tails
Dependent event	When the probability of one even depends on the outcome of another event.	If you miss the bus, the probability of being late for school increases.

Maths - Higher

Straight Line Graphs

Straight Line Graphs	
Equation of a line	$y = mx + c$
m	Gradient
c	y-intercept
Calculating Gradient	$\dfrac{change\ in\ y}{change\ in\ x}$
Parallel lines…	… have the same gradient
Perpendicular lines…	… have gradients that are the negative reciprocal of each other

Sketching Quadratics

Sketching Quadratics	
$x\ intercept$	Set y = 0 and solve the quadratic equation.
$y\ intercept$	Set $x = 0$ and solve to find the y coordinate.
$Turning\ Point$	Write the equation in completed square form i.e. $(x + p)^2 + q$. The coordinates of the turning point are $(-p, q)$.

EXTRAS
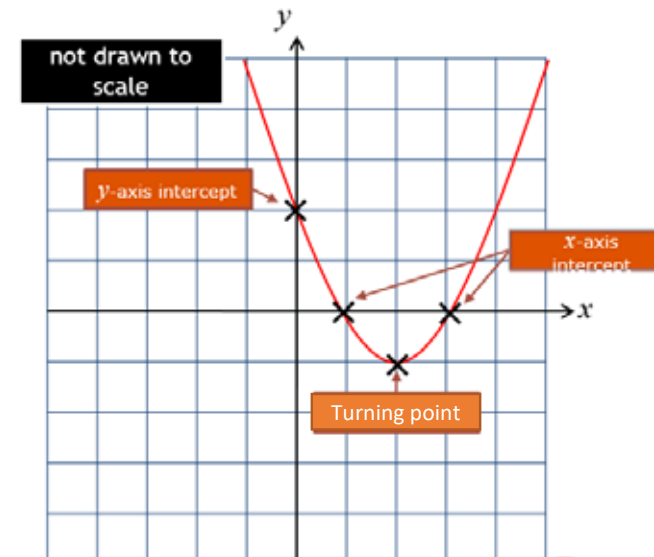
Type	Equation types	Key features	Possible shapes
Linear	$y = mx + c$	▪ straight line shape ▪ m is the gradient ▪ c is the y-intercept	
Quadratic	$y = ax^2 + bx + c$	▪ u shape if **a** is +ve ▪ n shape if **a** is -ve ▪ can have up to 2 roots	
Cubic	$y = x^3$ $y = ax^3 + bx^2 + cx + d$	▪ goes up first if **a** is +ve ▪ goes down first if **a** is –ve ▪ can have up to 3 roots ▪ can have up to 2 turning points	
Reciprocal	$y = \dfrac{a}{x}$	▪ has 2 asymptotes has curves in the … ▪ 1st and 3rd quadrant if a is +ve ▪ 2nd and 4th quadrant if a is -ve	
Circular	$x^2 + y^2 = r^2$	▪ has a centre at (0, 0) ▪ has a radius of **r** units	
Exponential	$y = a^x$	▪ increasing when x is +ve ▪ decreasing when x is -ve ▪ passes through (0 , 1) ▪ asymptote at the x axis	
Trig	$y = \sin x$ $y = \cos x$ $y = \tan x$	▪ sin starts at (0, 0) ▪ cos starts at (0, 1) ▪ both repeat every 360° ▪ tan has asymptotes	

English

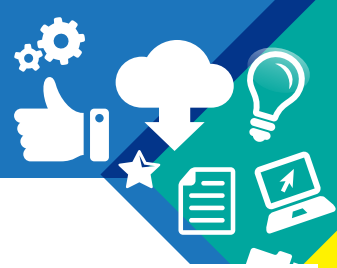| Poem	Content and Meaning
Ozymandias 1819	A traveler tells the poet that two huge stone legs stand in the desert. Near them on the sand lies a damaged stone head. The face is distinguished by a frown and a sneer which the sculptor carved on the features. On the pedestal are inscribed the words "My name is Ozymandias, king of kings: / Look on my works, ye Mighty, and despair!" Around the huge fragments stretches the empty desert.
London 1792	The speaker wanders through the streets of London and comments on his observations. He sees despair in the faces of the people he meets and hears fears and repression in their voices. The woeful cry of the chimney-sweeper stands as a criticism to the Church, and the blood of a soldier is seen to be staining the walls of a palace. The night time is just as harrowing; the cursing of prostitutes corrupts the babies and tarnishes marriage and death.
The Prelude 1799	The poet describes how as a youth he stole a boat and rowed one night across a lake. At the climax of this experience, he imagined that a mountain peak beyond the lake became a presence which reared up and menaced him because of his misdeed in taking the boat. He confides that for some time thereafter he struggled with the idea that nature has the capacity to torment mankind in such a way. The experience gives him a new respect for nature.
My Last Duchess 1842	The poem is based on Alfonso, the Duke of Ferrara, from the 16th century. The Duke is the speaker of the poem and tells us he is entertaining a messenger who has come to negotiate the Duke's marriage to the daughter of another powerful family (he has recently been widowed). As he shows the visitor through his palace, he stops before a portrait of his late Duchess. The Duke begins reminiscing about the painting sessions and then about the Duchess herself. He then talks about her disgraceful behaviour as he claims she flirted with everyone and did not appreciate him. As the monologue continues, the Duke reveals that he is the one responsible for the Duchess' death, after this, he returns to the business of arranging another marriage.
Charge of the Light Brigade 1854	The poem tells the story of the failed charge of the British cavalry in the Battle of Balaklava in October 1854. Britain was fighting against Russian forces in the Crimean War. A cavalry group (soldiers on horses), the Light Brigade, was ordered to charge down a narrow valley straight into the fire of Russian cannons. It was a huge catastrophe and 150 soldiers died. The men were respected for following orders, even though they knew they may be wrong but the disaster caused public outrage as the British public began to question the politicians and generals who led them.
Exposure 1917	The poem focuses on the misery felt by World War One soldiers waiting overnight in the trenches. Although nothing is happening and there is no fighting, there is still danger because they are exposed to the extreme cold and their wait through the night is terrifying. The speaker describes the trauma of living and struggling in such poor conditions; there is a sense of despair and of lost hope. If being 'exposed' to gunfire does not kill them, then exposure to the brutal weather conditions might do. Alongside the more obvious meanings of the title, there is also the idea that Owen has set out to expose the conditions the soldiers have experienced to the world and in doing so expose the government's negligence of the soldiers' situation.
Storm on the Island	Storm On The Island is a poem that can be taken literally, as a dramatic monologue on the life and attitude of island people facing a storm, or it can be understood as an extended metaphor of political struggle on the island of Ireland.
Bayonet Charge 1957	The poem depicts the thoughts and feelings of an inexperienced soldier as he makes his way across no-man's land in pursuit of attacking the enemy. On his journey, he sees how not only is humanity destroyed by war, but also nature – suggesting that the effects of war are universal and impacts both far and wide.
Remains 2008	The poem focuses on a soldier who is haunted by a violent memory of being at war. He tells how he and his comrades opened fire on a looter who may or may not have been armed, and they shot him dead. Later the soldier thinks about the shooting every time he walks down the street. Then later again, when he returns home he is still haunted by the thought of what he has done. He tries drink and drugs to drown out the memory, but they do not work. The final lines show that the memory was not left behind in the place of war in a distant land, but is with the speaker all the time.
Poppies 2009	The poem is about the grief a mother experiences, particularly when her son goes to fight at war. The mother expresses her feelings at different moments of her son's life: when he is young, when the son leaves to go to war and finally the death of her son.
War Photographer 1985	Duffy's poem is about how we deal with the suffering of others, who might be faraway. It takes the character of a war photographer to represent someone more involved and committed than we in the western world are. The photographer finds it difficult to have to record the harrowing events of war, without actually being able to help those who he takes the photograph of. Duffy provokes us to consider our own response when confronted with the photographs that we regularly see in our newspaper supplements, and why so many of us have become desensitised to these images.
Tissue 2006	The poem explores the conflicts and troubles of the modern world; destruction, religion, war and politics, money and wealth. The poem remarks on how nothing is meant to last, that it would be better not to hold too tightly to ideas/ buildings/ societal structures that have not been questioned for a long time, and instead we should be willing to let go and pass things on in their time to be remade.
The Emigree	A displaced person pictures the country and the city where he or she was born. However, Rumens suggests it may now be war-torn, or under the control of a dictatorial government that has banned the language the speaker once knew. Despite this, nothing shakes the light-filled impression of a perfect place that the their childhood memories have left. This shows the power that places can have, even over people who have left them long ago and who have never revisited since.
Checking Out Me History	This poem is an expression of the anger and the frustration that Agard feels about the British education system and the way he feels as though he has not been taught nor exposed to the history of his own culture. He suggests that he feels ignorant of his own background and identity as white history is prioritised in the history teaching of schools.
Kamikaze	The poem is set around the events of a kamikaze pilot flying to war and then turning back before it was too late. Kamikaze pilots were expected to use up all their weapons and then suicide by flying into their targets as a final act of destruction. It was considered a great honour in Japan to die for your country.

Poem	Context
Ozymandias 1819	The poem was inspired by the unearthing of part of a large statue of the Egyptian Pharoah, Ramesses II. The Egyptian Pharaohs like Ramesses believed themselves to be gods in mortal form and that their legacy would last forever. Shelley was critical of the monarchy and government in England and sympathised with the ideas behind the French Revolution (rebelling against those who were born into positions of authority). 'Ozymandias' can be read as a criticism of undemocratic or tyrannical governments, reflecting Shelley's socialist views.
London 1792	The poem is set during the Georgian era in England where there was a huge disparity between the rich and poor and child labour was common. Women had few rights, death rates from disease and malnutrition were high and the industrial revolution has resulted in many oppressive factories in which poorer members of society were desperate to work (in order to escape poverty) but the conditions were terrible and they were not paid adequately. During the late eighteenth century the French Revolution (a rebellion against those who were born into positions of authority) was taking place, and a sense of uprising against authority was spreading. Blake openly supported this.
The Prelude 1799	Wordsworth was part of the Romantic movement which means that he believed that nature ought to be respected above all else and that man's curiosity should be discouraged as it risked ruining the purity and beauty of nature. Wordsworth believed that, upon being born, human beings move from a perfect, idealised state into the imperfect, un-ideal earth. He believed that humans should connect to their natural surroundings in order to discover their true, uncorrupted selves.
My Last Duchess 1842	This poem is based on historical events. Duke Alfonso II of Modena and Ferrara (1559–1597) married Lucrezia de'Medici in June 1558. She was the first of his three wives and is believed to be 'the last duchess' of the poem. She died four years after her wedding. During the Victorian era, the idea was that upper and middle class women had to stay dependent on a man: first as a daughter and later as a wife. Once married, it was extremely difficult for a woman to obtain a divorce. Men the right to divorce their wives on the grounds of adultery. However, married women were not able to obtain a divorce if they discovered that their husbands had been unfaithful. Although institutions were set up during the Victorian era to help victims of domestic violence, physical force between husbands and wives was worryingly common during this period.
Charge of the Light Brigade 1854	The poem tells the story of the failed charge of the British cavalry in the Battle of Balaklava in October 1854. Britain was fighting against Russian forces in the Crimean War. A cavalry group (soldiers on horses) , the Light Brigade, was ordered to charge down a narrow valley straight into the fire of Russian cannons. It was a huge catastrophe and 150 soldiers died. The men were respected for following orders, even though they knew they may be wrong but the disaster caused public outrage as the British public began to question the politicians and generals who led them.
Exposure 1917	Wilfred Owen was a soldier and officer in World War 1. He died just a week before the end of the war but during his time he saw the full horror of conditions on the front line and he felt angry at the way that young men had been deceived into fighting in such terrible conditions. World War One began in 1914 and at first it was predicted that it would end swiftly. However, the war went on for much longer and during the winter of 1917 both sides had sustained massive losses and extreme cold weather made the misery even worse. It was said to be the coldest winter in living memory. As a result ofliving in the trenches, soldiers suffered from hypothermia and frostbite and many developed trench foot (a crippling disease caused by feet being wet and cold and confined in boots for days on end).
Storm on the Island	Seamus Heaney was a poet in Ireland, he grew up in a farming community and he uses a large number of agricultural and natural images in his work as metaphors for human nature. The poem is set around a story of a small isolated cottage near the sea in a storm and the exposure to the elements. The violence of the storm in the poem could also be a metaphor for the Troubles which was a series of conflicts between Ireland and Britain.
Bayonet Charge 1957	This poem was heavily influenced by the fact that Hughes' father was a veteran of the First World War. The poem outlines the horrific conditions that soldiers experienced on the battle field in WW1. Particularly at the start of the war when a consistent training programme had yet to be put in place, some soldiers were sent to battle with very limited training. Hughes also explores the idea that many soldiers were conscripted (they were legally obliged to go) to fight in WW1 and therefore did not always understand or support what they were fighting for.
Remains 2008	Armitage made a film and a collection of poems called 'The Not Dead'. In preparation for this work, he interviewed veteran soldiers of different wars, including the Gulf War. The reference to 'desert sand' in this poem suggests that it reflects the experiences of soldiers in the Gulf War. Armitage made the series to highlight the plight of soldiers suffering from Post Traumatic Stress Disorder. Today, veterans of any nation still have the highest rate of suicide among the general populace and Armitage wanted to highlight that soldiers suffer long after their service ends.
Poppies 2009	Weir's poem 'Poppies' was commissioned as part of a collection of modern war poems which were published in the Guardian in 2009, as part of a response to the escalating conflict in Afghanistan and the Iraq inquiry. Weir commented, 'I wrote the piece from a woman's perspective, which is quite rare, as most poets who write about war have been men. As the mother of two teenage boys, I tried to put across how I might feel if they were fighting in a war zone.'
War Photographer 1985	Duffy was inspired to write this poem by her friendship with a war photographer. She was especially intrigued by the strange challenge faced by these people whose job requires them to record terrible events without being able to directly help their subjects. Throughout the poem, Duffy encourages the reader to consider our own response when confronted with the photographs that we regularly see in our newspaper supplements, and why so many of us have become desensitised to these images. The 'children running in a nightmare heat' is based on an iconic image of a girl running away from a napalm attack on her village.
Tissue 2006	The poem explores the conflicts and troubles of the modern world; destruction, religion, war and politics, money and wealth. The poem remarks on how nothing is meant to last, that it would be better not to hold too tightly to ideas/ buildings/ societal structures that have not been questioned for a long time, and instead we should be willing to let go and pass things on in their time to be remade.
The Emigree	Emigrants are people who have left the country of their birth to settle elsewhere in the world. Neither the city nor the country left behind is ever named in the poem and this lack of specific detail seems intentional- Rumens wants her poem to be relevant to as many people who have left their homelands as possible. Rumens suggests the city and country may now be war-torn, or under the control of a **dictatorial** government that has banned the language the speaker once knew.
Checking Out Me History	Agard suggests that that because black history and experience is often ignored and forgotten in British history, what is taught in schools is very limited. Agard highlights the importance of recognising the social and historical achievements of black people in order to develop a personal identity that reflects his cultural and racial roots. Agard explores colonialist attitudes towards the way in which history is taught.
Kamikaze	The poem is set around the events of a kamikaze pilot flying to war and then turning back before it was too late. Kamikaze pilots were expected to use up all their weapons and then suicide by flying into their targets as a final act of destruction. It was considered a great honour in Japan to die for your country.

English

Language Techniques	Definition	Example
Symbolism	When an object represents an idea that is much deeper and more significant.	'Later a single dove flew from the pear tree'
Personification	Describing an inanimate object as having human feelings.	'My city takes me dancing through the city of walls'
Metaphor	A descriptive technique that names a person, thing or action as something else.	'The mind-forged manacles I hear'
Simile	A descriptive technique that compares one thing with another, usually using 'as' or 'like'.	'my boat Went heaving through the water like a swan'
Superlative	An adjective/ adverb that indicates the most of something.	'But most thro' midnight streets I hear'
Intensifier	A word, especially an adverb or adjective, that has little meaning itself but is used to add emphasis to another adjective, verb, or adverb.	'In every cry of every Man'
Minimiser	A word that is used to make another adjective, verb or adverb sound lesser.	'he's there on the ground, sort of inside out'
Imperative	A sentence that is a command.	'Honour the charge they made!'
Exclamatory	A sentence that expresses a heightened emotion. They end with an exclamation mark	'She thanked men—good!'
Listing	When the writer includes several words/ phrases/ ideas, one after the other.	'All my words flattened, rolled, turned into felt'
Repetition	When a word/ phrase is noticeably repeated throughout a sentence/ paragraph/ whole text.	'His bloody life in my bloody hands'
Imagery	A technique in which the author appeals to the senses i.e. seeing, hearing, touching.	'Stumbling across a field of clods towards a green hedge That dazzled with rifle fire'
Oxymoron	A phrase in which contradictory/ opposing terms appear in conjunction with one another.	'the black'ning church appals'
Semantic field	A group of words which are related in theme.	'pummels…exploding…flung…spits…dives…bombarded'

Themes	Ideas
Identity	Identity is something that is heavily shaped by painful experiences. Identity can be determined by others. Identity is influenced by your place of birth and cultural underpinnings.
Memory	Memory is something that is deeply unreliable. Memories can cause tremendous suffering. The memory of an event can become more painful that the event itself. Memories encourage regret.
Nature	Nature is all powerful and should be respected. The power of nature transcends the power of humans. Nature is destructive and vengeful.
Impact of war	War favours the collective over the individual. War encourages erratic behaviour. As wars develop, patriotism is replaced with fear and a need to survive.
Power	Power can be used by individuals to manipulate and control others. Power can be used to limit the opportunities of groups within society. The power of humans is always fleeting.

Word class	Definition	Example
Verb	A **verb** is a word or set of words that shows action (*runs, is going, has been painting*); feeling (*loves, envies*); or state of being (*am, are, is, have been, was, seem*)..	'We are prepared: we build our houses squat, Sink walls in rock and roof them with good slate.'
Adverb	An adverb labels how, when or where something happens (and they often end in '–ly').	'Suddenly, he awoke and was running.'
Noun	Nouns are names, places and things; they also signify imagined things like 'a ghost'; and ideas or concepts, such as 'love', 'guilt' or 'fate'.	'How the youthful harlots curse'
Pronoun	Words used instead of a noun i.e. 'he', 'she', 'they', 'it'.	'She looked on and her looks went everywhere.'
Adjective	An adjective is a describing word or phrase that adds qualities to a noun. It normally comes before a noun, or after verbs like 'am', 'is', 'was', 'appears' or 'seems'.	'The bough of cherries some officious fool broke.'
Preposition	Prepositions are short words and phrases that give information about place, time and manner	'Eyeballs prick with tears between the bath and pre-lunch beers.'

Structural Features	Definition
Opening	The first mood/ image of the poem.
Cyclical	When end of the poem repeats an idea/character/setting from the opening.
Stanza	A 'paragraph'/verse in a poem.
Enjambment	A sentence or phrase that runs onto the next line.
Anaphora	When the first word of a stanza is the same across different stanzas.
Volta	A turning point in a poem.
Juxtaposition	Two ideas/ images placed together for contrasting effect.
Foreshadowing	A warning/ hint about what is going to happen next.
Iambic pentameter	A rhythm in a poem containing 10 syllables per line.
Speaker	The narrator, or person in the poem.
Change of mood/ tone	When the writer alters the overall feeling of the poem.
Refrain	A phrase, line or group of lines which is repeated throughout a poem.
Ending	The final mood/image of the poem.

Poetry

Creative Writing

Language Techniques	Definition	Example
Metaphor	A descriptive technique that names a person, thing or action as something else.	The mesmerising circus was a magnet for the children.
Simile	A descriptive technique that compares one thing with another, usually using 'as' or 'like'.	The horse's majestic mane was like fire.
Personification	Describing an inanimate object as having human feelings.	The carpet lamented the demise of his beloved hoover.
Zoomorphism	A technique in which animal attributes are imposed upon non-animal objects, humans, and events.	The maid had a brusque manner; she snarled at anyone who dared to approach her.
Imagery	A technique in which the author appeals to the senses i.e. seeing, hearing, touching.	The earthy, unmistakable aroma of coffee weaved through the air.
Listing	When the writer includes several words/ phrases/ ideas, one after the other.	The familiar tapping, scratching, tearing and shouting echoed down the street.
Oxymoron	A phrase combining two or more contradictory terms.	There was a deafening silence.
Pathetic fallacy	A type of personification where emotions are given to a setting, an object or the weather.	The clouds crowded together suspiciously overhead as the sky darkened forebodingly.
Semantic field	Words from a the semantic field are part of a common category.	The writer includes a series of words from the semantic field of nature, 'Seedling…hedge…..plant'.

Sentences connecting paragraphs
The sound of….cut into his thoughts…….
She regarded her surroundings…..
As the figure came closer, her appearance sharpened….
They ambled towards….
The words radiated around him and….
The familiar words echoed…..
The surprising view of…..nudged into her vision…..
Her mind was transported back to….

Paper 1 Sentence Types

Begin with a verb:
Regarding the inside of the cave, they knew they had gone too far.

Begin with an adverb:
Hastily, she gripped the handle.

Begin with an emotion:
Desperate, they contemplated leaving her behind.

Use a hyphen to add extra information at the end:
They saw several icicles - the majority looming down at them from the ceiling.

Use hyphens to add extra information in the middle of a sentence:
She took a tentative step further in - then two or three steps - always expecting to feel woodwork against the tips of her fingers.

Use a semi colon to add more detail to a description:
His sleep had been fitful; his eyes burned and his body ached.

Use a semi colon to show the difference between the 'inside' and 'outside':
To the crowd, she appeared content; inside, she was reeling.

Use a colon to introduce a list:
The beach was a hive of activity: parents wrestling with umbrellas, children squealing delightedly and crabs dodging the clatter of human feet.

Use a colon to expand on the first part of the sentence:
His mood was notoriously difficult to predict: he regularly jolted between pleasant and peevish, without any warning.

Begin with a time connective:
Now, there was nothing to do but wait in terrified silence.

List a series of actions:
She immediately stepped into the wardrobe and immersed herself among the coats, rubbing her face against them, breathing in the musty scent and believing herself to be utterly safe.

Structural Techniques	Definition
Cyclical structure	When the conditions at the end are in the some way the same as they are at the beginning
One sentence paragraph	Using a one sentence paragraph to create emphasis, meaning or a turning point/change in tone.
Flashback	a scene in a novel, etc. set in a time earlier than the main story
Cliff-hanger	a story or event with a strong element of suspense/ unanswered questions
Climax	the most intense, exciting, or important point; the culmination of the story.

" " quotation marks	used to show what someone said
' apostrophe	used to show possession or to represent missing letters in contractions
( ) parentheses	used to set off less important details such as an afterthought or a personal comment
: colon	used to introduce a list; used in time and in Bible verses
; semi-colon	used to join two related sentences or used to separate items in a series that have commas
/ slash	used to indicate line breaks when quoting poetry
— hyphen	used to divide a word or in compound words
, comma	used to indicate a pause, to set off a phrase, or to separate items in a series

PUNCTUATION

There
"Look over there!"
"There it is!"
"She is there, by the park."

Their
(they own)
"Their books are red."
"Bob wants to play with their toys."

They're
(they are)
"They're my best friends!"
"They're having fun."

where - is an adverb relating to place/position.
I know where you left it.

were - is the plural past tense of the verb 'are'.
We were playing outside?

we're - is a contraction of 'we are'.
We're going to the park.

wear - is used when talking about clothing.
I don't know what to wear.

Science

Hartford Church of England High School

PiXL Partners in excellence

EDEXCEL GCSE HEALTH DISEASE AND MEDICINE part 1
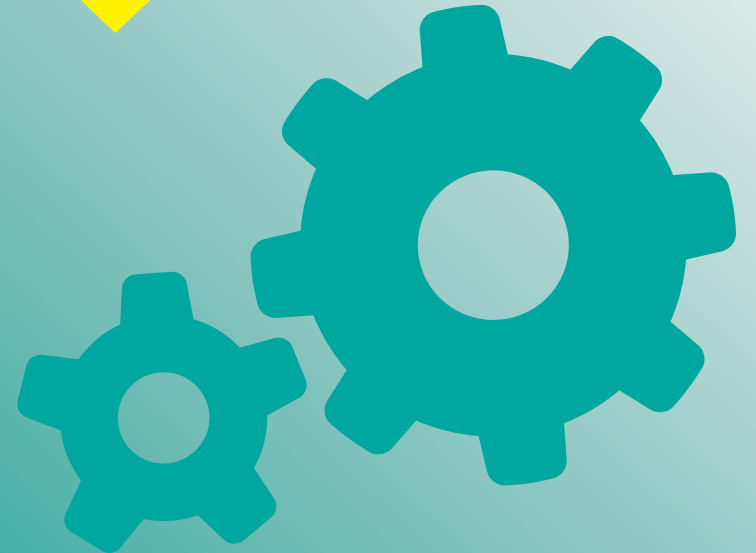
Health

The World Health Organisation (WHO) describes health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

The presence of one disease can lead to a higher susceptibility to other diseases.

Damage to immune system	Makes it easier for other pathogens to cause disease.
Damage to body defences	Barriers and defences are damages. Pathogens can enter the body.
Damage to organ systems	Organ systems don't work as effectively leading to other diseases.

Communicable and non communicable diseases

Communicable	*Non-communicable*
Caused by pathogens. They can be passed from person to person.	Caused by a fault in genes or by the way we live (lifestyle)

Pathogens may infect plants or animals and can be spread by direct contact, water or air

Detection and identification of plant diseases (bio HT only)

Detection	Identification
Stunted growth	Reference using gardening manual or website, laboratory test for pathogens, diagnostic testing.
Spots on leaves	
Area of decay	
growths	
Malformed stem/leaves	
Discolouration	
Presence of pests	

Plants have several ways of defending themselves from pathogens and animals (Biology only)

Physical	*Mechanical*
Thick waxy layers, cell walls stop pathogen entry	Thorns, curling up leaves to prevent being eaten
Chemical	
Antibacterial and toxins made by plant	

Bacteria may produce toxins that damage tissues and make us fell ill

Viruses	**Bacteria (prokaryotes)**	**Protists (eukaryotes)**	**Fungi (eukaryotes)**
e.g. cold, influenza, measles, HIV, tobacco mosaic virus	*e.g. tuberculosis (TB), Salmonella, Gonorrhoea*	*e.g. dysentery, sleeping sickness, malaria*	*e.g. athlete's foot, thrush, rose black spot*
DNA or RNA surrounded by a protein coat	No membrane bound organelles (no chloroplasts, mitochondria or nucleus). Cell wall. Single celled organisms	Membrane bound organelles. Usually single celled.	Membrane bound organelles, cell wall made of chitin. Single celled or multi-cellular

Pathogens are microorganisms that cause infectious disease

Pathogens

Communicable diseases

Pathogen	*Disease*	**Symptoms**	**Method of transmission**	**Control of spread**
Bacteria	cholera	Causes diarrhoea.	Contaminated water	Vaccination, water treatment to remove bacteria.
Bacteria	tuberculosis	Causes lung damage.	Air borne water droplets from couching.	Isolation of infected person, vaccination.
Fungi	*Chalara ash dieback*	Leaf loss and bark lesions.	Spores in the air.	Remove/destroy infected trees.
Protists	*Malaria*	Recurrent fever. Damage to blood and liver.	By an animal vector (mosquitoes).	Prevent breeding of mosquitoes. Use of nets to prevent bites.
Bacteria	*Stomach ulcers (Bio only)*	Pain in abdomen, damage to stomach lining.	Oral transmission.	60% already carry the bacteria.
Virus	*Ebola (Bio only)*	Internal bleeding and fever.	Contact with bodily fluids of an infected person.	Isolation of infected person. Vaccination.
Virus	*HIV*	Initially flu like systems, serious damage to immune system.	Sexual contact and exchange of body fluids.	Anti-retroviral drugs and use of condoms.
Bacteria	*Chlamydia*	Unusual discharge from genitals or anus, pain when urinating.	Unprotected sex.	Using condoms during sex.

Life cycle of a virus

Lysogenic pathway	Lytic pathway
Virus attaches to cell and inserts genetic material	Viral genetic material can spilt off from bacterial chromosome.
Viral genetic material forms a circle.	
The viral genetic material uses to cell to produce new proteins and genetic material to make new viruses	Viral genetic material is inserted into the bacterial chromosome.
Cell breaks apart (lyse) to release new viruses.	Bacterium reproduces normally replicating both types of genetic material.

Antigens (surface protein)

Specific immune system

a. Exposure to pathogen	Pathogens are identified by white blood cells by the different proteins on their surfaces ANTIGENS.
b. Antigens trigger an immune response	Trigger causes the production of antibodies.
c. Production of memory lymphocytes	Antigens also trigger the production of memory lymphocytes (a type of white blood cell). These cells can produce the specific antibody for a pathogen.
d. Secondary response	Memory lymphocytes can produce specific antibodies much more quickly if the same pathogen returns.

Antibiotics

e.g. penicillin	Used to treat bacterial infection by inhibiting cells processes in the bacterium but not the host organism (human) cells. They do not work on viruses.

EDEXCEL GCSE HEALTH DISEASE AND MEDICINE part 2

Immunisation

Immune system

Non-specific immune systems

The human body has several chemical and physical ways of providing protection from pathogens

	Nose	Nasal hairs, sticky mucus and cilia prevent pathogens entering through the nostrils.
	Trachea and bronchus (respiratory system)	Lined with mucus to trap dust and pathogens. Cilia move the mucus upwards to be swallowed.
	Stomach acid	Stomach acid (pH1) kills most ingested pathogens.
	Skin	Hard to penetrate waterproof barrier. Glands secrete oil which kill microbes.
	Lysozymes in tears	Breaks down the cell wall of some bacteria.

Vaccines are used to immunise a large proportion of the population (herd immunity) to prevent the spread of a pathogen

Vaccination

Small amount of dead or inactive form of the pathogen	1st infection by pathogen	White blood cells detect pathogens in the vaccine. Antibodies are released into the blood.
	Re-infection by the same pathogen	White blood cells detect pathogens. Antibodies are made much faster and in larger amounts.

Vaccination (Biology only)

Disadvantages	A very small number of people (eg 1 in 900000 for MMR) a person may have a bad reaction to a vaccine and therefore cannot be immunised.
Advantages	Almost everyone can be immunised (herd immunity) which protects those people who cannot have vaccines. Spread of a pathogen in a population is prevented.
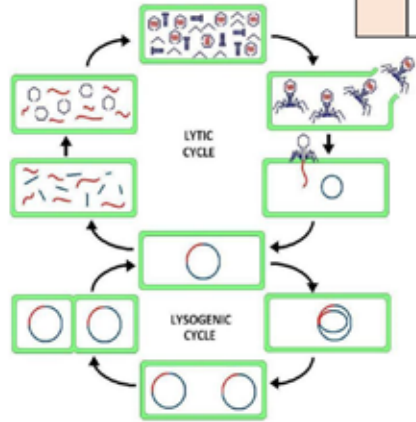
Calculate cross sectional area

흠 풍 ㄷㅅ

Measure the diameter of the clear area where bacteria has not grown. Half the diameter of the clear area to find the radius.
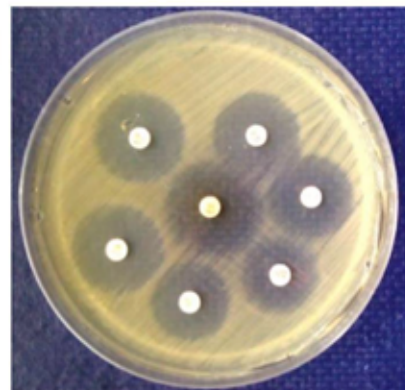
Aseptic technique

Autoclave	Sterile inoculating loops	Covered petri dishes and culture vials
Sterile growth medium and agar plates are sterilized by subjecting them to high pressure steam.	Sterilized before transferring microorganisms so that sample isn't contaminated.	Covered to avoid contamination by other microorganisms in the air.

LYTIC CYCLE

LYSOGENIC CYCLE

EDEXCEL GCSE HEALTH DISEASE AND MEDICINE part 3

Healthy weight can be calculate using waist:hip ratio and the equation for BMI.

$$ratio = \frac{Waist}{Hip} \qquad BMI = \frac{MASS}{(HEIGHT)^2}$$

Non-communicable diseases are caused by the interaction of a number of factors

Disease	Interacting factors
Cardiovascular disease	Diet, obesity, smoking, drinking alcohol, lack of exercise, genetics.
Cancer	
Lung disease	
Liver disease	
Malnutrition	

Lifestyle factors and their effects on non-communicable disease

Disease	lifestyle factors
Obesity and malnutrition	Lack of exercise and consuming too many/too few calories through an unbalanced diet. Schools meals are balanced to combat this in young people.
Liver disease	Large amounts of alcohol taken over a long period of time can lead to liver disease e.g. cirrhosis. The NHS spends over £500 million a year treating liver disease.
Cardiovascular disease	Smoking leads to damage and blocking of arteries supplying the heart with oxygenated blood. WHO estimates that 6 million people die globally as a result of smoking related illnesses.

Non-communicable diseases

Discovery of new drugs

Drugs (including antibiotics) have to be tested and trialled before to check they are safe and effective

New drugs are extensively tested for:

Efficacy	Make sure the drug works
Toxicity	Check that the drug is not poisonous
Dose	The most suitable amount to take

Preclinical trials - using cells, tissues and live animals - must be carried out before the drug can be tested on humans.

Clinical trials use healthy volunteers and patients

Stage 1	Stage 2	Stage 3	Stage 4
Healthy volunteers try small dose of the drug to check it is safe record any side effects	A small number of patients try the drug at a low dose to see if it works	A larger number of patients; different doses are trialled to find the optimum dose	A double blind trial will occur. The patients are divided into groups. Some will be given the drug and some a placebo.

Double blind trial: patients and scientists do not know who receives the new drug or placebo until the end of the trial. This avoids bias.

A placebo can look identical to the new drug but contain no active ingredients

Treating CVD

Evaluating different treatments for cardiovascular disease (CVD)

Life long medication	Surgical procedures	Lifestyle changes
Medicines to reduce blood pressure and cholesterol. Statins for lowering cholesterol carry a small risk of developing diabetes.	A stent can be surgically inserted into blocked blood vessel. Blocked blood vessels can be bypassed with inserted blood vessels. This treatment requires life long medication.	Giving up smoking, drinking excess alcohol and taking more exercise can reduce the risk of CVD. Some patients may not stick to lifestyle changes.

Monoclonal antibodies (Biology only HT)

Monoclonal antibodies — Identical copies of one types of antibody produced in laboratory

1. A mouse is injected with pathogen.
2. Lymphocytes produce antibodies (but do not divide).
3. Lymphocytes are removed from the mouse and fused with rapidly dividing mouse tumour cells.
4. The new cells are called hybridomas.
5. The hybridomas divide rapidly and release lots of antibodies which are then collected.

Monoclonal antibodies can be used in a variety of ways

Testing	Diagnosis
e.g. pregnancy test – measure the level of hormones	Can detect very small quantities of chemicals in the blood

Specific to one binding site on the antigen. Can target specific chemicals or cells in the body unlike drug and radiotherapy treatments.

PiXL Partners in excellence

Base	A base is any substance that reacts with an acid to form a salt and water only
Examples of soluble bases	Alkalis e.g. sodium hydroxide, potassium hydroxide

Reactions with acids		
Metals	Metal + acid → metal salt + hydrogen	Magnesium + hydrochloric acid → magnesium chloride + hydrogen
Metal oxides	Metal oxide + acid → metal salt + water	Copper oxide + sulfuric acid → copper sulfate + water
Metal hydroxides	Metal hydroxide + acid → metal salt + water	Sodium hydroxide + nitric acid → sodium nitrate + water
Metal carbonates	Metal carbonates + acid → metal salt + carbon dioxide + water	Calcium carbonate + sulfuric acid → calcium sulfate + carbon dioxide + water

Acids

Concentrated	High mass of substance in a given volume of solution
Dilute	Low mass of substance in a given volume of solution
Strong acids	Completely ionised in aqueous solutions e.g. hydrochloric, nitric and sulfuric acids.
Weak acids	Only partially ionised in aqueous solutions e.g. ethanoic acid, citric acid.
Hydrogen ion concentration	As the pH decreases by one unit (becoming a stronger acid), the hydrogen ion concentration increases by a factor of 10.

Strong and weak acids (HT ONLY)

EDEXCEL TOPIC SC8: ACIDS & ALKALIS

Reactions with acids

Acids

Producing salts from insoluble reactants

Soluble salts	Soluble salts can be made from reacting acids with solid insoluble substances (e.g. metals, metal oxides, hydroxides and carbonates).
Production of soluble salts	Add the solid to the acid until no more dissolves. Filter off excess solid and then crystallise to produce solid salts.

Universal indicator	Red in acid, green in neutral and blue in alkali
Litmus	Red in acid, purple in neutral and blue in alkali
Methyl orange	Red in acid, yellow in neutral and yellow in alkali
Phenolpthalein	Colourless in acid and in neutral and pink in alkali

Gas tests

Gas	Test	Positive result
Hydrogen	Burning splint	'Pop' sound.
Carbon dioxide	Limewater	Goes cloudy (as a solid calcium carbonate forms).

Producing salts from soluble reactants

Titration	The acid and the soluble reactant are mixed in the correct proportions and the remaining solution is only salt and water

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

acidic   neutral   alkaline

The pH scale and indicators

A neutralisation reaction is between an acid and a base	In neutralisation reactions, hydrogen ions react with hydroxide ions to produce water: $H_+ + OH^- \rightarrow H_2O$

Acids	Acids produce hydrogen ions (H_+) in aqueous solutions.
Alkalis	Aqueous solutions of alkalis contain hydroxide ions (OH^-).

PiXL Partners in excellence

The ions discharged when an aqueous solution is electrolysed using inert electrodes depend on the relative reactivity of the elements involved.

At the negative electrode	Metal will be produced on the electrode if it is less reactive than hydrogen. Hydrogen will be produced if the metal is more reactive than hydrogen.
At the positive electrode	Oxygen is formed at positive electrode. If you have a halide ion (Cl⁻, I⁻, Br⁻) then you will get chlorine, bromine or iodine formed at that electrode.

Electrolysis of aqueous solutions

Process of electrolysis	*Splitting up using electricity*	When an ionic compound is melted or dissolved in water, the ions are free to move. These are then able to conduct electricity and are called electrolytes. Passing an electric current though electrolytes causes the ions to move to the electrodes.
Electrode	*Anode Cathode*	The positive electrode is called the anode. The negative electrode is called the cathode.
Where do the ions go?	*Cations Anions*	Cations are positive ions and they move to the negative cathode. Anions are negative ions and they move to the positive anode.

Oxidation **I**s **L**oss, **R**eduction **I**s **G**ain

PiXL science

Extracting metals using electrolysis	*Metals can be extracted from molten compounds using electrolysis.*
	This process is used when the metal is too reactive to be extracted by reduction with carbon.
	The process is expensive due to large amounts of energy needed to produce the electrical current. *Example: aluminium is extracted in this way.*

Electrolytic processes

Lead ions Pb +
Bromide ions Br ⁻
Molten lead (II) bromide

EDEXCEL TOPIC SC10-13: Electrolytic Processes

Higher tier: You can display what is happening at each electrode using half-equations:
At the cathode: $Pb^{2+} + 2e^- \rightarrow Pb$
At the anode: $2Br^- \rightarrow Br_2 + 2e^-$

Acids

Titrations

Titrations are used to work out the precise volumes of acid and alkali solutions that react with each other.

Making pure, dry insoluble salts

Step 1	*Add insoluble reactant (e.g. metal oxide) to acid*	Add until there is an excess of insoluble reactant.
Step 2	*Filter the solution*	Collect the filtrate in a conical flask and dispose of the residue.
Step 3	*Crystallisation*	Heat the filtrate using a Bunsen burner to evaporate the water from the solution.
Step 4	*Evaporation*	Leave the evaporating basin with the heated filtrate to evaporate any remaining water and make pure, dry insoluble salts.

Using copper	*Copper is a very good electrical conductor*	Much of the copper available isn't pure enough for this use so it is purified using electrolysis.
Copper sulfate solution	*The anode is made of impure copper and the cathode is made of pure copper*	Both electrodes are placed in copper sulfate sultion. Copper ions (Cu2+) leave the anode and are attracted to the cathode.
Electrodes	*The cathode of pure copper builds up*	The anode decreases in size. The impurities left behind form a sludge.

Solubility		
	Sodium, potassium and ammonium	All common sodium, potassium and ammonium salts are soluble e.g. sodium chloride and potassium fluoride.
	Nitrates	All nitrates are soluble e.g. potassium nitrate.
	Sulfates	Common chlorides (e.g. sodium chloride) are soluble, expect those of silver and lead.
	Carbonates and hydroxides	Common carbonates and hydroxides are insoluble except those of sodium, potassium and ammonium.

1. Use the pipette to add 25 cm³ of alkali to a conical flask and add a few drops of **indicator**.

2. Fill the **burette** with acid and note the starting volume. Slowly add the acid from the burette to the alkali in the conical flask, swirling to mix.

3. Stop adding the acid when the end-point is reached (the appropriate colour change in the indicator happens). Note the final volume reading. Repeat steps 1 to 3 until you get consistent readings.

PiXL Partners in excellence

Oxidation Is Loss (of electrons) **Reduction Is Gain** (of electrons)

Ionic half equations (HT only)

For displacement reactions	Ionic half equations show what happens to each of the reactants during reactions	For example: The ionic equation for the reaction between iron and copper (II) ions is: $Fe + Cu^{2+} \rightarrow Fe^{2+} + Cu$ The half-equation for iron (II) is: $Fe \rightarrow Fe^{2+} + 2e^-$ The half-equation for copper (II) ions is: $Cu^{2+} + 2e^- \rightarrow Cu$

Oxidation and reduction in terms of electrons (HT ONLY)

Obtaining and using metals

EDEXCEL TOPIC SC10-13

Obtaining and using metals

HT ONLY: Reactions between metals and acids are redox reactions as the metal donates electrons to the hydrogen ions. This displaces hydrogen as a gas while the metal ions are left in the solution.

Reactions with acids	$metal + acid \rightarrow metal\ salt + hydrogen$	magnesium + hydrochloric acid → magnesium chloride + hydrogen zinc + sulfuric acid → zinc sulfate + hydrogen

Acids react with some metals to produce salts and hydrogen.

Reactions of acids and metals

Extraction using carbon

Metals less reactive than carbon can be extracted from their oxides by reduction.	For example: zinc oxide + carbon → zinc + carbon dioxide

Extraction of metals and reduction

Unreactive metals, such as gold, are found in the Earth as the metal itself. They can be mined from the ground. More reactive metals are obtained by displacement or electrolysis.

	Reactions with water	Reactions with acid
Group 1 metals	*Reactions get more vigorous as you go down the group*	*Reactions get more vigorous as you go down the group*
Group 2 metals	*Do not react with water*	*Observable reactions include fizzing and temperature increases*
Zinc, iron and copper	*Do not react with water*	*Zinc and iron react slowly with acid. Copper does not react with acid.*

The reactivity series

Metals ores	These resources are limited	Copper ores especially are becoming sparse. New ways of extracting copper from low-grade ores are being developed.
Phytomining	Plants absorb metal compounds	These plants are then harvested and burned; their ash contains the metal compounds.
Bioleaching	Bacteria is used to produce leachate solutions that contain metal compounds	The metal compounds can be processed to obtain the metal from it e.g. copper can be obtained from its compounds by displacement or electrolysis.

Metal oxides

Metals and oxygen	Metals react with oxygen to form metal oxides	magnesium + oxygen → magnesium oxide $2Mg + O_2 \rightarrow 2MgO$
Reduction	This is when oxygen is removed from a compound during a reaction	e.g. metal oxides reacting with hydrogen, extracting low reactivity metals
Oxidation	This is when oxygen is gained by a compound during a reaction	e.g. metals reacting with oxygen, rusting of iron

Metals form positive ions when they react	The reactivity of a metal is related to its tendency to form positive ions	The reactivity series arranges metals in order of their reactivity (their tendency to form positive ions).
Carbon and hydrogen	Carbon and hydrogen are non-metals but are included in the reactivity series	These two non-metals are included in the reactivity series as they can be used to extract some metals from their ores, depending on their reactivity.
Displacement	A more reactive metal can displace a less reactive metal from a compound.	Silver nitrate + Sodium chloride → Sodium nitrate + Silver chloride

	most reactive	
potassium		K
sodium		Na
calcium		Ca
magnesium		Mg
aluminium		Al
carbon		C
zinc		Zn
iron		Fe
tin		Sn
lead		Pb
hydrogen		H
copper		Cu
silver		Ag
gold		Au
platinum	least reactive	Pt

If one direction of a reversible reaction is exothermic, the opposite direction is endothermic. The same amount of energy is transferred in each case.

For example:
Hydrated copper sulfate $\underset{\text{exother}}{\overset{\text{endothermic}}{\rightleftharpoons}}$ Anhydrous copper sulfate + Water
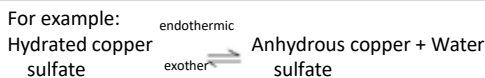
The relative amounts of reactants and products at equilibrium depend on the conditions of the reaction.

Energy changes and reversible reactions

Reversible reactions	In some chemical reactions, the products can react again to re-form the reactants.
Representing reversible reactions	$A + B \rightleftharpoons C + D$
The direction	The direction of reversible reactions can be changed by changing conditions: $A + B \underset{\text{cool}}{\overset{\text{heat}}{\rightleftharpoons}} C + D$

Reversible reactions

Equilibrium in reversible reactions — When a reversible reaction occurs in apparatus which prevents the escape of reactants and products, equilibrium is reached when the forward and reverse reactions occur exactly at the same rate.

Equilibria

Reversible reactions and equilibria

Changing conditions and equilibrium (HT)

Le Chatelier's Principles	States that when a system experiences a disturbance (change in condition), it will respond to restore a new equilibrium state.
Changing concentration	If the concentration of a reactant is increased, more products will be formed. If the concentration of a product is decreased, more reactants will react.
Changing temperature	If the temperature of a system at equilibrium is increased: - Exothermic reaction = products decrease - Endothermic reaction = products increase
Changing pressure (gaseous reactions)	For a gaseous system at equilibrium: - Pressure increase = equilibrium position shifts to side of equation with smaller number of molecules. - Pressure decrease = equilibrium position shifts to side of equation with larger number of molecules.

EDEXCEL TOPIC SC10-13 Extracting metals

Life cycle assessment and recycling

Life cycle assessment

LCAS	**Life cycle assessments are carried out to assess the environmental impact of products**	They are assessed at these stages: - Extraction and processing raw materials - Manufacturing and packaging - Use and operation during lifetime - Disposal
Values	**Allocating numerical values to pollutant effects is difficult**	Value judgments are allocated to the effects of pollutants so LCA is not a purely objective process.

Ways of reducing the use of resources

Reduce, reuse and recycle	**This strategy reduces the use of limited resources**	This, therefore, reduces energy sources being used, reduces waste (landfill) and reduces environmental impacts.
Limited raw materials	**Used for metals, glass, building materials, plastics and clay ceramics**	Most of the energy required for these processes comes from limited resources. Obtaining raw materials from the Earth by quarrying and mining causes environmental impacts.
Reusing and recycling	**Metals can be recycled by melting and recasting/reforming**	Glass bottles can be reused. They are crushed and melted to make different glass products. Products that cannot be reused are recycled.

The Haber process

The Haber process	This process uses nitrogen from the air and hydrogen from natural gas to form ammonia. The reaction is reversible and uses optimum conditions and a catalyst in order to reach dynamic equilibrium.
Optimum temperature	The optimum temperature for the Haber process is $450^{\circ}C$.
Optimum pressure	The optimum pressure for the Haber process is 200 atmospheres.
The use of a catalyst	The Haber process uses an iron catalyst. This does not alter the position of the equilibrium but it does increase the rate of the reaction.

PiXL Partners in excellence

Changing concentration	If the concentration of a reactant is increased, more products will be formed . If the concentration of a product is decreased, more reactants will react.
Changing temperature	If the temperature of a system at equilibrium is increased: - Exothermic reaction = products decrease - Endothermic reaction = products increase
Changing pressure (gaseous reactions)	For a gaseous system at equilibrium: - Pressure increase = equilibrium position shifts to side of equation with smaller number of molecules. - Pressure decrease = equilibrium position shifts to side of equation with larger number of molecules.

The Haber process

The Haber process	This process uses nitrogen from the air and hydrogen from natural gas to form ammonia. The reaction is reversible and uses optimum conditions and a catalyst in order to reach dynamic equilibrium.
Optimum conditions	The optimum temperature for the Haber process is 450°C and optimum pressure is 200 atmospheres. These are economically viable conditions as they produce the best yield to cost ratio.

Fertilisers

NPK fertilisers	*These contain nitrogen, phosphorous and potassium*	Formulations of various salts containing appropriate percentages of the elements.
Fertiliser examples	*Potassium chloride, potassium sulfate and phosphate rock are obtained by mining*	Phosphate rock needs to be treated with an acid to produce a soluble salt which is then used as a fertiliser. Ammonia can be used to manufacture ammonium salts and nitric acid.

Dynamic equilibria

Properties and uses of metals

Metal	Properties	Uses
Aluminium	*Low density (lightweight), layer of oxides at surface (corrosion resistant)*	Aluminium cans, cooking foil, saucepans.
Copper	*Good electrical and thermal conductor, flexible*	Saucepans, electrical wiring.
Gold	*Unreactive*	Jewellery, coins.

Magnalium (Aluminium and magnesium alloy)	Aircraft and car parts.
Brass (copper and zinc alloy)	Used in electrical fittings.

EDEXCEL TOPIC SC10-13:

Transition metals, alloys and corrosion

Oxidation

Corrosion	*The destruction of materials by chemical reactions with substances in the environment*	An example of this is iron rusting; iron reacts with oxygen from the air to form iron oxide (rust) water needs to be present for iron to rust.
Preventing corrosion	*Coatings can be added to metals to act as a barrier*	Examples of this are greasing, painting and electroplating. Aluminium has an oxide coating that protects the metal from further corrosion.
Sacrificial corrosion	*When a more reactive metal is used to coat a less reactive metal*	This means that the coating will react with the air and not the underlying metal. An example of this is zinc used to galvanise iron.
Electroplating	*Used to improve the appearance and/or resistance to corrosion*	Electrolysis is used to reduce metal cations so they form a thin layer at the cathode.

Properties of metals and alloys

High melting and boiling points	This is due to the strong metallic bonds.
Pure metals can be bent and shaped	Atoms are arranged in layers that can slide over each other.

Alloys

Mixture of two or more elements at least one of which is a metal	Harder than pure metals because atoms of different sizes disrupt the layers so they cannot slide over each other.

Pure metal	Alloy
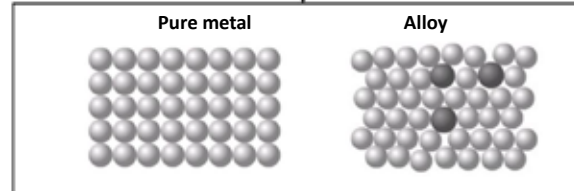
Transition metals

Most metals are transition metals	• High melting points • High density • They form coloured compounds • They can be used as catalysts (without being used up)

PiXL Partners in excellence

Small molecules (ie: Oxygen) typical size of 10^{-10}m.

Diameter of an atom 1×10^{-10}m.

Diameter of nucleus is 10,000 times smaller.

Atom

Neutral charge — Equal numbers of protons and electrons.

Positively charged nucleus, surrounded by negatively charged electrons

Nuclear radius is much smaller than the atom.

Almost all of the atom's mass is in the nucleus.

Electrons

Orbit the nucleus at set distances — Absorbing or emitting EM radiation causes change in orbit.

Electrons lost | Positive ion.

Atomic number = 3 protons
Mass number = 6 (3 neutrons + 3 protons).

Atomic number = 3 protons
Mass number = 7 (4 neutrons + 3 protons).

Isotope ^6_3Li ^7_3Li

Different forms of an element with the same number of protons but different number of neutrons

Mass number	*Number of protons and neutrons*
Nucleon	*Smaller particles in the nucleus*
Atomic number	*Number of protons*
Ion	*Unequal number of electrons to protons*

Particle	*Relative Charge*	*Relative mass*	*Found*
Proton	*+1*	*1*	*In the nucleus*
Neutron	*None*	*1*	
Electron	*-1*	*1/1835 0r 0.0005*	*Orbits the nucleus*
Positron	*+1*		

Detecting

Use Geiger-Müller *tube* — Radiation passes into tube, ionising gas causing a short pulse of current to flow.

Photographic film — Film becomes darker when radiation reaches it.

Count rate	*Number of clicks per second*
Dose	*Amount of radiation*

Atom Structure

EDEXCEL TOPIC 6 RADIOACTIVITY.

Types of radiation and radioactive decay

Background radiation

Background radiation

Low level ionising radiation from space and naturally occurring radioactive substances in the environment

Radon gas (49%), Medical (15%), Ground and buildings (13%), Cosmic rays (12%), Food and Drink (10%), Nuclear and other (1%).
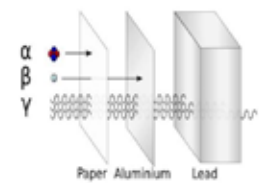
To balance nuclear equations the total mass and atomic numbers must be equal on both sides.

J J Thomson (1897)	Discovered electrons could be removed from atoms. Suggested 'plum-pudding' model – atoms were spheres of positive charge with tiny negative electrons stuck in them.
Rutherford and Marsden (1909)	Fired a beam of alpha particles (He^{2+}) at thin gold foil. They expected particles to pass straight through or be slightly deflected. They found some travelled through, some were deflected more than expected and some bounced back.
Rutherford (1911)	Used above evidence to suggest most of the mass of atom was concentrated at the centre in a tiny nucleus, most of atom was empty space and the nucleus had a positive charge since positive alpha particles were repelled. The nuclear model was created.
Bohr (1913)	Tweaked Rutherford's idea, and suggested modern model of atom – electrons in fixed orbits at set distances from nucleus. The distances were called energy levels. He suggested electrons can only exist in these energy levels. This Bohr model is the currently accepted model of the atom.

Radioactive decay	*Unstable atoms randomly emit radiation to become stable*
Ionisation	*Radiation that 'knocks' electrons from atoms*

Decay	Alpha (α)	Beta (β-)	Positron (β+)	Gamma (γ)	Neutron
Emitted from nucleus	Helium nuclei (^4_2He)	High energy, high speed electron ($^0_{-1}e$)	High energy, high speed particle ($^0_{+1}e$)	High frequency Electromagnetic wave	Neutron
Mass number	4	0	0	0	+1
Atomic number	+2	-1	+1	0	0
Charge	+2	-1	+1	0	0
Ionising	Strongly	Moderately.	Moderately.	Weakly.	Not.
Penetrating	Few cm	Few metres.	Smaller range.	Few kilometres.	
Stopped by	Paper or skin.	Aluminium.	When they hit an electron they destroy each other.	Concrete or lead.	

α β γ — Paper Aluminium Lead

$^{226}_{88}\text{?} \rightarrow ^{222}_{86}\text{?} + ^4_2\alpha$

$^{14}_6\text{?} \rightarrow ^{14}_7\text{?} + ^0_{-1}\beta$

$^{18}_8\text{O} \rightarrow ^{18}_8\text{?} + ^0_{+1}\beta$

$^{99}_{43}\text{?} \rightarrow ^{99}_{43}\text{?} + \gamma$

$^{13}_?\text{?} \rightarrow ^{12}_?\text{?} + ^1_0n$

When nuclei undergo radioactive decay, nuclear rearrangement and loss of energy as gamma radiation often occurs.

β- a neutron becomes an proton and an electron.

β+ a proton becomes an neutron and a positron.

Gamma rays do not change the charge or the mass of the nucleus.

PiXL Partners in excellence

| Beta | *Gauging thickness* | Paper is passed between rollers connected to a detector, which measures the amount of Beta particles passing through. Too thin, pressure reduced, too thick, pressure increased. |

| Beta or Gamma | *Tracing leaks* | Radioactive tracer leaks out of damaged area and is detected using Geiger-Müller tube. |

| Decay | *When a nucleus will decay cannot be predicted - it is a random process* | An unstable nucleus changes and emits particles changing the atom. |

Radioactive activity of a source decreases over a period of time.

| Gamma | *Diagnosis of cancer.* | Cancer cells are very active so take up glucose quicker than normal cells. Using radioactive glucose will detect cancer cells. |
| | *Treatment of cancer.* | Cancer cells divide more quickly and are more susceptible to be killed by radiation. |

| Alpha | *Household smoke alarms* | Alpha particles ionise molecules in air. Ions are attracted to charged plates allowing a small current to flow. Smoke gets in the way of ions and current decreases setting off alarm. |

| Half life | *The time taken for the activity of a radioactive source to decay by half* | A period of time, constant for each isotope for half of the un-decayed nuclei to decay. |

| Gamma | *Irradiating food* | Kills bacteria. |
| | *Sterilising medical equipment* | Kills bacteria. |

PHYSICS ONLY

Using radiation

Half-life

| Unit of activity | *Becquerel* | The number of nuclear decays per second. |

| Uses | *Different isotopes have different half lives* | Household smoke alarms, irradiating food, sterilising medical equipment, tracing and gauging thicknesses, diagnosis and treatment of cancer. |

EDEXCEL TOPIC 6 RADIOACTIVITY.

Fuel rods	Made of U-238, 'enriched' with U-235 (3%). Long and thin to allow neutrons to escape, hitting nuclei.
Control rods	Made of Boron. Controls the rate of reaction. Boron absorbs excess neutrons.
Moderator	Water slows down fast moving neutrons.
Concrete	Neutrons hazardous to humans – thick concreate shield protects workers.

PHYSICS ONLY

Low doses cause minor damage, cells divide rapidly (cancer).

High doses kills cells causing radiation sickness.

Dangers

Nuclear energy

Alpha cannot penetrate the body.

PHYSICS ONLY

| Controlled reaction | *Steady rate of nuclear fission* | 1 neutron produces another fission. |

To prevent activity decreasing, isotope made close to scanner.

Ionisation

Radiation ionises atoms leads to tissue damage

Beta and gamma penetrate the body.

| Nuclear power | *Thermal energy released from nuclear fission* | Produces radioactive products. |

| PET scanners | *Positron emission tomography – used to diagnose conditions.* |
| | Short half=life tracers injected into patient. Positron meets electrons in organ and annihilates emitting high energy gamma rays in opposite direction. Gamma rays used to locate tumour. |

| Reduce the risk | Reduce length of exposure time. |
| | Reduce distance from source. |

Irradiation

Person is in exposed to radioactive source

| Nuclear fission | *One large unstable nucleus splits to make two smaller nuclei* | Neutron hits U-235 nucleus, nucleus absorbs neutron, splits emitting two or three neutrons and two smaller daughter nuclei. Process also releases energy. |

Nuclear energy store in fuel.	Thermal energy.	Thermal energy store in moderator.
Thermal energy store in moderator.	Thermal energy.	Thermal energy store in water.
Thermal energy store in water.	Kinetic energy.	Kinetic energy store in steam.
Kinetic energy store in steam.	Kinetic energy.	Kinetic energy store in turbine.
Kinetic energy store in turbine.	Kinetic energy.	Kinetic energy store in generator.
Kinetic energy store in generator.	Electrical energy.	To the National Grid.

Contamination

Unwanted presence of radioactive atoms in body or ground

Treating tumours	*Internally – short half-life alpha emitters placed inside body in or near tumour.*	Alpha is strongly ionising so damages cells. Have a short range so damage to normal tissue is limited.
	Internally – short half-life beta emitters (implants) placed inside body in or near tumour.	Beta penetrates case of implant and damages tumour cells. Range is longer so more damage to healthy can occur.
	Externally – long half-life gamma rays aimed at tumour	Gamma penetrates into body, some damage to surrounding cells occurs.

| Advantages | *Very reliable, 'clean' fuel - does not release greenhouse or acid rain gases, produces huge amounts of energy* |

| Disadvantages | *People see it as dangerous, nuclear waste has very long half life and needs to disposed of safely, risk of leaking and explosions* |

Process repeats, chain reaction formed.

Used in nuclear power stations.

Nuclear fusion

Two small nuclei join to make one larger nucleus

Difficult to do on Earth – huge amounts of pressure and temperature needed.

Occurs in stars.

Strong electrostatic repulsive forces from positively charged nuclei have to be overcome, using lots of heat and pressure so is uneconomical.

PiXL Partners in excellence

Solar system

Distance increases further away from the Sun.

Milky Way our galaxy.

Solar System

The Sun, 8 planets, moons, dwarf planets, asteroids and comets

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

Planet	*A large body orbiting the Sun*
Moon	*A natural satellite orbiting a planet*
Dwarf planet	*A body large enough to have its own gravity which caused a spherical shape*
Solar system	*Any object orbiting the Sun due to gravity*
Galaxy	*Collection of billions of stars*
Universe	*Collection of galaxies*

Geocentric Aristotle (ancient Greek)	*Earth at centre, everything orbits Earth in circles*	Greeks used visual observations with naked eye. Saw Sun, moon, stars move across the sky in the same direction.
Heliocentric Copernicus (1473 - 1543)	*Sun at centre, everything orbits Sun in circles*	Galilei (1610) used a telescope to discover 4 moons going around Jupiter. Supported Copernicus's heliocentric idea.
Modern	*Everything orbits Sun in elliptical orbits*	Newer technology has refined our information and view.

EDEXCEL TOPIC 7 ASTRONOMY (PHYSICS ONLY).

Due to the Sun's gravity, planets accelerate towards the Sun and so changes direction.

A planet's velocity changes but speed remains constant.

Planets further away from the Sun, gravity pull is weaker. So speed of planet is slower.

Planets close to the Sun, gravity pull is strong. Planets move quickly.

Changing orbits

If the direction changes, velocity will change. (As velocity is a vector).

Moving objects go in a straight line unless a force acts on it.

An object in orbit, the gravitational force is at right angles to the direction of movement, so force changes direction not speed.

Circular motion

Velocity constantly changes.

Velocity is both speed and direction..

An object travelling in a circle at a constant speed, is accelerating . (It is constantly changing direction so changing velocity).
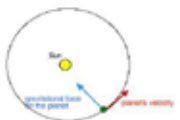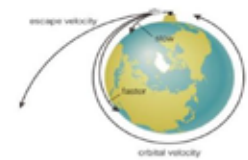
Centripetal force

Force acting towards the centre of a circle.

Resultant force acts upon an object moving in a circular motion.

Too fast = disappears into Space.

Correct speed = steady orbit around Earth.

Too slow = falls to Earth.

Gravity and orbits

Each Kg has a gravitational pull of 9.8N.

Gravitational field strength

Gravity exerted around an object.

Earth's gfs = 9.8N/kg.

The Earth is larger than the moon, so an object weighs more on Earth than the moon.

Gravitational field strength

Depends on the mass of the body creating the field

The larger the mass, the stronger the gravitational force.

Depends on the distance from the body creating the field

Closer to the body, the stronger the gravitational force.

Stable orbits

If the orbital speed changes, the radius will change.

Faster moving objects in a stable orbit have a smaller radius than a slower moving object.

Weight

Force acting upon an object due to gravity

Newton (N).

Mass

How much matter an object has

Kilograms (Kg).

Effect of gravity

Gravity causes moons to orbit planets, planets to orbit the Sun, stars to orbit galaxy centres.

Force of gravity changes the moon's direction not its speed.

Due to the Sun's gravity, planets accelerate towards the Sun and so changes direction.

Orbit descriptions		
Moon		Circular orbit.
Planets		Mostly circular orbit.
Comets		Highly elliptical orbit.
Artificial satellites		Geostationary satellite - circular orbit.
		Polar satellite - elliptical orbit.

PiXL Partners in excellence

Frequency of sound wave decreases, wavelength increases.

When a wave source moves relative to an observer, the frequency and wavelength changes.

More evidence supports The Big Bang theory so it is the current accepted model for the origin of the Universe.

Steady State theory	*Universe has always existed and is expanding. New matter continuously created as expansion occurs.*
Big Bang theory	*The whole Universe and all matter started out as s tiny point of energy. Universe expanded from this point and is still expanding.*

Evidence supporting	
Steady State theory.	Red-shift.
Big Bang theory.	Red-shift and CMBR.

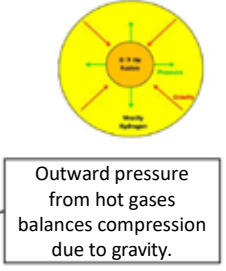| Red-shift	*The observed increase in wavelength of light from most distance galaxies. Light moves towards the red end of the spectrum.*
Hubble (1929)	*He studied light from distant galaxies; found as frequency decreases, wavelength increases.*

Redshift

Origin of Universe

CMBR	
	Cosmic Microwave Background radiation

Huge amounts of radiation released at Big Bang. As universe expands, wavelength of radiation has increased. Detected now as microwave radiation.

Light from star in our galaxy.

Light from star in nearby galaxy.

Light from star in distant galaxy.

EDEXCEL TOPIC 7 ASTRONOMY (PHYSICS ONLY).

Provides evidence for expansion.

Galaxies are moving away from us in all directions.

Greater the red-shift, the further away a galaxy is so the faster it is moving.

Light from distant galaxies is red-shifted, so galaxy is moving away from us.

Looking into space

Life cycle of stars

Reflecting telescope.

Refracting telescope.

Optical telescope	*Uses light to help to see distant objects clearly.*

For clearer images use a higher quality of objective lens and increase the aperture (increase the diameter of objective lens to allow more light in).

Nebula	*A cloud of hydrogen gas and dust*	Particles pulled together by own gravity. Cloud contracts becoming denser. Hydrogen becomes hotter as it spirals inwards, starts to glow.
Protostar	*The large ball of gas contracts to form a star*	More mass is attracted, clouds gravitational pull gets stronger and temperature rises. A star is 'born'.
Main sequence	*Stable period of star*	Temperature and pressure become high enough forcing Hydrogen nuclei to fuse to form Helium.

Outward pressure from hot gases balances compression due to gravity.

On Earth	Earth's atmosphere reflects and absorbs light coming from space. Light pollution makes it hard to see dim objects.
In space	Avoids atmosphere, so better images obtained.

Stars the same size as our Sun.

Stars larger than our Sun.

| Red giant	*Most of Hydrogen has been fuse, outer layers expand, star swells*	Core is not hot enough to withstand gravity and it collapses.
White dwarf	*Star pulled inwards by gravity and collapses*	Nuclear fuel runs out, fusion stops, dense very hot core which cools to become a black dwarf.

Red super giant	*Fuel used faster, undergo more fusion making heavier elements.*	Expand and contract more times, as balance between gravity and thermal expansion shifts.
Supernova	*Gigantic explosion due to run away fusion reactions*	Outer layers of dust and gas flung into space. Large gravitational forces collapse the core into a tiny space.
Neutron star	*Very dense star*	Matter pulled back in due to gravity.

Using EM waves	*Allows us to 'see' parts of the Universe not emitting light.*

Telescopes using all parts of EMS have been developed (1940s).
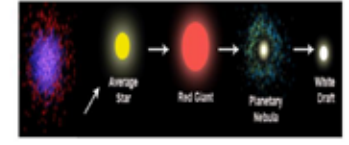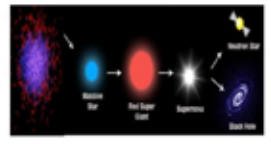
X-ray telescopes detect high temperature events ie: exploding stars.

Modern telescopes often connected to computers for sharper, clearer images.

Bigger telescopes provide better resolution, and gathers more light.
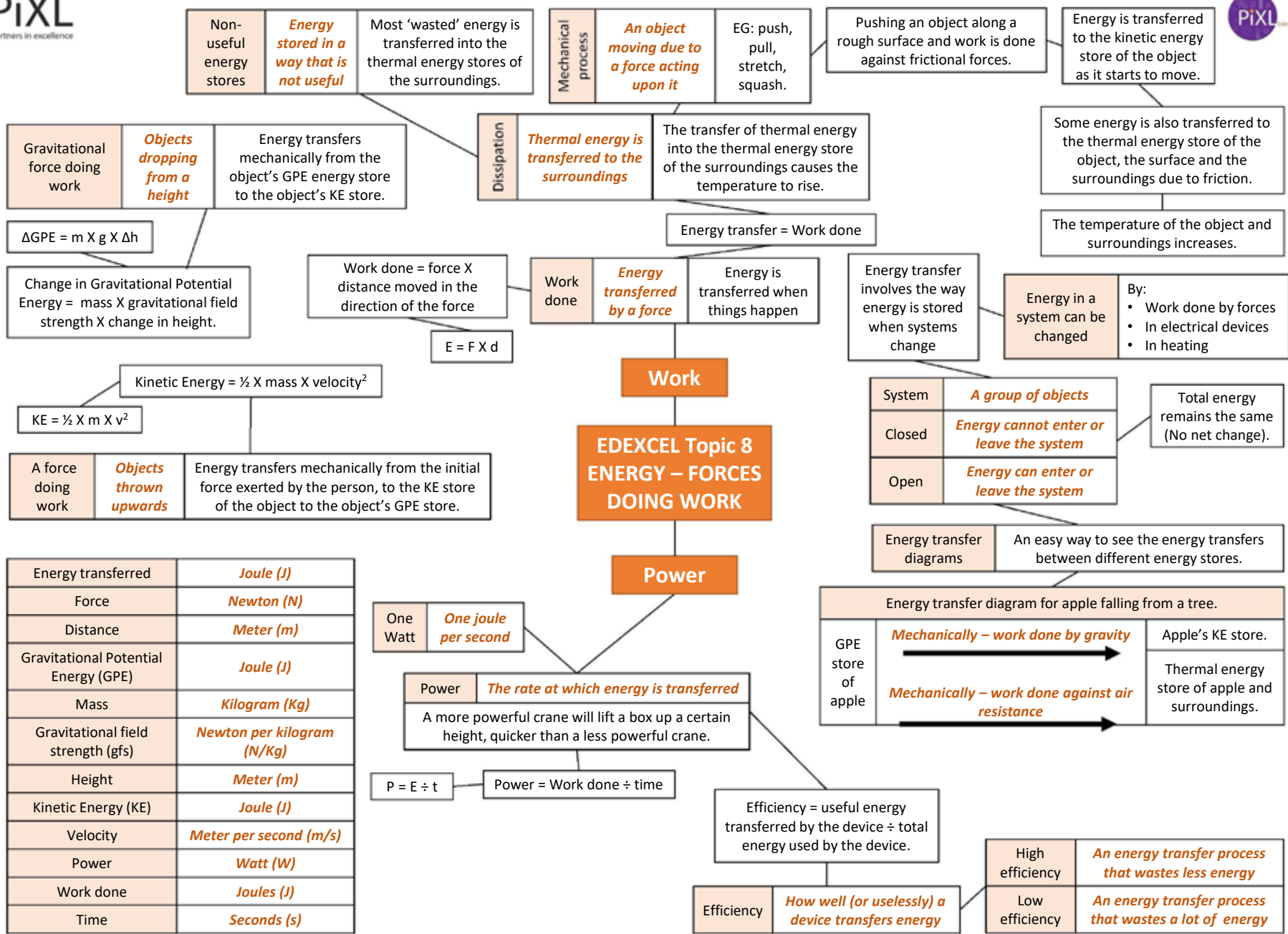
See fainter objects, further in space.

Huge Stars.

Black hole	*Gravity pulls remains in.*	Gravitational pull so strong not even light escapes.

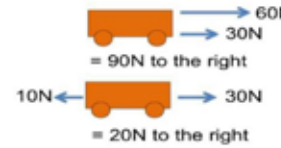**PiXL** Partners in excellence

| Non-useful energy stores | *Energy stored in a way that is not useful* | Most 'wasted' energy is transferred into the thermal energy stores of the surroundings. |

| Mechanical process | *An object moving due to a force acting upon it* | EG: push, pull, stretch, squash. |

Pushing an object along a rough surface and work is done against frictional forces.

Energy is transferred to the kinetic energy store of the object as it starts to move.

| Gravitational force doing work | *Objects dropping from a height* | Energy transfers mechanically from the object's GPE energy store to the object's KE store. |

| Dissipation | *Thermal energy is transferred to the surroundings* | The transfer of thermal energy into the thermal energy store of the surroundings causes the temperature to rise. |

Some energy is also transferred to the thermal energy store of the object, the surface and the surroundings due to friction.

$$\Delta GPE = m \times g \times \Delta h$$

Change in Gravitational Potential Energy = mass X gravitational field strength X change in height.

Energy transfer = Work done

The temperature of the object and surroundings increases.

| Work done = force X distance moved in the direction of the force | | Work done | *Energy transferred by a force* | Energy is transferred when things happen |

Energy transfer involves the way energy is stored when systems change

| Energy in a system can be changed | By: • Work done by forces • In electrical devices • In heating |

$$E = F \times d$$

Kinetic Energy = ½ X mass X velocity^2

$$KE = \tfrac{1}{2} \times m \times v^2$$

| A force doing work | *Objects thrown upwards* | Energy transfers mechanically from the initial force exerted by the person, to the KE store of the object to the object's GPE store. |

Work

EDEXCEL Topic 8 ENERGY – FORCES DOING WORK

Power

System	*A group of objects*	
Closed	*Energy cannot enter or leave the system*	Total energy remains the same (No net change).
Open	*Energy can enter or leave the system*	

| Energy transfer diagrams | An easy way to see the energy transfers between different energy stores. |

Energy transferred	*Joule (J)*
Force	*Newton (N)*
Distance	*Meter (m)*
Gravitational Potential Energy (GPE)	*Joule (J)*
Mass	*Kilogram (Kg)*
Gravitational field strength (gfs)	*Newton per kilogram (N/Kg)*
Height	*Meter (m)*
Kinetic Energy (KE)	*Joule (J)*
Velocity	*Meter per second (m/s)*
Power	*Watt (W)*
Work done	*Joules (J)*
Time	*Seconds (s)*

| One Watt | *One joule per second* |

| Power | *The rate at which energy is transferred* |
| A more powerful crane will lift a box up a certain height, quicker than a less powerful crane. |

$$P = E \div t$$

Power = Work done ÷ time

Energy transfer diagram for apple falling from a tree.

| GPE store of apple | *Mechanically – work done by gravity* → | Apple's KE store. |
| | *Mechanically – work done against air resistance* → | Thermal energy store of apple and surroundings. |

Efficiency = useful energy transferred by the device ÷ total energy used by the device.

| Efficiency | *How well (or uselessly) a device transfers energy* |

| High efficiency | *An energy transfer process that wastes less energy* |
| Low efficiency | *An energy transfer process that wastes a lot of energy* |

Hartford Church of England High School

PiXL — Partners in excellence

Scalar	*Has a magnitude (size)*	Temperature, speed, mass, time.		Vectors	*Pairs of arrows are used*	Length or arrow shows magnitude, direction of arrow shows the direction of the force
Vector	*Has a magnitude (size) and a direction*	Velocity, gravity, momentum.				

Force	*A vector quantity*	. A push or a pull on an object.
Contact forces	*Two objects have to touch for the force to act. Interact at zero distance.*	Caused by objects interacting. E.G. Friction, man pushing a wall, a book on a table, Upthrust of water on a boat.
Non-contact forces	*Two objects do not have to touch for the force to act. Can interact at a distance.*	Caused by interacting fields. E.G. Magnetic forces, electrostatic forces, gravitational forces.

= 60N
30N
= 90N to the right

10N
30N
= 20N to the right

HIGHER ONLY

Vector diagrams

EDEXCEL TOPIC 9 - FORCES AND THEIR EFFECTS

Objects affecting each other

Free body force diagrams	*A diagram showing all the forces acting on an isolated object or a system*	The size and direction of the pairs of forces acting upon an object or system.
Resultant force	*Forces acting along the same line*	Add together the forces acting in the same direction. Subtract the forces acting in opposite directions.
Vector diagrams	*A diagram where forces do not act in the same line. Use scale diagrams to find the resultant force*	Draw all the forces acting upon an object. Make sure they are to scale and in the right directions. Draw a joining line rom the start of the first force and the end of the last force.
Equilibrium	*Pairs of forces are balanced, the resultant force is zero*	On a scale diagram, the tip of the last force drawn should end where the tail of the first force was drawn
Resolving forces	*Not all forces act horizontally or vertically*	If make the 'awkward' angle easier to work with, split it into two components - drawn at right angles the two forces act together to have the same effect as the single force.
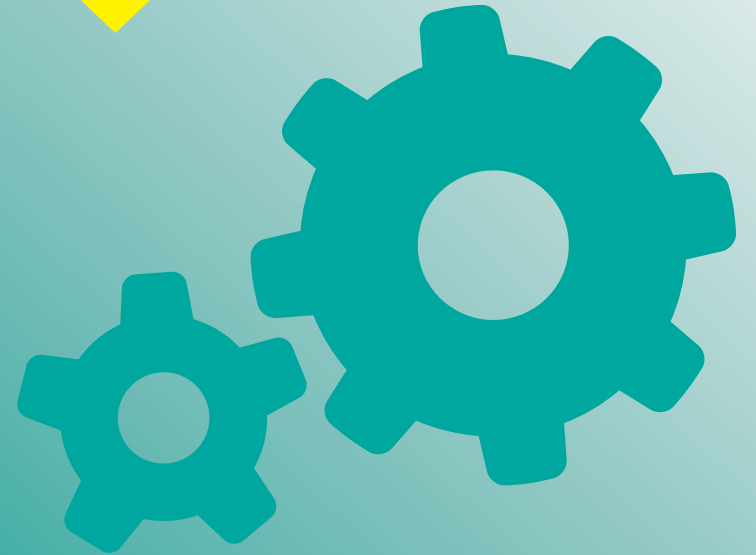
The sum of clockwise moments = The sum of anti-clockwise moments .

Principle of moments	*Rotational forces are in equilibrium*

Moment	*A turning effect of a force*	When a force causes an object to rotate. EG: Spanner on a nut.

Moment of a force = force X distance normal to the direction of the force.

Moment of a force	*Newton metre (Nm)*
Force	*Newton (N)*
Distance normal to direction of force	*Metre (m)*

Lever	*A bar pivots about a point and transfer a force.*	Using a long lever the force applied by a man at one end can be multiplied at the load end to lift a large force.

Rotational forces

PHYSICS HIGHER ONLY
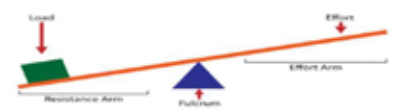
Lubrication	*Using a liquid to reduce friction between moving parts*	Reduces unwanted thermal energy transfer.

Gears	*Two interlocking round circles with 'teeth'*	Gear A moves and affects gear B by interlocking the teeth and passing on the rotation motion.

Gear A has 12 teeth and gear B has 18 teeth.

The wheel with more teeth turns slower but the moment of the turning force will be bigger.

Ratio of moments = ratio of teeth = ratio of radii.

Load
Effort
Effort Arm
Resistance Arm
Fulcrum

History

Elizabeth I

Henry VIII- Father of Elizabeth. Began the Tudor period of religious turmoil by breaking from Rome.

Queen Mary I – Following the protestant reigns of Henry VIII and Edward VI, Mary sought to return England to Catholicism. Over 200 religious dissenters were burnt at the stake, leading to her being nick-named '**Bloody Mary**' by protestants

Queen Mary of Scots- Catholic Queen of Scotland considered by many English Catholics as the rightful heir to the English throne. Several plots to replace Elizabeth with her failed. Eventually executed by Elizabeth I.

King Philip of Spain- Catholic. A one-time suitor of Elizabeth, he went to war with Elizabeth with the Spanish Armada

Sir Francis Drake- Best known for his role in the defeat of the Spanish Armada. Also a 'privateer' (pirate) Explorer and slave trader.

Tudor Religious Turmoil

👑 **King Henry VIII-** broke from Rome & the Catholic Church

👑 **Edward VI-** Protestant. Persecution of Catholics.

👑 **Queen Mary-** Catholic. Persecution of Protestants

👑 **Elizabeth I-** Protestant

Catholicism
- Pope the head of Church.
- Bible & church services held in Latin.
- Mass an important ritual. Catholics believed in transubstantiation- that the bread and wine became Jesus' body
- Churches often elaborately decorated & priests wore vestments (ceremonial clothing)

Protestantism
- Luther, a German Monk, brought widespread change to Europe, leading to a new form of Christianity.
- Henry VIII broke from Rome, positioning himself as head of the English church. (largely because he needed to divorce Catherine of Aragon to have a male heir)
- Protestant churches believed the bible should be taught in the vernacular (local language) not latin.
- Did not believe in transubstantiation

Religious Settlement

Elizabeth needed to unite Protestants and Catholics. She aimed to avoid the religious extremism of previous monarchs and create a '**middle way**' between the two.

Act of Supremacy: made Elizabeth 'Supreme Governor' of the Church Of England. Denying her position was considered treason.

Act of uniformity: Protestantism made the official religion, fines introduced for recusants (those refusing to attend church) but aspects of Catholic worship preserved in churches (e.g. Holy Communion & priests wearing of vestments) and aspects of Catholicism preserved in **the book of common prayer**

What were the causes of the Spanish Armada?
- Execution of Catholic Queen Mary of Scots in 1587
- Francis Drake's raid on Cadiz
- Philip's desire to restore Catholicism to England. Pressure on Philip from Pope to act.
- English raids by privateers (Sir Francis Drake) on Spanish shipping in the New World (South America)
- Elizabeth's military support of Protestants in Netherlands and France (Huguenots) a threat to Catholic Spain and France.

Key dates

1533- Born

1558- Becomes Queen

1559- Act of Supremacy and Uniformity passed

1587- Execution of Mary Queen of the Scots

1588- Spanish Armada defeated

1601- The Golden Speech

1603- Death

Elizabeth I- A golden Age?

Trade and Exploration

👍 Sir Francis Drake Circumnavigated the world 1577-1580. Many new lands 'discovered'. And gold, and other precious commodities traded

👎 Sir Francis Drake completed some of the earliest slaving trips, selling slaves to the Spanish in the New World. First attempts at establishing colonies in America failed. Privateers were motivated by wealth and Queen had little control over them

Poverty

Introduction of **Elizabethan Poor Laws in 1601**: the Rich were taxed in order to provide for the 'deserving poor'. These laws were largely unchanged until the 1834 Poor Laws.

Widescale shift from arable to sheep farming saw increase in unemployed. The Monasteries, which had traditionally helped the poor, were closed during the 1530s. Many harsh punishments for 'vagabonds'. Life did not improve for most people.

Education & The Arts

Shakespeare was writing during Elizabeth's reign. A boom in theatre: The Globe opened in 1599
The **peace and stability** brought to England following years of upheaval allowed the arts to flourish, and Elizabeth was a significant **patron of the arts**.

Foreign Relations

Seminal victory of 1588 against Spanish Armada, beginning of the English Navy's ascendancy; establishment of the East India Company, and networks that formed the basis of an English Empire; First colony of Roanoke in Virginia (named after the Queen) English power maintained by Elizabeth's refusal to marry a foreign prince.

The Spanish Armada

1560- English Privateers capture Spanish ships

1567- Spain invades the Netherlands. England allies with the Dutch.

1585- King Philip commissions ships for the Spanish Armada.

1587 February- Catholic Queen Mary of Scots executed by Elizabeth I.

1587 April- Sir Francis Drake raids Cadiz (Spain) destroying or capturing over 100 ships.

1588- Spanish Armada sets sail for England, despite being weakened by 1587 attack on Cadiz.

July 20-27 Spanish sail up Channel. Sporadic attacks by English, but crescent formation of Spanish makes them unsuccessful

July 27th English attack Spanish fleet anchored at Calais using fireships. Spanish cut anchors to flee.

July 28th Battle of Gravelines. English prevent Spanish from landing.

Spanish fleet forced to sail North, around Scotland and Ireland. Many Spanish ships destroyed by storms. Cemented Elizabeth's reputation as a powerful leader.

Despite the defeat, Spanish Empire continued to grow in influence for the next 100 years.

A Golden Age?

Peace, power and pride

Art • Science and technology

A Golden Age?

Exploration • Education

Theatre • Literature

Buildings

Key individuals

John Hawkins was a key figure at court. He was responsible for building up the Royal Navy. Was also involved in the slave trade and introduced tobacco

Sir Walter Raleigh very loyal to Elizabeth and a favourite. Attempted to establish a colony in North America. He was banished for 5 years (secret marriage)

William Shakespeare was the most celebrated playwright of all time with 38 plays. Wrote for the Lord Chamberlain's Men

Francis Drake was English hero but Spanish called pirate. Led defeat of the Was a privateer.

Key dates

1576	The Theatre was opened by James Burbage
1587	The Rose opened
1588	The Spanish Armada
1599	The Globe opened

Voyages of exploration

Several European countries were investigating the new world, bringing home treasures and claiming land. Drake circumnavigated the globe from 1577-80. He and his cousin John Hawkins made one of the first voyages to sell slaves. New technology such as the and astrolabe helped make this possible. Spain was often the target of the privateers 'sea dogs'

Poverty

Not everyone in Elizabethan England benefited from the increased prosperity and trade. A growing population, bad harvests and enclosure created a very poor group at the bottom of society. The poor were categorised into; the deserving poor who could not help themselves, the undeserving poor who were untrustworthy and did not want honest work, the idle poor seen as lazy and the able poor. Beggars could be whipped, branded, have a hole burned in the ear or hung. Towns such as York, Ipswich and Norwich had their own ways to deal with the poor. The 1601 Poor Law taxed the wealthy to care and support the old, sick and vulnerable. The fit and healthy were to be given work. The idle could be whipped and placed in the house of correction.

KEY VOCABULARY/ TERMS

Tier 2 - significant, conclude, attitude, contrast, overall, furthermore, convincing, involve, feature, impact, previous, contribute, demonstrate, illustrate, participate, despite, hence, facilitate, nevertheless, globe, exploit, likewise.

Tier 3 - exploration, theatre, poverty, beggars, vagabond, Armada, privateers, circumnavigation, voyages, enclosure.

Key words

Make sure you understand what each word means and try to use it in a practice answer.

Write an account... 8 marks

- Write an account of the ways in which Elizabeth's reign could be seen as a 'golden age'
- Write an account of the different ways in which towns and cities dealt with poverty in Elizabethan England.
- Write an account of how the Poor Law system changed under Queen Elizabeth I.

Explain... 8 marks

- Explain what was important about exploration and trade in Elizabethan England.
- Explain what was important about the voyages of discovery in the reign of Elizabeth I.
- Explain what was important about the navy for Elizabethan England.

How convincing is interpretation...about... 8 marks

- How convincing is Interpretation B about the causes of poverty in Elizabethan England?
  Explain your answer using Interpretation B and your contextual knowledge.

Interpretation B Spartacus Educational, a history education website

Unemployment was a major cause of poverty. When large landowners changed from arable to sheep farming unemployment increased rapidly. The closing of the monasteries in the 1530s created even more unemployment. As monasteries had also helped provide food for the poor, this created further problems. Unemployed people were sometimes tempted to leave their villages to look for work. This was illegal and people who did this were classed as vagabonds.

Geography
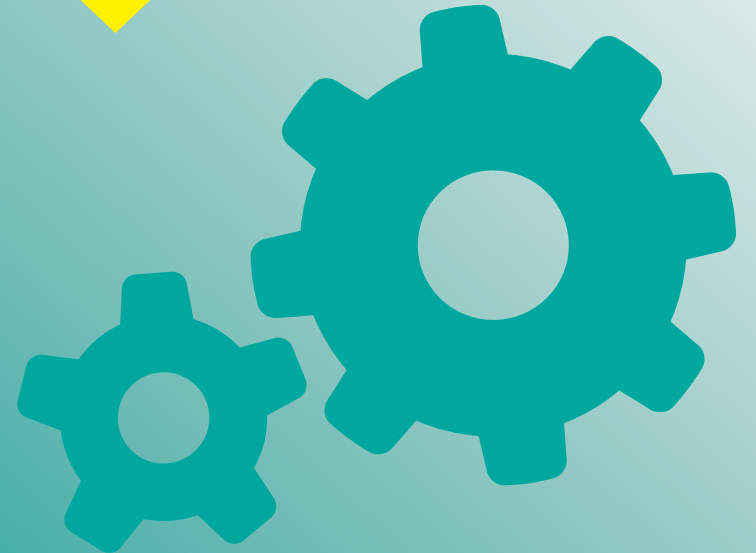
What are Natural Hazards?
Natural hazards are physical events such as earthquakes and volcanoes that have the potential to do damage humans and property. Hazards include tectonic hazards, tropical storms and forest fires.
What affects hazard risk?
Population growth
Global climate change
Deforestation
Wealth - LICs are particularly at risk as they do not have the money to protect themselves

Earthquakes and Volcanoes
Volcanoes
Constructive margins – Hot magma rises between the plates eg. Iceland. Forms Shield volcanoes
Destructive margins – an oceanic plate subducts under a continental plate. Friction causes oceanic plate to melt and pressure forces magma up to form composite volcanoes eg the Pacific Rim
Earthquakes
Constructive margins – usually small earthquakes as plates pull apart.
Destructive margins – violent earthquakes as pressure builds and is then released
Conservative margins – plates slide past each other. They catch and then as pressure builds it is released eg San Andreas fault. .

Structure of the Earth
The earth has 4 layers
The inner core
The outer core
The mantle
The crust
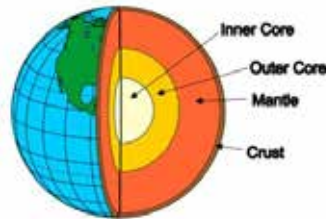
The crust is split into major fragments called **tectonic plates**.
There are 2 types: **Oceanic** (thin and younger but dense) and **Continental** (old and thicker but less dense)
These plates move and where they meet you get tectonic activity (volcanoes and earthquakes).
There are 2 theories of why plates move: **convection currents** and **ridge push, slab pull**.

Plates either move against each other (**destructive** margin) away from each other (**constructive**) or next to each other (**conservative**

Destructive plate margin

Constructive plate margin
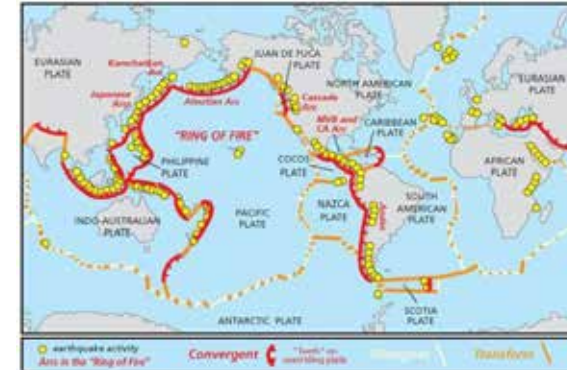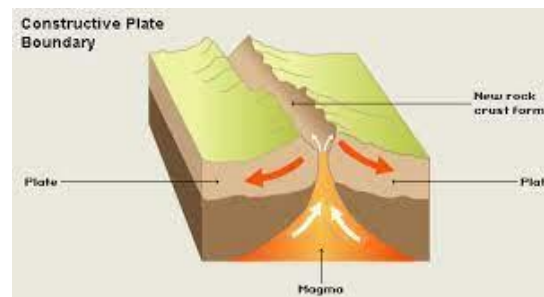
Conservative plate margin
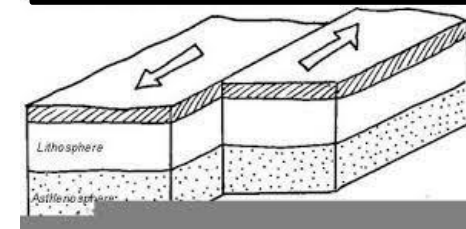
Effects of Tectonic Hazards

Primary effects happen immediately. Secondary effects happen as a result of the primary effects and are therefore often slightly later.

Primary - Earthquakes
Property and buildings destroyed, People injured or killed
Ports, roads, railways damaged, Pipes (water and gas) and electricity cables broken

Secondary - Earthquakes
Business reduced as money spent repairing property, Blocked transport hinders emergency services, Broken gas pipes cause fire
Broken water pipes lead to a lack of fresh water

Primary - Volcanoes
Property and farm land destroyed, People and animals killed or injured
Air travel halted due to volcanic ash, Water supplies contaminated

Secondary - Volcanoes
Economy slows down. Emergency services struggle to arrive
Possible flooding if ice melts Tourism can increase as people come to watch
Ash breaks down leading to fertile farm land

Responses to Tectonic Hazards

Immediate (short term)
Issue warnings if possible
Rescue teams search for survivors
Treat injured
Provide food and shelter, food and drink
Recover bodies
Extinguish fires

Long-term
Repair and re-build properties and infrastructure
Improve building regulations
Restore utilities
Resettle locals elsewhere
Develop opportunities for recovery of economy
Install monitoring technology

Chile GDP:$ 13,000
HDI: 0.85

Nepal GDP: $1550.
HDI 0.60

Comparing Earthquakes – Chile (HIC) and Nepal (LIC)

Primary Effects Chile, Feb 2010
500 deaths, 12,000 injured, Lose of power and water.220,000 homes destroyed

Nepal, April 2015 Primary Effects
9,000 deaths, 3 million people homeless, Water and electricity cut off

Secondary Effects Chile, Feb 2010
1500 km of road damaged by landslides., Coastal owns devastated by tsunami waves.
Fire at a chemical plant – area had to be evacuated.

Secondary Effects Nepal, April 2015
Landslides and avalanches blocked roads and hampered relief efforts. Avalanche on Mt Everest killed 19 people., Landslide blocked a river – many people evacuated in case of flooding.

Immediate Responses Chile, Feb 2010
Temporary repairs made to Route 5 (north-south highway) within 24 hours., Power and water restored to 90% of homes within 10 days., A national appeal raised $60 million enough for 30,000 small emergency shelters.

Immediate Responses Nepal, April 2015
Search and rescues teams, water and medical support arrived from UK, India., Helicopters rescued people.
Half a million tents needs to provide sheltered for the homeless. Field hospitals set up to support overcrowded main hospitals

Long term responses Chile, Feb 2010
Housing reconstruction plan to help 200,000 households., President says it could take 4 years to recover from damaged caused to buildings and ports., Chile used money from exporting copper so didn't need foreign aid.

Long term responses Nepal, April 2015
Roads repaired and landslides cleared., 7,000 schools to be re-built/repaired., Stricter controls on building codes., Repairs to Everest base camp and trekking routes. By August 2015 it was re-opened for climbers.

Reducing the risk of tectonic hazard

Monitoring:

Volcanoes: Remote sensing from satellites, seismometers, measuring gases dissolved in water.

Earthquakes: These occur without warning

Prediction:

Volcanoes: Based on scientific monitoring

Earthquakes: Using historical records but you cant accurately predict.

Protection:

Volcanoes: earth embankments can divert lava

Living on a plate margin: Iceland

Iceland lies on the Mid Atlantic ridge

Iceland has many benefits from the tectonic activity

Tourism (Blue Lagoon)

Geothermal energy (25%)

Natural hot water provides central heating to 90% of the country

Why do people live in tectonic risk areas?

Poor people have no choice

Earthquake resistant buildings can make it safer

Earthquakes and volcanic eruptions are seen as rare so the risk is low

Fertile soils and tourism can have economic benefits
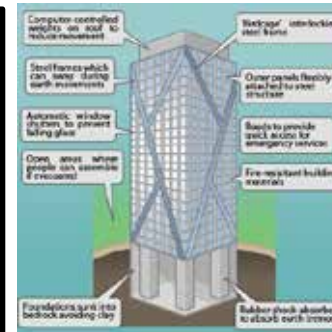
Tectonic Hazards	Geothermal energy	Pressure
Composite volcanoes	Ground deformation	Primary effect
Conservative plate margin	Hot spots	Protection
Constructive plate margin	Hydrology	Remote sensing
Continental crust	Immediate response	Ridge push
Continental drift	Landslide	Search and rescue
Convection current	Lava	Secondary effects
Core	Linear belts	Seismicity
Destructive plate margin	Long-term response	Shield volcano
Earthquake	Magma	Slab pull
Friction	Management strategies	Subduction
Fold mountains	Mantle	Tectonic hazard
Geophysical measurements	Monitoring	Tectonic plate
	Oceanic Crust	Tsunami
	Disaster planning	Volcanic belt
	Plate margin Prediction	Volcano

- Explain the physical processes that happen at constructive plate margins (4 marks)
- Using Figure 2 and your own understanding, suggest how plate movements cause box tectonic hazards in Iceland. (6 marks)
- Study Figure 5, photographs showing different types of response to a tectonic hazard. 'Long-term responses to a tectonic hazard are more important than immediate responses.' Do you agree? Using Figure 5 and one or more examples, explain your answer. [9}
- Using the images and your own knowledge, assess how management strategies can be used to reduce tectonic hazard risk. [9]

Religious Studies

Religious Studies - Theme B: Religion and Life
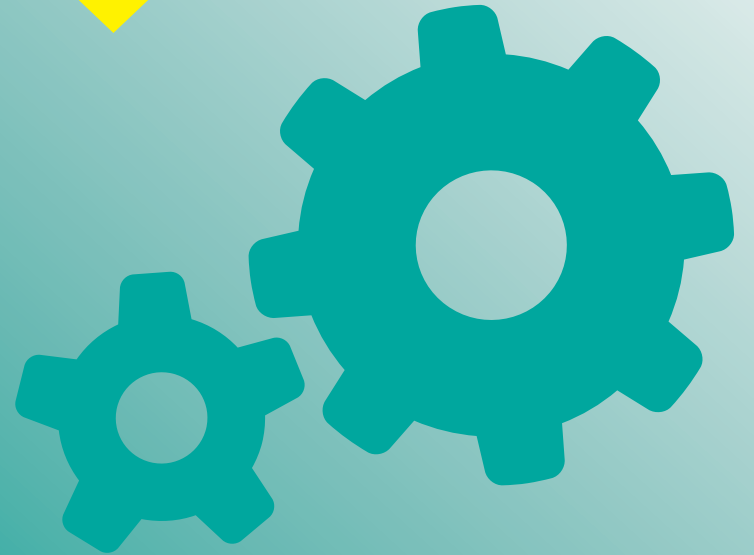
Key Words			
Abortion	The ending of a pregnancy	**Liberal**	A type of Christian who reads the Bible as stories, myths and metaphors
Big Bang Theory	Scientific theory of the creation of the universe through a large explosion	**Literalist**	A type of Christian who believes the Bible is literally true + the word of God
Dominion	The power humans have over God's creation	**Natural Resources**	Materials found in nature (e.g. coal, oil) which are exploited by humans
Euthanasia	The painless killing of a terminally ill patient	**Purgatory**	Where Catholics believe souls are purified after death + before heaven
Evolution	Scientific theory of the development of humans from apes	**Quality of Life**	How easy or difficult someone's life is – e.g. cancer causes a low quality of life
Heaven	Paradise where those judged good go after death to be forever with God	**Sanctity of Life**	The belief that all life is sacred as man is made in God's image
Hell	Damnation where those judged bad go after death to be forever without God	**Stewardship**	The responsibility God gave humans to look after the world
Judgement	After death Christians believe you are judged by God	**Vegetarian**	The choice not to eat animals

Key Ideas		
Ideas about Creation	**Christian Ideas** - Christians believe the universe was designed and made by God - The creation story in **Genesis 1** says that God made the world in six days - **Literalist Christians** believe this is true and that God created Adam + Eve from whom all humans come - **Liberal Christians** say the creation story in the Bible is just a story and may agree with scientific ideas about creation *"In the beginning God created the heavens and the earth" – Genesis 1:1*	**Scientific Ideas** - The **Big Bang Theory** argues that the universe started as a dense collection of mass which massively expanded creating stars, galaxies and planets - The **Theory of Evolution** comes from Charles Darwin who observed that animals change over time and argued that humans were not designed by God but evolved from apes - These theories do not fit with a **literalist Christian's** view but could fit with a **liberal** view
Stewardship + Dominion	**Stewardship** - **Stewardship** means Christians have a **duty** to look after the environment on behalf of God and for future generations - This can be seen where Christians campaign for environmental charities or choose to reduce waste and recycle *"Rule over [..] every living creature" - Genesis 1:28*	**Dominion** - **Dominion** is the idea that God gave humans power and authority over the world - Some Christians believes this allows them to use **natural resources** (e.g. oil and coal) and animals to make their lives better - In **Genesis** God gives Adam and Eve the power to name the animals and rule over them
Abortion	- **Abortion** is the removal of a foetus from the womb in order to end a pregnancy. - In the UK (except Northern Ireland) it is **legal** during the first 24 weeks of pregnancy unless the mother's life is in danger or the foetus is severely deformed. ☒ The **Catholic Church** is strongly against abortion. They believe in **sanctity of life**, the idea that life is a sacred gift from God which only God can take away. They see the foetus as a living thing. ☑ The **Church of England** think abortion is sometimes acceptable as a pregnancy as a result of rape or where the child would be very ill would lead to a very poor **quality of life**	
Euthanasia	- **Euthanasia** is the painless killing of a patient with a terminal illness. - **Voluntary** euthanasia is where the patient asks for their life to be ended. - **Non-voluntary** euthanasia is where the patient is not capable of asking to die, perhaps in a coma. - All forms of euthanasia are currently **illegal** in the UK. ☒ The **Catholic Church** is strongly against euthanasia. They believe that only God can give and take life and that life is sacred (**sanctity of life**) ☑ Some *liberal Christians* think euthanasia can be an act of mercy which Jesus tells them is a good thing to do, this is especially the case when someone's **quality of life** is very poor.	
The Afterlife	- Christians believe that when you die you will be judged and that those who are found to be good will go to **heaven** but those who have sinned and gone against God's wishes will go to **hell**.	
	Roman Catholics believe that there is a middle stage called **purgatory** where souls go to be purified of sin before they go to heaven	**Some Christians** believe that Jesus will return on a future **Day of Judgement** when all souls will be judged

Spanish
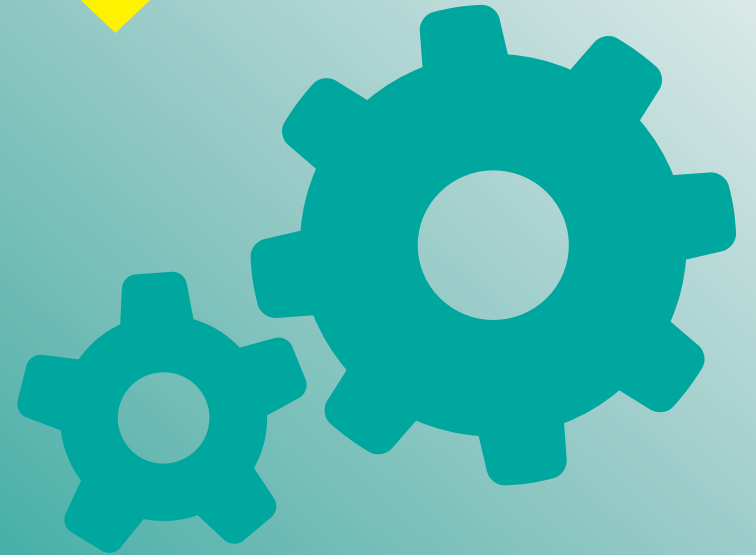
Mi casa y donde vivo

Los verbos	
Vivir	To live
Visitar	To visit
Construir	To build
Compartir	To share
Tener	To have
Mudar se	To move

Los adjetivos	
Amueblado/a	Furnished
Adosado/a	Detatched
Lleno/a de	Full of …
Conocido/a por	Known for
Animado/a	Lively
Ruidoso/a	Noisy
Tranquilo/a	Quiet
Limpio/a	Clean
Sucio/a	Dirty
Feo/a	Ugly
Hermoso-a/ Precioso/a	Pretty
Antiguo-a/Viejo-a	Old
Moderno-a	Modern
(In)Cómodo/a	(Un)Comfortable
Grande	Big
Pequeño/a	Old

Los sustantivos (Donde vivo)	
Vivo en …/ Vivimos en …	I live in/ We live in …
un piso	an apartment
una casa adosada	semi-detached/terraced house
una finca/una granja	a farmhouse
una casa individual	a detached house
una residencia de ancianos	an old people's home
un barrio de la ciudad	a neighborhood in the city
está situado/a *lejos* de …	it is situated far from
está situado/a *cerca* de …	it is situated near to
está situado/a en	it is situated in
el norte / sur	the north/ south
el este/ oeste	the east/west
una ciudad	a city
un pueblo	A town
una calle	A street
las afueras	the outskirts
la costa	the coast
el campo	the countryside
la montaña / la sierra	the mountains

Los posesivos	
Mi (casa)	My (house)
Tu (casa)	Your (house)
Su (casa)	His/her (house)
Nuestra/o casa	Our (house

Sustantivos – Mi casa	
Mi casa (no) tiene.. En mi casa (no) hay…	Mi house has (not) ….. In my house there is (not)…
(dos) plantas	(two) floors
(cinco) habitaciones	(five) rooms
En la primera/segunda planta hay …	On the first/second floor there is/are
En la planta baja hay …	On the ground floor there is /are
Arriba / abajo hay …	Upstairs/downstairs there is/are
un dormitorio	a bedroom
una cocina	a kitchen
un estudio	a studio
un sótano	a basement
un cuarto de baño	a bathroom
un comedor	a dining room
un aseo	a toilet
un salón	a living room
un jardín con cesped /flores	a garden with grass/flowers
un garage	a garage

Mi casa ideal
Sería – It would be Estaría – It would be Tendría - It would have Me gustaría que fuera – I would like it to be Me gustaría que tuviera – I would like it to have

Knowledge organiser: Mi rutina

Daily Routine	
Me levanto	I get up
Me despierto	I wake up
Me ducho	I have a shower
Me baño	I have a bath
Me visto	I get dressed
Me peino	I comb my hair
Desayuno	I have breakfast
Voy al colegio	I go to school
Me maquillo	I do my make up
Me visto	I get dressed
Estudio	I study
Vuelvo a casa	I return home
Como/ Almuerzo	I eat/ I have lunch
Meriendo	I have a snack
Hago los deberes	I do homework
Escucho música	I listen to music
Veo la tele	I watch tv
Ceno	I have dinner
Me acuesto	I go to bed
Voy a la cama	I go to bed
Duermo	I sleep
Sueño	I dream

Los verbos para ganar dinero de bolsillo			
Para ganar dinero, ayudo en casa		To earn money, I help at home	
Tengo que / Suelo …		I have to / I usually …	
Hacer de canguro	To babysit	Cocinar	To cook
Pasar la aspiradora	To hoover	Planchar la ropa	To iron the clothes
Pasear el perro	To walk the dog	Cuidar a mis hermanos	Look after my brothers
Lavar los platos	To do the dishes	Sacar la basura	To take the rubbish out
Limpiar el baño	To clean the bathroom	Cocinar	To cook
Lavar el coche		Cortar el cesped	To cut the grass
Poner la mesa	To set the table	Hacer la cama	To make the bed
Ordenar mi dormitorio	To tidy my room	Poner el lavavajillas	To put the washing machine

Reflexive Verbs (Pelear**se**/ Vestir**se**/Duchar**se**)

	SE	-AR	-ER	-IR
Yo(I)	Me	O	O	O
Tu (You)	Te	AS	ES	ES
Él/ ella (he/ she)	Se	A	E	E
Nosotros (we)	Nos	AMOS	EMOS	IMOS
Vosotros (You all)	Os	AÍS	EÍS	ÍS
Ellos/as	Se	AN	EN	EN

Muebles			
Un ascensor	A lift	Un armario	A wardrobe
Un lavaplatos	A dishwasher	Una silla	A chair
Un microondas	A microwave	Una mesa	A table
Un sillón	A sofa	Una puerta	A door
Una nevera	A fridge	Una ventana	A window
Una alfombra	A carpet	Una calefacción	A central heatng
Una cama	A bed	Una lavadora	A washing machine

Knowledge organiser: Mi region

En la ciudad… In the city….			
Un ayuntamiento	A townhall	Una fabrica	A factory
Un castillo	A castle	Un cine	A cinema
Un mercado	A market	Un parque	A park
Un museo	A museum	Un polideportivo	A sports centre
Un puerto	A port	Un teatro	A theatre
Una bolera	A bowling alley	Una biblioteca	A library
Una iglesia	A church	Una mezquita	A mosque
Una piscina	A swimming pool	Una playa	A beach
Una plaza	A square	Un banco	A bank
Un estanco	A tobacconist's	Una cafetería	A café
Una estación de trenes	A train station	Una farmacia	A pharmacy
Una frutería	A grocery shop	Una librería	A book shop
Una panadería	A bakery	Una pastelería	A cake shop
Una peluquería	A hairdressers	Una tienda	A shop
Una agencia de viajes	A travel agency	Una zapatería	A shoe shop
Una centro comercial	A shopping center	Una tienda de regalos	A gift shop

Preposociones			
¿Dónde está?	Where is it?	Está…	It is …
Al lado de –	Next to	Aqui	Here
Delante de	In front of	Alli	There
Detrás de	Behind	Al final de la calle	At the end of the road
A la derecha	On the right	Cerca	Near
A la izquierda	On the left	Lejos	Far away
Debajo de	Underneath	Encima de	On top of

If Clause	
Si hace siol, iré al centro comercial	
If (it is sunny), I will go to the shopping center	
Si. (weather) + full infinitve +é (I will….)	

False Friends

las atracciones	entertainment facilities
la circulación	traffic
las distracciones	entertainment venues

Ventajas y desventajas de vivir en la ciudad/pueblo			
Lo bueno es que	The good thing is that	La ventaja es que	The advantage is that
Lo malo es que	The bad thing is that	La desventaja es que	The disadvantage is that
Es más …. que	It is more …than	Es menos ….que	It is less …than
hay mucho/poco que hacer		there is a lot/little to do	
hay buena vida nocturna		there is good night live	
hay más posibilidades laborales		there is more job opportunities	
hay demasiada gente		there are too many people	
hay más contaminación		there is more pollution	
hay mejores vistas		there are better views	
hay más paros		there are more unemployment	
la gente está más relajada		people are more relaxed	
es demasiado industrial		it is too industrial	

Clues for Tenses		
Past	**Present**	**Future**
Hace un mes– a month ago	Ahora -now	En el futuro
Antes - before	Hoy en dia - Nowadays	Después - after
En el pasado	Actualmente	El año que viene
El año pasado	De momento	Dentro de..within…
Había/ Tenía/ Solia haber/ Solía tener/ Era/Fue	Hay/ Tiene/ Suele haber/ Suele tener/ Es	Habrá/ Tendrá/ Será Ojalá tuviera Espero que tenga

IT

Topic Area 1: Planning and designing the spreadsheet solution

MB1: 1–3 marks	MB2: 4–6 marks	MB3: 7–10 marks
Limited use of design tools and features used to plan the solution, which are under-utilised for the intended purpose.	**Adequate** use of design tools and features used to plan the solution, which are mostly utilised for the intended purpose.	**Effective** use of design tools and features used to plan the solution, which are fully utilised for the intended purpose.
MB1: 1–4 marks	**MB2: 5–8 marks**	**MB3: 9–13 marks**
Limited functional design of spreadsheet solution. **Limited** design of system output(s) produced. **Limited** design of Human Computer Interface.	**Adequate** functional design of spreadsheet solution. **Adequate** design of system output(s) produced. **Adequate** design of the Human Computer Interface.	**Effective** functional design of spreadsheet solution. **Effective** design of system outputs produced. **Effective** design of Human Computer Interface.

MB1: 1–3 marks	MB2: 4–6 marks	MB3: 7–10 marks
Limited use of tools and techniques used to create the solution which are under-utilised for the intended purpose.	**Adequate** use of tools and techniques used to create the solution which are mostly utilised for the intended purpose.	**Effective** use of tools and techniques used to create the solution which are fully utilised for the intended purpose.

MB1: 1–4 marks	MB2: 5–8 marks	MB3: 9–13 marks
The solution allows **limited** interaction between user and spreadsheet to meet the needs of the scenario. The solution contains **inefficient** processes that affects the accuracy and quality of the data produced. The information presented is **limited** in relevance and accuracy.	The solution allows **adequate** interaction between the user and spreadsheet to meet the needs of the scenario. The solution contains some **inefficiencies**, but these do not affect the accuracy and quality of the data produced. The information presented is **partly** relevant and clear, but is open to misinterpretation. Data integrity is preserved using a **limited range** (one or two) tools and techniques. Future predictions are **partially** generated using the solution developed.	The solution allows **effective** interaction between the user and spreadsheet to fully meet the needs of the scenario. The solution contains **efficient** processes that generates accurate and high-quality data. The information presented is **fully** relevant to the scenario needs and clear in its message. Data integrity is preserved using a **range** of tools and techniques. Future predictions are **fully** generated using the solution developed.

MB1: 1–2 marks	MB2: 3–4 marks	MB3: 5–7 marks
Limited technical and/or usability testing undertaken.	**Adequate** technical and usability testing undertaken with results partly documented.	**Effective** technical and usability testing undertaken with results thoroughly documented.

Topic Area 4: Evaluating the spreadsheet solution

MB1: 1–2 marks	MB2: 3–4 marks	MB3: 5–7 marks
Basic evaluation which states which parts of the solution meet the client requirements.	**Adequate** evaluation which describes the effectiveness of the solution to meet the client requirements.	**Comprehensive** evaluation which explains the effectiveness of the solution to meet the client requirements.
Basic evaluation which states which parts of the Human Computer Interface worked well/ did not work well.	**Adequate** evaluation which describes the effectiveness of the Human Computer Interface to meet the client requirements.	**Comprehensive** evaluation which explains the effectiveness of the Human Computer Interface to meet the client requirements.

Computer
Science

Computer Science

Data Representation

In a computer, all data is stored in binary form. A binary digit has two possible states, 1 and 0.

A binary digit is known as a bit. A bit is the smallest unit of data a computer can use. The binary unit system is used to describe bigger numbers too.

File Sizes

8 bits	➡️	1 byte (B)
1,000 bytes	➡️	1 kilobyte (KB)
1,000 kilobytes	➡️	1 megabyte (MB)
1,000 megabytes	➡️	1 gigabyte (GB)
1,000 gigabytes	➡️	1 terabyte (TB)
1,000 terabytes	➡️	1 petabyte (PB)

Character sets

Every word is made up of symbols or characters. When you press a key on a keyboard, a number is generated that represents the symbol for that key. This is called a character code. A complete collection of characters is a character set.

Denary/Decimal

The number system most commonly used by people. It contains 10 unique digits 0-9. Can be known as either Decimal, Denary or Base 10.

Hexadecimal

Hexadecimal (or hex) is a base 16 system used to simplify how binary is represented. A hex digit can be any of the following 16 digits: 0 1 2 3 4 5 6 7 8 9 A B C D E F.

Binary

Computers use binary - the digits 0 and 1 - to store data. A binary digit, or bit, is the smallest unit of data in computing. It is represented by a 0 or a 1. Binary numbers are made up of binary digits (bits), e.g. the binary number 1001.

Key terms

Bit, nibble, kilobyte, megabyte, gigabyte, terabyte, petabyte, binary, hexadecimal, denary, decimal, file size, ASCII, UNICODE, character set, metadata, pixel, bit depth, overflow error, lossy, lossless, compression, sample.

Business
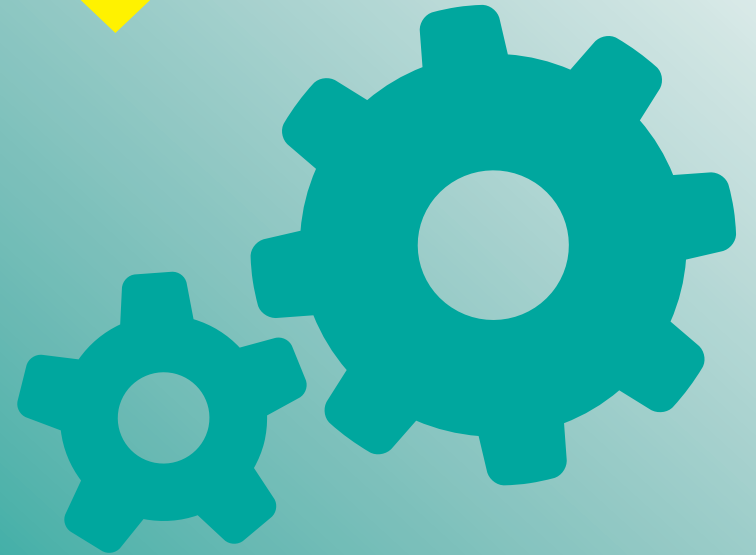
Business

Location

The location of a business is important as it is the place where the customers go to in order to purchase. When a business locates, it will base it on the following factors:

- Proximity to market- How important is it to be close to the customers
- Proximity to raw materials-How close the business is to the materials needed to produce the product/service.
- Proximity to labour - Some businesses need to be located close to skilled workers in order to run/function.
- Proximity to competitors -How close a business is to its rivals may determine how successful it is.

E commerce- some businesses operate online only and so do not benefit from having a physical marketplace.
Fixed Premises- a physical and permanent place of operation

Marketing Mix

The marketing mix is an overview of the 4 elements. They are known as the 4 Ps

- Price- The amount charged to the customers to purchase
- Place- where the product/service can be accessed
- Product- the purpose and design mix of the product/service
- Promotion- how the business and product is going to raise awareness to encourage customers to purchase.

It is important that a business regularly adapts parts of the mix to meet the needs of the customers to avoid becoming obsolete.

Technology is forcing businesses to constantly adapt

Start up options

Type	Benefits	Drawbacks
Sole Trader An unincorporated business run by one person,	• Can start trading immediately • Have 100 per cent control • You are your own boss • You receive 100% profit	• Unlimited liability • Have 100 per cent responsibility • Can lead to a high workload • Difficult getting finance
Partnership A business that is owned by a group of two or more people	• Liability is spread between the partners • Complementary skills • Not as much stress	• Unlimited liability • There may be conflict • Have to split the profits with all partners
Private Limited A private limited company is an incorporated business that is owned by shareholders.	• Limited liability • Can sell shares to outside investors through invitation only • The term LTD betters reputation	• Risk of losing control • Cost of starting up Could be conflict • More documentation to
Franchise Franchising means paying a franchise owner for the right to use an established business name, branding and business methods	• Product that has already become well established. • Risks of failure therefore become much smaller	• A royalty has to be paid each year even if sales and profits are falling. • The entrepreneur will have less control

Business Plans

The purpose of a business plan is to minimise risk and obtain finance
Include:
The Business Idea- what the business is all about
Aims and Objectives- where the business aims to be with strategies to get there.
Target market- details of market research
Sales and profit- A forecast regarding initial profit and costs
Cash flow forecast- a forecast showing a liquid/stable company
Sources of finance- what investment is needed to start up
Location- where the business be operating from
Marketing mix- analysis of all 4 aspects of marketing mix

Liability

Liability is the amount of money you are responsible for should your company/business go into debt and eventually liquidate.

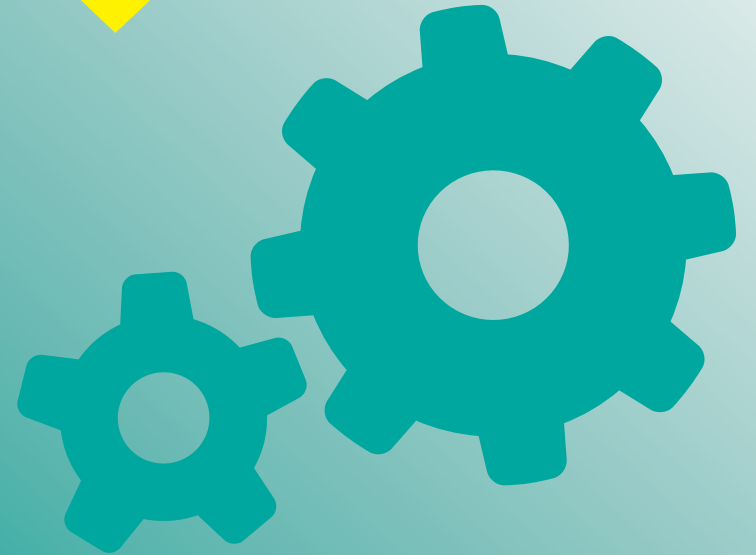| Limited	Unlimited
Limited Liability is where the level of risk is limited to the amount invested into the business, should the business face debt/financial crisis. They are liable for only the limited amount they invested to cover debts	Unlimited liability is where the owner of the business is responsible for all the debts it incurs, no matter how large. If the person cannot pay the debts they could lose their personal possessions or be made bankrupt.

Art

A04 Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language

RESPONSE
MEANINGFUL
VISUAL LANGUAGE **DEMONSTRATE**
UNDERSTANDING
MAKE CONNECTIONS
CONCLUSION

You need to be able to present a personal response, realising intentions and making informed connections with the work of others.

This final objective looks at all your work as a complete package; the examiner will view all of your preparatory work together with the final piece as an entire unit. They will be looking to see if you have successfully achieved what you set out to do. The examiner should be able to see connections between your own work and the work of the artists you have studied. Whatever you learned through artist research should be put to good practical use and clearly reflected in your own work.

Demonstrate skill
Communicate
Mastery
Respond
Link

Final pieces can be in any Fine art media
- Painting and drawing
- Sculpture
- Printmaking
- Textiles/Fashion

Expectations:
•It is expected that you will complete quite a lot of work for this course through the homework programme, approximately two hours per week
•It is advisable to attend GCSE Art club sessions each week
•You will need to hand in a sketchbook as part of your portfolio component.

Assessment

At the end of each project your work will be formally assessed by you and your teacher. However as your project progresses your teacher will assess your progress both with written and verbal feedback in lessons. This should give you a good indication of how well you have met the success criteria for each assessment objective and whether you are meeting your targets.

Please remember grades are not set in stone and any improvements you make to your work can be re assessed by your teacher.
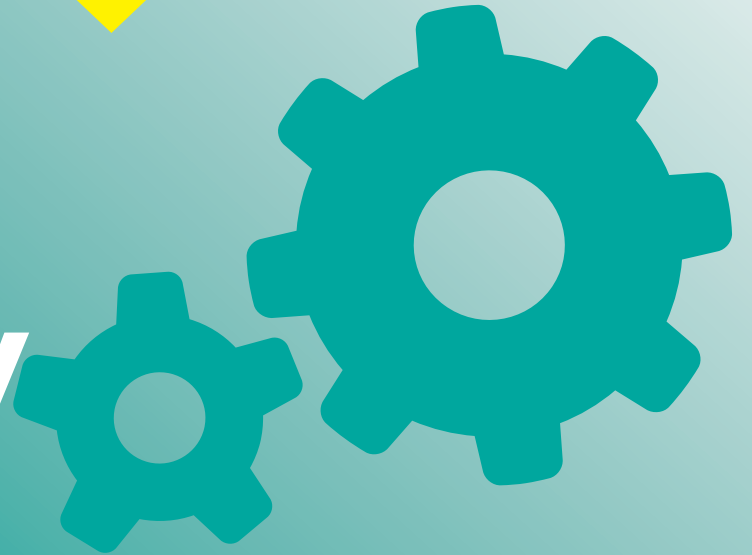
Design Technology

Hartford Church of England High School

Knowledge Organiser – Design Technology
KS4 GCSE

1. CAD – Computer Aided Design

Advantages of CAD	Disadvantages of CAD
Designs can be created, saved and edited easily, saving time	CAD software is complex to learn
Designs or parts of designs can be easily copied or repeated	Software can be very expensive
Designs can be worked on by remote teams simultaneously	Compatibility issues with software
Designs can be rendered to look photo-realistic to gather public opinion in a range of finishes	Security issues - Risk of data being corrupted or hacked
CAD is very accurate	
CAD software can process complex stress testing	

SolidWorks 2D DESIGN

CAD Software

2. CAM – Computer Aided Manufacturing

Advantages of CAM	Disadvantages of CAM
Quick – Speed of production can be increased.	Training is required to operate CAM.
Consistency – All parts manufactures are all the same.	High initial outlay for machines.
Accuracy – Accuracy can be greatly improved using CAM.	Production stoppage – If the machines break down, the production would stop.
Less Mistakes – There is no human error unless pre programmed.	Social issues . Areas can decline as human jobs are taken.
Cost Savings – Workforce can be reduced.	
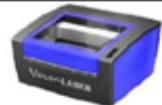
Laser Cutter   Robots   Barcode Scanner   AGV – Automated Guided Vehicle

3: Production Techniques

3.1 Flexible Manufacturing Systems (FMS) : involves an assembly of automated machines commonly used on short-run batch production lines where the products frequently change.

3.2 Lean Manufacturing: It aims to manufacture products just before they are required to eliminate areas of waste including:

- Overproduction
- Waiting
- Transportation
- Inappropriate processing
- Excessive inventory
- Unnecessary motion
- Defects

3.3 Just In Time (JIT) : Items are created as they are demanded. No surplus stock of raw material, component or finished parts are kept.

Advantages of JIT	Disadvantages of JIT
No warehousing costs	Reliant on a high quality supply chain
Ordered secured before outlay on parts is required	Stock is not available immediately off-the-shelf
Stock does not become obsolete, damaged or deteriorated	Fewer benefits from bulk purchasing

4. Scales of Production

One off: when you make a unique item
Batch: when you make a few/set amount
Mass: when you make thousands
Continuous: open ended production

5: Informing Design Decisions

5.1 Planned obsolescence - Planned obsolescence is when a product is deliberately designed to have a specific life span. This is usually a shortened life span.

5.2 Design for maintenance - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.

5.3 Disposability – Some products are designed to be disposable.
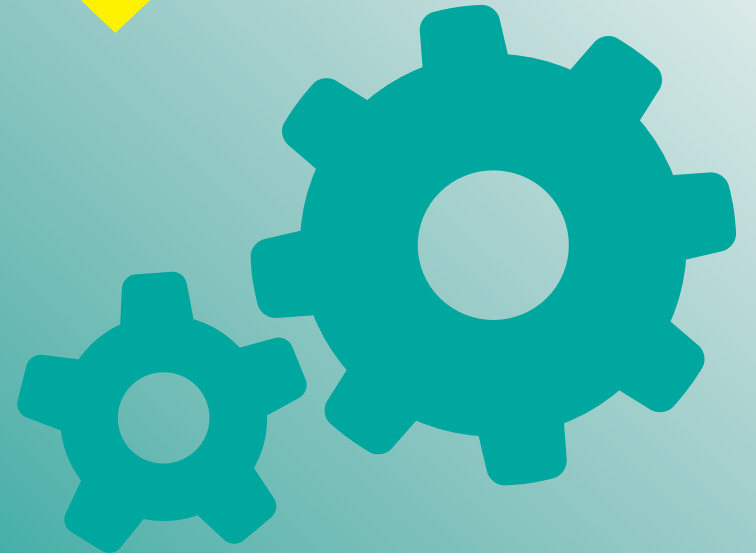
5.4 Product Lifecycle -

PRODUCT LIFE CYCLE

7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

CNC	Computer Numerical Control
EPOS	Electronic Point Of Sale (Barcodes)

Creative Media

LO1: Understand the purpose and properties of digital graphics		
MB1: 1–3 marks	**MB2: 4–6 marks**	**MB3: 7–9 marks**
Produces a summary of how and why digital graphics are used, demonstrating a **limited** understanding of the purpose of digital graphics. Identifies a **limited range** of file types and formats, only **some** of which are appropriate to digital graphics.	Produces a summary of how and why digital graphics are used, demonstrating a **sound** understanding of the purpose of digital graphics. Identifies a **range** of file types and formats, **most** of which are appropriate to digital graphics.	Produces a summary of how and why digital graphics are used, demonstrating a **thorough** understanding of the purpose of digital graphics. Identifies a **wide range** of file types and formats, which are **consistently** appropriate to digital graphics.
MB1: 1–4 marks	**MB2: 5–7 marks**	**MB3: 8–9 marks**
Demonstrates a **limited** understanding of the connection between the properties of digital graphics and their suitability for use. Demonstrates a **limited** understanding of how different purposes and audiences influence the design and layout of digital graphics.	Demonstrates a **sound** understanding of the connection between the properties of digital graphics and their suitability for use. Demonstrates a **sound** understanding of how different purposes and audiences influence the design and layout of digital graphics.	Demonstrates a **thorough** understanding of the connection between the properties of digital graphics and their suitability for use. Demonstrates a **thorough** understanding of how different purposes and audiences influence the design and layout of digital graphics.

LO2: Be able to plan the creation of a digital graphic		
MB1: 1–2 marks	**MB2: 3–4 marks**	**MB3: 5–6 marks**
Produces an interpretation from the client brief which meets **few** of the client requirements. Produces a **limited** identification of target audience requirements. Draws upon **limited** skills/ knowledge/understanding from other units in the specification.	Produces an interpretation from the client brief which meets **most** of the client requirements. Produces a **clear** identification of target audience requirements. Draws upon **some relevant** skills/knowledge/understanding from other units in the specification.	Produces an interpretation from the client brief which **fully** meets the client requirements. Produces a **clear** and **detailed** identification of target audience requirements. **Clearly** draws upon **relevant** skills/knowledge/understanding from other units in the specification.
MB1: 1–5 marks	**MB2: 6–9 marks**	**MB3: 10–12 marks**
Produces a work plan for the creation of the digital graphic, which has **some** capability in producing the intended final product. Produces a **simple** visualisation diagram for the intended final product. Identifies **a few** assets needed to create a digital graphic, demonstrating a **limited** understanding of their potential use. Identifies **a few** of the resources needed to create a digital graphic, demonstrating a **limited** understanding of their purpose. Demonstrates a **limited** understanding of legislation in relation to the use of images in digital graphics.	Produces a work plan for the creation of the digital graphic, which is **mostly** capable of producing the intended final product. Produces a **sound** visualisation diagram for the intended final product. Identifies **many** assets needed to create a digital graphic, demonstrating a **sound** understanding of their potential use. Identifies **many** of the resources needed to create a digital graphic, demonstrating a **sound** understanding of their purpose. Demonstrates a **sound** understanding of legislation in relation to the use of images in digital graphics.	Produces a **clear** and **detailed** work plan for the creation of the digital graphic, which is **fully** capable of producing the intended final product. Produces a **clear** and **detailed** visualisation diagram for the intended final product. Identifies **most** assets needed to create a digital graphic, demonstrating a **thorough** understanding of their potential use. Identifies **most** of the resources needed to create a digital graphic, demonstrating a **thorough** understanding of their purpose. Demonstrates a **thorough** understanding of legislation in relation to the use of images in digital graphics.

LO3: Be able to create and save a digital graphic		
MB1: 1–4 marks	**MB2: 5–7 marks**	**MB3: 8–9 marks**
Sources or creates a **limited range** of assets for use in the digital graphic. Prepares the assets for use in the digital graphic, **some** of which are technically **appropriate or compatible**.	Sources and creates a **range** of assets for use in the digital graphic. Prepares the assets for use in the digital graphic, **most** of which are **technically appropriate and compatible**.	Sources and creates a **wide range** of assets for use in the digital graphic. Prepares the assets for use in the digital graphic, **all** of which are **technically appropriate and compatible**.
MB1: 1–4 marks	**MB2: 5–7 marks**	**MB3: 8–9 marks**
Use of standard tools and techniques to create the digital graphic is **limited** and therefore creates a **simple** digital graphic which is appropriate to **some** aspects of the client brief. **Occasionally** saves and exports the digital graphic in formats which are **appropriate**. **Occasionally** saves electronic files using appropriate file and folder names and structures.	Use of standard tools and techniques to create the digital graphic is **effective** and therefore creates a digital graphic which shows **some** detail which is appropriate to **most** aspects of the client brief. **Mostly** saves and exports the digital graphic in formats and properties which are **appropriate**. **Mostly** saves electronic files using file and folder names and structures which are **consistent** and **appropriate**.	Use of a range of advanced tools and techniques to create the digital graphic is **effective** and therefore creates a **complex** digital graphic which is appropriate for the client brief. **Consistently** saves and exports the digital graphic in formats and properties, which are **appropriate**. **Consistently** saves electronic files using file and folder names and structures which are **consistent** and **appropriate**.

LO4: Be able to review the digital graphic		
MB1: 1–2 marks	**MB2: 3–4 marks**	**MB3: 5–6 marks**
Produces a review of the finished graphic which demonstrates a **limited** understanding of what worked and what did not, making **few** references back to the brief. Review identifies areas for improvement and further development of the final digital graphic, **some** of which are **appropriate** and sometimes **explained**.	Produces a review of the finished graphic which demonstrates a **reasonable** understanding of what worked and what did not, **mostly** referencing back to the brief. Review identifies areas for improvement and further development of the final digital graphic, which are **mostly appropriate** and **explained well**.	Produces a review of the finished graphic which demonstrates a **thorough** understanding of what worked and what did not, **fully** referencing back to the brief. Review identifies areas for improvement and further development of the final digital graphic, which are **wholly appropriate** and **justified**.

Music

Tonality: can be major or minor

Harmonies:
- Major
- Minor
- Suspended 4th
- Inverted chord

Texture: melodic line accompanied by instruments within the band. Accompaniment is mainly chordal (homophonic)

Guitar: Acoustic/electric played **rhythm** (chords) and **lead** (riffs) with effects such as **distortion**/**overdrive, palm muting, hammer ons, pitch bending.**

Vocals: usually a **solo** voice, catchy lyrics, **harmonies** in chorus. Lyrics usually in **1st person** and used **regional accents**

Drum Kit: Played a strong **4/4 rhythm**. Lots of **fills** and sometimes a drum solo.

Bass Guitar Electric bass guitar, usually played the **root note** of the chord using **interesting rhythms**.

Piano/Keyboard: Would play **chords/ rhythms**. Sometimes **riffs**. Sometimes played the introduction of the song.
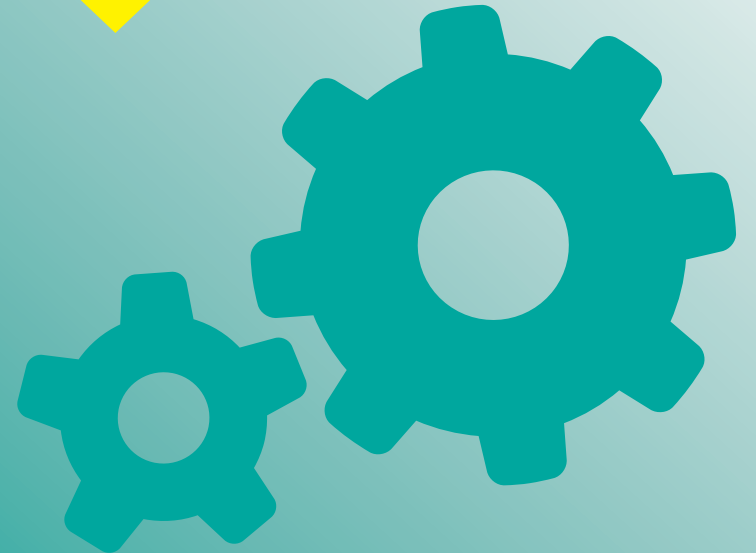
An example of a typical structure

Intro
Verse
Chorus
Mid 8
Verse
Chorus
Outro

Awight geeza Britpop is common for memorable guitar riffs and iconic hooks

Sport

COMPONENTS OF FITNESS

- AGILITY – To change direction quickly with control.
- BALANCE – Maintaining centre of gravity over a base of support.
- CO-ORDINATION – Flow of movements to perform motor task effectively.
- REACTION TIME – Responding to stimulus and initiation of response.
- AEROBIC ENDURANCE – Cardio-respiratory system working for long periods of time supplying oxygen and nutrients to working muscles.
- MUSCULAR ENDURANCE – Muscle is able to contract over periods of time against a light to moderate exercise rate.
- FLEXIBILITY – The range of motion around a joint.
- SPEED – Distance divided by the time taken
- MUSCULAR STRENGTH – Maximum force that can be generated by a muscle or muscle group.
- BODY COMPOSITION – Ratio of fat mass in the body compared to the % of fat free mass found as muscle.

PRINCIPLES OF TRAINING

All training programmes should be:
- SPECIFIC – To the individual and the sport they take part in.
- PROGRESSIVE – Training should be increased at steady rate.
- OVERLOAD – The body should be made to work harder than usual (F.I.T.T).
- REVERSIBILITY – Although rest is important, resting for too long will cause the body to lose its fitness levels.
- Our training programme must also be varied to avoid TEDIUM or boredom. By using a variety of different training methods we ill keep out enthusiasm and motivation.
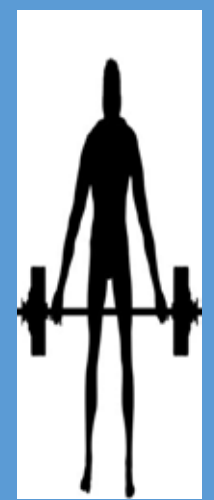
The FITT Principle

F – FREQUENCY
How regularly/ how many times a week

I – INTENSITY
How hard you train.

T – TIME
How long each session must be in order to benefit

T - TYPE
What sort of training you do?

EXERCISE INTENSITY

Heart rate max
- Measure heart rate by measuring beats per minute.
- Max Heart Rate is calculate 220 – AGE
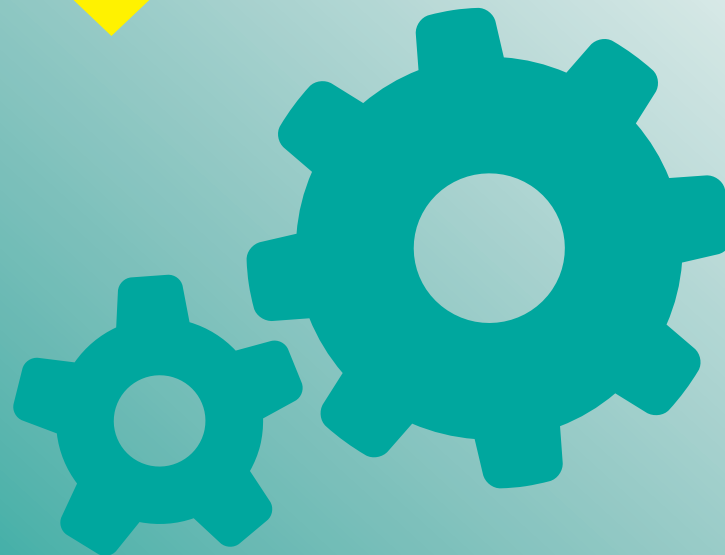- Then work out 60% and 80% threshold and apply the recommended training zones to the athletes.
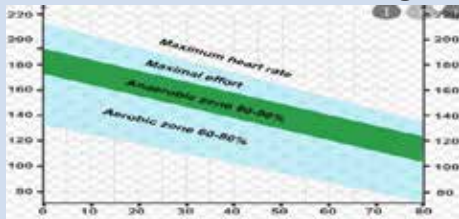
THE BORG SCALE

- Rate of Perceived Exertion, ranges from 6 to 20.
- Athletes choose a stage in which they feel they are working at. To work out HR multiply by 10.

Dance

Hartford Church of England High School

Interesting Facts

- Disney's The Lion King the Musical has been performed around the world for 13 years and has become one of the most popular shows in musical theatre history.

- Lion King the Musical debuted its first ever performance in Africa in Johannesburg, South Africa.
The show debuted at the West End's Lyceum Theatre in 1999 and is still running.

- It takes 114 people to prepare for each performance of The Lion King.

- There are 5 different languages used in the Lion King including Zulu, Xhosa and Swahili.
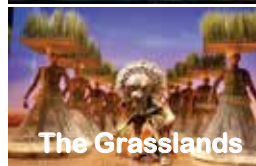
Screen to stage

https://www.youtube.com/watch?v=8RB9wnK5BmY

The purpose of The Lion King

The Lion King's main purpose is to entertain and not fix all the things in the world right. **More than an entertaining tale about exile and triumphant return, it's also a celebration of the music, language, costumes and culture of South Africa.**

FURTHER RESEARCH?
https://www.londontheatredirect.com/news/things-you-didn-t-know-about-disneys-the-lion-king

Set Design

The Circle of Life

The Stampede

Elephant Graveyard

The Grasslands

Meet the choreographer

Garth Fagan - born 3 May 1940
 A Jamaican modern dance choreographer Fagan's choreography incorporates elements of modern dance, ballet, Afro-Caribbean dance and social dance
https://www.garthfagandance.org

Production Musical Numbers

- "Hakuna Matata"
- "Circle of Life"
- "Grasslands Chant"
- "The Lioness Hunt "
- "I just can't wait to be King"
- "Chow Down"
- "They Live in You"
- "The Stampede"
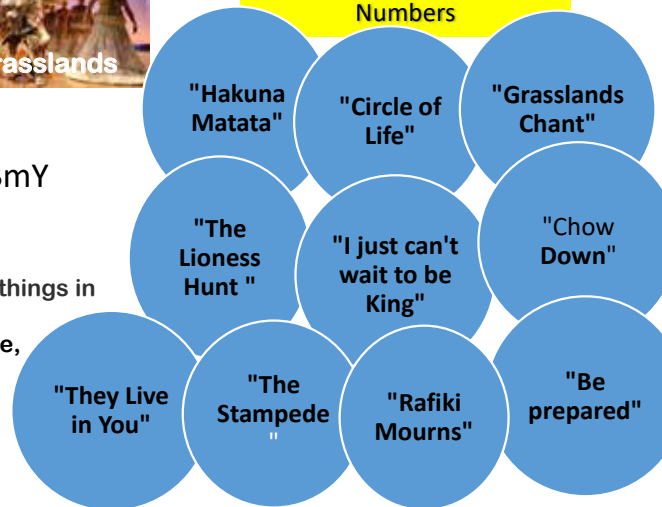- "Rafiki Mourns"
- "Be prepared"

Meet the Characters

- **Simba**: a male lion who is next in line to become king, son of Mufasa

- **Scar**: a male lion, Simba's uncle and Mufasa's brother; he kills Mufasa in order to become king

- **Mufasa**: a male lion, King of the Pridelands; Simba's father and Sarabi's husband

- **Nala**: a lioness who later becomes Simba's love interest

- **Rafiki** : a female mandrill who serves as narrator

- **Timon**: a male meerkat who becomes a friend with Simba

- **Pumbaa** : a male warthog who also becomes a friend with Simba

- **Zazu** : a male hornbill, Mufasa's majordomo

The Role of the Dancer

A professional dancer works closely with the choreographer to use movement gesture and body language to convey a story or concept to an audience.

Responsibilities and skills

A Dancer
Rehearses Safely (Clothing, Space, Movement)
Prevents injury (Warming Up & Cooling Down)
Needs to have awareness of Muscles and Skeletal structure
Follows a healthy Diet (Nutrition and Hydration)

Physical Skills
Control
Strength
Flexibility
Alignment
Balance
Coordination
Stamina

Expressive Skills
Projection
Phrasing
Spatial Awareness
Musicality
Facial Expressions
Focus
Communication

Famous Dancers you could research

Anna Pavlova – Ballet
Maddie Ziegler – Reality TV
Fred Astaire – Ballroom and Tap

The Role of the Choreographer

A choreographer is the person who creates and plans routines for the performance. Choreographers create routines for stage, TV or film performances, music videos, fashion shows or corporate events.

Responsibilities and skills

A Choreographer
- Makes plans from the director's ideas
- Responds to the music and stimulus given
- Creates the movements
- Teaches the movement to the performers
- Works with closely with the set designer and costume designer
- Oversees rehearsal of the dances.

Skills
- Creative imagination
- Be a competent teacher and demonstrator.
- Excellent communication skills.
- High dance ability.
- Good movement memory.

Famous choreographers you could research

Bob Fosse – Jazz
Katherine Dunham – Ballet
Siobhan Davies – Contemporary

The Role of the Costume Designer

The costume helps to establish the appearance of a particular character or meaning of a piece. A costume designer, works closely with the director and is a specialist who takes their idea and turns it into a costume.

Responsibilities and skills

A Costume Designer
- Creates the design drawings, chooses materials and sews and fits the costume.
- Manages the wardrobe budget.
- Responsible for the upkeep of the costumes which includes making alterations or adapting the costumes.

Skills
- A Creative imagination.
- Excellent organisation and communication skills.
- Have secure knowledge of costume history and modern fashion.
- Have good knowledge of textiles and fabrics.

Famous costume designers you could research

Julie Taymor – Lion King
Jenny Beavan - Nutcracker
Sandy Powell - Shakespeare (film)

Child Development

Physical factors that affect growth and development

Prenatal

Genetics and how genetic abnormalities occur

Maternal nutrition and exercise

Effects of parental drug or substance abuse

Mothers mental health

Premature birth

Health status

Health
Asthma / Epilepsy / Cancer / Sepsis

Diet & Exercise

A healthy diet
Proteins / Dairy / Fats / Vitamins and Minerals

Exercise
Activity / weight / wellbeing

Environmental factors that affect growth and development

Housing

Housing needs

Deprivation / Moving house / Safety

The home

Abuse and neglect

Physical / Sexual abuse / Neglect / Emotional

Parental conflict

Conflict / Aggression / Anxiety

Drugs, alcohol and smoking

Drugs

Accidents / Mental health / Dangerous behaviour

Smoking

Respiratory / Cancer/ Infection

Socio-economic factors that affect growth and development

Discrimination

Treated differently
Gender / Race / Age / Social background / Ability

Social Exclusion
Low income / Lack of opportunities

Race and Culture
Discrimination / Poor attachments/ Minority

Income and poverty

Poverty
Relative poverty / Absolute poverty

Unemployed and Workless Households
State benefits / Early education experiences

Relationships with significant adults

Warmth and affection – babies
Cuddles / Trust / Security

Giving children attention
Eye contact / Communication / Interest

Environmental factors that affect growth and development

HOUSING

There has been lots of research that suggests that where you grow up and what experiences you have shape your future life. Experiencing housing needs, such as not having suitable housing or having to move to temporary accommodation, can be very distressing for children and their families.

Living in a house that is safe and secure is taken for granted by many people.
Not everyone has the luxury of having a roof over their head.
Losing your home or living in poor quality housing is incredibly stressful and can lead to long-term difficulties, such as debt, depression and poor health
This can affect a person's capacity to parent and affect children's well-being.

0-18 months Babies who live in cramped housing might not have a peaceful place to sleep. Noise and light disrupt sleep, leaving babies restless, tearful and unhappy.
The family may not have room to store suitable equipment for babies meaning that they might be more at risk of accidents
Having more space can allow babies to move around, especially as they practise learning to crawl and walk.

18 months – 3 years Children that have to move house often might find it difficult to settle.
Parental stress at moving frequently might lead to family arguments and children not having attention from parents to help them to learn.
Overcrowded accommodation can mean that there is liitle space for children's toys to help them to learn. Having their own space can help children to understand about their own belongings and help them to gain a sense of identity.

3- 5 years Children who move house often might miss out on attending pre-school, nursery or school. This means that they do not start to form friendships with others and this can affect their learning.
Living in a flat might mean children do not have access to an outdoor space to play, so they cannot develop their large muscles as well as those with an outdoor space
Having a quiet place to rest and sleep helps children to wake up refreshed and ready to learn

THE HOME

Not all children live in a home where they are safe
The NSPCC identified that there were over 51,000 children identified as needing protection from abuse.
Do you know what work the NSPCC does?

There are four main types of abuse
PHYSICAL – This is where children are deliberately hurt and can result in injuries such as broken bones, cuts, bruises, burns.

SEXUAL – This is where children are forced or coerced into sexual activity or exposed to sexual activity

NEGLECT – This is failure to meet children's basic needs, which causes them ongoing harm

EMOTIONAL – This is where words or actions are used to affect children's self-esteem and well-being

Services and charities that can help

ChildLine
0800 1111

DON'T WAIT UNTIL YOU'RE CERTAIN
If you are worried about a child and need advice
Call 0808 800 5000, text 88858 or email help@nspcc.org.uk

Hartford
Church of England
High School

CARITAS ET VERITAS

Socio economic factors that affect growth and development

Discrimination

Discrimination occurs when assumptions are made about a person or group of people and they are treated less favourably as a result.
Discrimination can take place for a variety of reasons, such as gender, race, age, social background or ability.
How true is this statement; All people with blond hair are dumb?

Social exclusion – where someone lives and a low income can lead to them suffering a lack of opportunities compared with other people. The introduction of early years funding has meant that more children are able to go to a child care provider.

Race and culture – Racial and cultural discrimination can have a negative impact on even the youngest children's well being. Even very young children can be the victims of discrimination. For example, babies born of mixed ethnicity might not quite be fully accepted by either ethnic group and this can lead to poor attachments. Some cultural practices, such as dietary requirements, are not well understood by others, leaving children with limited choices of things to eat. This can mean that they miss out on having a balanced diet to support their growth and development.

How discrimination affects children
Children may become shy and withdrawn
Children might feel isolated
Children may find it difficult to form relationships
Children could develop a lack of identity and confusion over who they are. Affecting their self esteem
Children could be less likely to want to join in with activities and mix with others

Income and Poverty

Relative poverty. This is where there is not enough income to afford an ordinary living pattern. Those in relative poverty cannot afford the activities that the average person enjoys.
Absolute poverty. This is when there is not enough income to afford the basics- food, clothing and shelter

Why do some families live in poverty?
-Parents lose their job
-Relationship breakdown
-Borrowing too much money
-Death of a partner
-Injury or inability to work
-Mental health issues
-Victim of crime
-Disability pr illness
-Disasters such as flood or fire

0-18 months The children may have ill fitting clothes that restricts their movements. Parents might fibd buying essentials, such as nappies, difficult
18 months – 3 years As children get older they need more stimulation. Having little money to afford toys and equipment might mean that children do not have the chance to learn through playing to boost their problem-solving skills.
3-5 years – good quality early education can help to transform children's lives when they live in poverty. They may not have clothing or resources that meet their needs – this can impact a child's ability to build relationships with others.

Food Technology
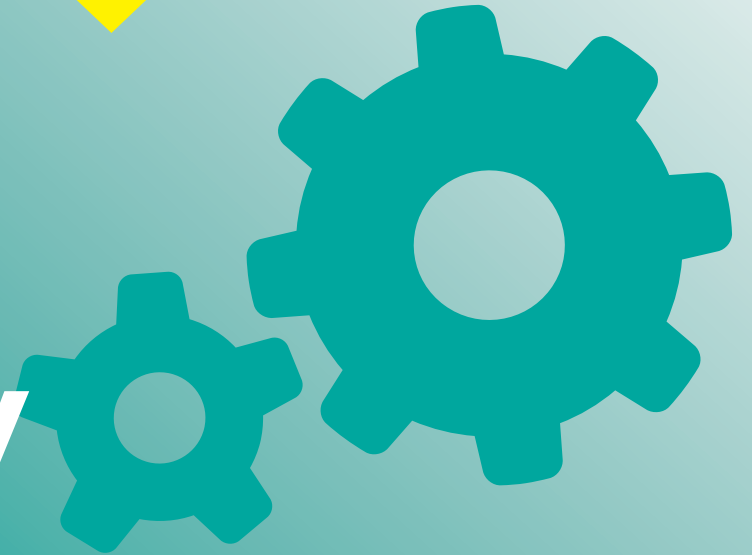
Functions of ingredients
Ingredients provide a variety of functions in recipes.

Carbohydrate, protein and fat
Carbohydrate, protein and fat all have a range of properties that make them useful in a variety of food products.

Carbohydrates perform different functions in food.
They can:
- help to cause the colour change of bread, toast and bakery products (dextrinisation);
- contribute to the chewiness, colour and sweet flavour of caramel;
- thicken products such as sauces and custards (gelatinisation).

Maillard reaction
Foods which are baked, grilled or roasted undergo colour, odour and flavour changes. This is primarily due to a group of reactions involving amino acids (from protein) and reducing sugars.

Dextrinisation
When foods containing starch are heated they can also produce brown compounds due to dextrinisation. Dextrinisation occurs when the heat breaks the large starch polysaccharides into smaller molecules known as dextrins which produce a brown colour.

Caramelisation
When sucrose (table sugar) is heated above its melting point it undergoes physical and chemical changes to produce caramel.

Gelatinisation
When starch is mixed with water and heated, the starch granules swell and eventually rupture, absorbing liquid, which thickens the mixture. On cooling, if enough starch is used, a gel forms.

Proteins perform different functions in food products.
They:
- aerate foods, e.g. whisking egg whites;
- thicken sauces, e.g. egg custard;
- bind ingredients together, e.g. fishcakes;
- form structures, e.g. gluten formation in bread;
- gel, e.g. lime jelly.

Gluten formation
Two proteins, gliadin and glutenin, found in wheat flour, form gluten when mixed with water. Gluten is strong, elastic and forms a 3D network in dough. In the production of bread, kneading helps untangle the gluten strands and align them. Gluten helps give structure to the bread and keeps in the gases that expand during cooking.

Gelation
Gelatine is a protein which is extracted from collagen, present in animal connective tissue. When it is mixed with warm water, the gelatine protein molecules start to unwind. On cooling, a stable, solid network is formed, trapping the liquid.

Denaturation
Denaturation is the change in structure of protein molecules. The process results in the unfolding of the protein's structure. Factors which contribute to denaturation are heat, salts, pH and mechanical action.

Coagulation
Coagulation follows denaturation. For example, when egg white is cooked it changes colour and becomes firmer (sets). The heat causes egg proteins to unfold from their coiled state and form a solid, stable network.

Aeration
Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar. Small bubbles of air are incorporated and form a stable foam.

Fats performs different functions in food.
They help to:
- add 'shortness' or 'flakiness' to foods, e.g. shortbread, pastry;
- provide a range of textures and cooking mediums;
- glaze foods, e.g. butter on carrots;
- aerate mixtures, e.g. a creamed cake mix;
- add a range of flavours.

Plasticity
Fats do not melt at fixed temperatures, but over a range. This property is called plasticity.

Colloidal systems
Colloidal systems give structure, texture and mouthfeel to many different products.

System	Disperse phase	Continuous phase	Food
Sol	Solid	Liquid	Unset jelly
Gel	Liquid	Solid	Jelly
Emulsion	Liquid	Liquid	Mayonnaise
Solid emulsion	Liquid	Solid	Butter
Foam	Gas	Liquid	Whipped cream
Solid foam	Gas	Solid	Meringue

Raising agents
Raising agents include anything that causes rising within foods, and are usually used in baked goods. Raising agents can be:
- biological, e.g. yeast;
- chemical, e.g. baking powder;
- mechanical, e.g. adding air through beating or folding.

Functional ingredients
These are ingredients that are specifically included in food for additional health benefits. They include:
- probiotics – 'good' bacteria that may have a positive impact on human health;
- prebiotics – food ingredients that promote the growth of beneficial microorganisms in the gut;
- sterols/stanols – compounds that can lower cholesterol;
- healthy fats (e.g. omega-3);
- added vitamins and minerals (more than in the original food).

Why is food prepared and cooked?
Food is prepared and cooked to:
- make the food more palatable – improves flavour, texture and appearance;
- reduce the bulk of the food;
- provide variety and interest to meals.

Methods of cooking food
The methods of cooking are divided up into groups. These are based on the cooking medium used. They are:
- moist/liquid methods, e.g. boiling;
- dry methods, e.g. grilling;
- fat-based, e.g. frying.

Selecting the most appropriate way of preparing and cooking certain foods is important to maintain or enhance their nutritional value.
- Vitamins can be lost due to oxidation during preparation or leaching into the cooking liquid.
- Fat-based methods of cooking increase the energy (calories) of the food.
- The use of different cooking methods affects the sensory qualities of the food.

There are three ways that heat is transferred to food.

- Conduction – the exchange of heat by direct contact with foods on a surface.
- Radiation – energy in the form of rays.
- Convection – currents of hot air or hot liquid transfer the heat energy to the food.

Key terms
Conduction: The exchange of heat by direct contact with foods on a surface.
Convection: Currents of hot air or hot liquid transfer the heat energy to the food.
Functional ingredients: Included in food for additional health benefits.
Heat transfer: Transference of heat energy between objects.
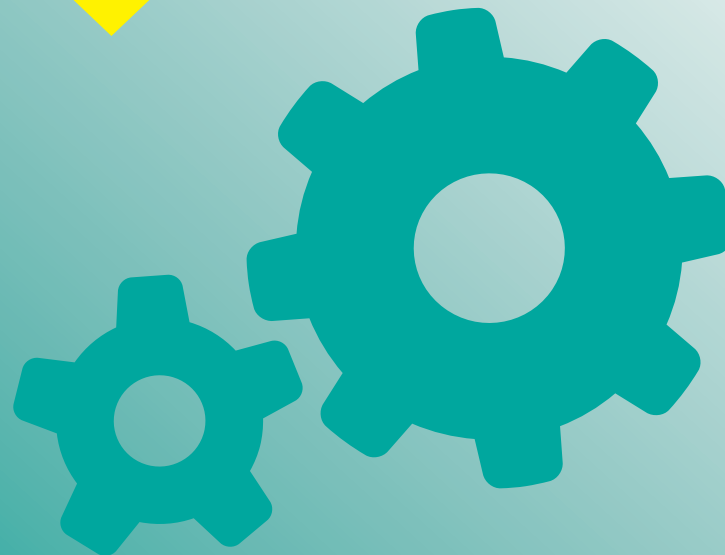**Radiation**: Energy in the form of rays.

Tenderisation
- Mechanical tenderisation – a meat cleaver or meat hammer may be used to beat the meat. Cutting into small cubes or mincing can also help.
- Chemical tenderisation (marinating) –the addition of any liquid to flavour or soften meat before cooking.
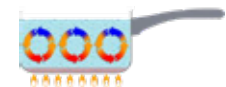
French

Ma maison et ma ville

Les verbes

Habiter	To live
Visiter	To visit
Construire	To build
Partager	To share
Avoir	To have
Déménager	To move house

Les adjectifs

Meublé(e)	Furnished
Une maison individuelle	A detached house
Plein de	Full of …
Connu pour	Known for
Animé(e)	Lively
Bruyant(e)	Noisy
Tranquille	Quiet
Propre	Clean
Sale	Dirty
Laid(e)	Ugly
Joli(e)	Pretty
Ancien(ne)	Old
Moderne	Modern
(In)confortable	(Un)Comfortable
Grand(e)	Big
Petit(e)	Small

Les noms (Là où j'habite)

J'habite/On habite/Nous habitons dans …	I live in/ We live in …
un appartement	an apartment
Une maison jumelée	semi-detached/terraced house
Une ferme	a farmhouse
Une maison individuelle	a detached house
Une maison de retraite	an old people's home
Un quartier	a neighborhood in the city
Il est situé loins de	it is situated far from
Il est situé près de	it is situated near to
Il est situé dans	it is situated in
le nord/le sud	the north/ south
l'est/l'ouest	the east/west
Une très grande ville	a city
Une ville	A town
Une rue	A street
La banlieue	the outskirts
la côte	the coast
La campagne	the countryside
la montagne	the mountains

Les possessifs

Ma (maison)	My (house)
Ta (maison)	Your (house)
Sa (maison)	His/her (house)
Notre (maison)	Our (house

Les substantifs – Ma maison

Ma maison a/n'a pas de … Dans ma maison il y a /il n'y a pas de…	Mi house has/doesn't have….. In my house there is/there isn't…
(deux) étages	(two) floors
(cinq) pièces	(five) rooms
Au premier/deuxième étage il y a …	On the first/second floor there is/are
Au rez-de-chaussée il y a …	On the ground floor there is /are
En haut/en bas …	Upstairs/downstairs there is/are
Une chambre	a bedroom
Une cuisine	a kitchen
un bureau	an office
un sous-sol	a basement
Une salle de bain	a bathroom
Une salle à manger	a dining room
Une toilette	a toilet
un salon/séjour	a living room
un jardin avec des fleurs	a garden with flowers
un garage	a garage

Ma maison idéale

serait – would be

aurait – would have

French

Knowledge organiser: Ma routine

Daily Routine	
Je me lève	I get up
Je me réveille	I wake up
Je me douche	I have a shower
Je prends un bain	I have a bath
Je m'habille	I get dressed
Je me peigne	I comb my hair
Je prends le petit déjeuner	I have breakfast
Je vais au collège	I go to school
Je me maquille	I do my make up
J'étudie	I study
Je reviens à la maison	I return home
Je mange	I eat/ I have lunch
J'ai un encas	I have a snack
Je fais mes devoirs	I do my homework
J'écoute de la musique	I listen to music
Je regarde la télévision	I watch tv
Je dîne	I have dinner
Je me couche	I go to bed
Je vais au lit	I go to bed
Je dors	I sleep
Je rêve	I dream

Les verbes pour gagner de l'argent de poche.			
Pour gagner de l'argent, j'aide à la maison		To earn money, I help at home	
Je dois + infinitive		I have to / I must …	
Faire du babysitting	To babysit	Faire la cuisine	To cook
Passer l'aspirateur	To hoover	Faire le repassage	To iron the clothes
Promener le chien	To walk the dog	M'occuper de mes frères	Look after my brothers
Faire la vaisselle	To do the dishes	Sortir la poubelle	To take the rubbish out
Nettoyer la salle de bains	To clean the bathroom	Épousseter	To dust
Laver la voiture	To wash the car	Tondre la pelouse	To cut the grass
Mettre la table	To set the table	Faire le lit	To make the bed
Ranger ma chambre	To tidy my room	Faire le lavage	To do the washing

Muebles			
Un ascenseur	A lift	Une armoire	A wardrobe
Un lave-vaisselle	A dishwasher	Une chaise	A chair
Un micro-onde	A microwave	Une table	A table
Un sofa	A sofa	Une porte	A door
Un réfrigérateur	A fridge	Une fenêtre	A window
Un tapis	A carpet	Le chauffage central	Central heating
Un lit	A bed	Une machine à laver	A washing machine

Knowledge organiser: Ma région

En ville… In town….			
Un hôtel de ville	A townhall	Une usine	A factory
Un château	A castle	Un cinéma	A cinema
Un marché	A market	Un parc	A park
Un musée	A museum	Un centre sportif	A sports centre
Un port	A port	Un théatre	A theatre
Un bowling	A bowling alley	Une bibliothèque	A library
Une église	A church	Une mosquée	A mosque
Une piscine	A swimming pool	Une plage	A beach
Une place	A square	Une banque	A bank
Un tabac	A tobacconist's	Un café	A café
Une gare	A train station	Une pharmacie	A pharmacy
Une épicerie	A grocery shop	Une librarie	A book shop
Une boulangerie	A bakery	Une pâtisserie	A cake shop
Un salon de coiffeur	A hairdressers	Un magasin	A shop
Une agence de voyages	A travel agency	Un magasin de chaussures	A shoe shop
Un centre commercial	A shopping center	Un magasin de souvenirs	A gift shop

Prepositions			
Où est …?	Where is ..?	C'est…	It is …
À côté de	Next to	Ici	Here
Devant	In front of	Là-bas	There
Derrière	Behind	Au bout de la rue	At the end of the road
À droite	On the right	Près de	Near to
À gauche	On the left	Loins de	Far from
Sous	Underneath	Au dessus de	On top of

If Clause	
S'il fait beau, j'irai au centre commercial	
If (it is sunny), I will go to the shopping center	
Regular verbs = Si + (weather) + full infinitive + ai (I will….)	

Avantages et désavantages d'habiter en ville.			
Ce qui est bien c'est que	The good thing is that	L'avantage c'est que	The advantage is that
Ce qui est mauvais c'est que	The bad thing is that	Le désavantage c'est que	The disadvantage is that
C'est plus …. que	It is more …than	C'est moins ….que	It is less …than
Il y a beaucoup/peu à faire	there is a lot/little to do		
Il y a une bonne vie nocturne	there is good night live		
Il y a plus d'opportunités d'emploi	there are more job opportunities		
Il y a trop de gens	there are too many people		
Il y a plus de pollution	there is more pollution		
Il y a de bonnes vues	there are good views		
Il y a plus de chômage	there is more unemployment		
Les gens sont plus détendus	people are more relaxed		

Clues for Tenses		
Past	Present	Future
Il y a un mois– a month ago	Maintenant -now	À l'avenir – In the future
Avant - before	De nos jours - Nowadays	Après - After
Autrefois – In the old days	Actuellement - Currently	L'année prochaine – Next year
Auparavant -Previously	En ce moment – At the moment	Dans deux jours – In two days time
Il y avait - There was/were c'était – It was	Il y a – There is/are c'est – It is	Il y aura – There will be Ça sera – It will be