

Year 10 Knowledge Organiser



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Maths





Indices:

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$x^0 = 1$$

$$(x^a)^b = x^{ab}$$

$$\circ a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$\circ a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$\circ a^{-m} = \frac{1}{a^m}$$

Product rule for counting:

$m \times n$

Where m is the number of ways to do one task and for each of these, there are n ways of doing another task

Surds:

$$\sqrt{a} \times \sqrt{a} = a$$

$$\text{Multiply surds: } \sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

$$\text{Divide surds: } \sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$$

Adding/subtracting surds:

$$a\sqrt{c} \pm b\sqrt{c} = (a \pm b)\sqrt{c}$$

Rationalise denominator:

$$\frac{a}{\sqrt{b}} \times \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

$$\frac{a}{b + \sqrt{c}} \times \frac{b - \sqrt{c}}{b - \sqrt{c}} = \frac{ab - \sqrt{c}}{b^2 - c}$$

Simplify:

$$\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$$

Find a square number that goes into it.

Bounds:

How to find the upper and lower bound?

1. Half the degree of accuracy specified
2. Add to get the upper bound.
3. Subtract to get lower bound.

Find the lower and upper bound of 5.7 to 1 decimal place.

1. Half the degree of accuracy = $0.1 \div 2 = 0.05$.
2. Upper bound = $5.7 + 0.05 = 5.75$.
3. Lower bound = $5.7 - 0.05 = 5.65$.

Recurring decimals:

$$0.\dot{5} = 0.55555 \dots$$

$$0.\dot{5}\dot{7} = 0.5757575 \dots$$

$$0.4\dot{8} = 0.4888888 \dots$$

Example:

$$x = 0.5\dot{4}$$

$$10x = 5.4444444 \dots$$

$$100x = 54.4444444 \dots$$

$$90x = 49$$

$$x = \frac{49}{90}$$



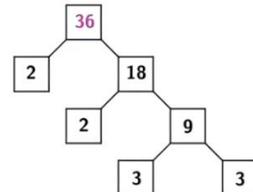
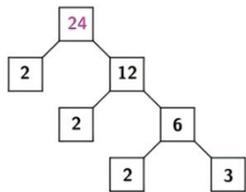
Prime number: only factors 1 and its self
2,3,5,7,11,13,17.....

Factor: is a number that divides into another number exactly and without leaving a remainder
e.g factors of 8= 1, 8,2,4

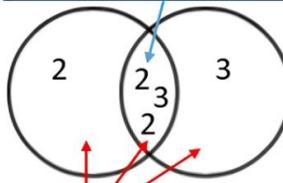
Multiples: The result of multiplying a number by an integer
e.g multiples of 10
10,20,30,40

HCF and LCM

Find the HCF and LCM of 24 and 36



HCF: $2 \times 2 \times 3 = 12$



LCM: $2 \times 2 \times 2 \times 3 \times 3 = 72$

on a calculator

39% of 82
 0.39×82

Change to a decimal and multiply

increasing

Increase £60 by 12%

$12\% \text{ of } 60 = 0.12 \times 60 = \text{£}7.20$

New amount = $\text{£}60 + \text{£}7.20 = \text{£}67.20$

ADD

fraction to %

$\frac{15}{20} = \frac{75}{100} = 75\%$

OR
 $15 \div 20 \times 100 = 75\%$

Percentages

%

decreasing

decrease £60 by 12%

$12\% \text{ of } 60 = 0.12 \times 60 = \text{£}7.20$

New amount = $\text{£}60 - \text{£}7.20 = \text{£}52.80$

SUBTRACT

without a calculator

50% - half

25% - half and half

75% - 50% + 25%

10% - divide by 10

5% - half 10%

20% - double 10%

compound interest = original \times multiplierⁿ
Where n is the number of years



Addition

+

$$\frac{1}{4} + \frac{3}{8} =$$

If the denominators are different, first find a common denominator.

$$\left[\frac{1}{4} \times \frac{2}{2}\right] + \frac{3}{8} =$$

Then add or subtract the numerators.

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

The denominators stay the same.

Subtraction

-

$$\frac{5}{6} - \frac{3}{4} =$$

If the denominators are different, first find a common denominator.

$$\left[\frac{5}{6} \times \frac{2}{2}\right] - \left[\frac{3}{4} \times \frac{3}{3}\right] =$$

Then add or subtract the numerators.

$$\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$$

The denominators stay the same.

Multiplication

×

Multiply the numerators.

$$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$$

Multiply the denominators.

Reduce.

Division

÷

First, invert the divisor.

$$\frac{4}{5} \div \frac{5}{6} =$$

Multiply the numerators.

$$\frac{4}{5} \times \frac{6}{5} = \frac{24}{25}$$

Multiply the denominators.

Remember to Reduce!

For all operations, reduce or simplify when possible

Mixed number to Improper Fraction

Denominator stays the same

$$\text{Improper Fraction} = \frac{\text{Mixed Number} \times \text{Denominator} + \text{Numerator}}{\text{Denominator}}$$

$$21 \frac{2}{3} = \frac{21 \times 3 + 2}{3} = \frac{65}{3}$$

Improper Fraction to Mixed number

Denominator stays the same

$$\text{Improper Fraction} = \frac{\text{Numerator} \div \text{Denominator}}{\text{Denominator}} = \text{Whole number R Numerator}$$

$$\frac{47}{4} = 11 \frac{3}{4}$$

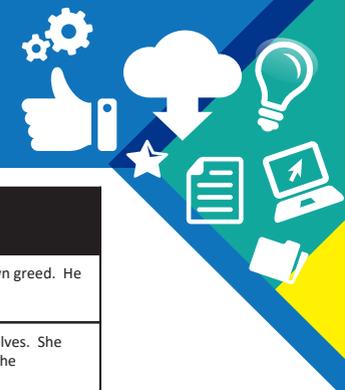
$$\begin{array}{r} 11 \\ 4 \overline{)47} \\ \underline{-44} \\ 3 \end{array}$$

English





English - An Inspector Calls



AN INSPECTOR CALLS <u>Context: Key Ideas</u>	<u>Characters</u>	
1912 – when the play was set. Just before WW1 (1914-18) and the sinking of the Titanic. JBP wanted to make sure audiences in 1945 recognised the problems of society in 1912 before the wars (class system, capitalism, sexism) and weren't tempted to go back to living like that. He wrote the play to highlight the dangers of the capitalist lifestyle.	Mr Birling	The father. He is egocentric and capitalist businessman who works against social equality due to his own greed. He sacks Eva from his factory when she asks for equal pay for women and threatens a strike.
1945 – when the play was written and performed. After WW2, society changed for the better. The benefits system started to be introduced and there was more equality for women and less of a class divide because of different classes and different genders integrating in order to assist with the war. JBP supported and encouraged these changes and wanted to make sure he promoted them in his play by making capitalists like the older Birlings appear ignorant and selfish.	Mrs Birling	The mother. She is a superior and conceited capitalist who believes everyone is responsible for themselves. She doesn't help Eva when she comes to the charity for help because of her own prejudicial views against the proletariat.
Socialism – JBP was a keen Socialist. This meant that he wanted everyone to look after each other rather than just caring about themselves. He was trying to promote this with the play, by making the Socialist characters like the Inspector much more insightful than the capitalist ones.	Inspector	The interrogator. He is Priestley's mouthpiece (represents JBP's personal views) and a keen Socialist who fights for collective responsibility and encourages the Birlings to re-evaluate their outlook and their actions.
Capitalism – JBP wished to challenge Capitalists – those who believe in individual profit over equality. He created Mr and Mrs Birling as an emblem for capitalism, in order to present capitalism as egocentric and regressive.	Sheila	The daughter. She wrongly causes Eva to lose her job because she purposely misinterprets her actions. Sheila is initially ignorant of her privilege but transform her views as the play progresses and she eventually feels sympathy for Eva Smith's plight and starts to adopt increasingly Socialist views. By the end of the play, there is a huge disparity between Sheila's views and those of her parents.
Outdated ideas – In 1912, the social classes were segregated, women got paid less than men for the same work, there was no benefit system or help with unemployment or housing. Society was patriarchal (men ruled).	Eric	The son. Priestley hints that Eric is an alcoholic and it is heavily implied that his sexual encounter with Eva is not consensual and that she was raped. As a result of this, Eva falls pregnant and Eric resorts to stealing from his dad to give Eva money.
Priestley – was a broadcaster and playwright, he also served in the army in WW1. Priestley saw, firsthand, during WW1, men from different paths in life/ classes coming together and working for the common, greater good. He believed that this mantra should be taken forward in a broader context to make society more responsible for one another. When working for the BBC as a broadcaster during WW2, Priestley broadcast a series of short propaganda radio shows which were credited for strengthening civilian morale. His left wing beliefs brought him into conflict with the government and influenced the birth of the welfare state. The programme was eventually cancelled by the BBC for being too critical of the government.	Gerald	Sheila's fiancé. Gerald is a businessman who has capitalist ideals and has similar political beliefs to Mr Birling. He shows some regret for his affair with Eva, but does not seem sincere in making any long-term changes to his beliefs.
<u>Plot</u>		
	ACT 1	The family are celebrating Sheila and Gerald's engagement. Mr B states there will be no war, and the Titanic is unsinkable. An Inspector arrives and tells them Eva Smith has committed suicide. He urges Mr B to admit sacking her from his factory because she threatened to strike over unfair wages. He refuses to accept any blame. The Inspector encourages Sheila to admit that she caused Eva to lose her job at Milwards. She is contrite and ashamed of herself.
	ACT 2	The Inspector prompts Gerald to admit having an affair with Eva Smith (now called Daisy Renton after a name change). Sheila consequently questions her relationship with Gerald. The Inspector coaxes Mrs B into admitting not helping Eva when she came to Mrs B's charity for help when she became pregnant because of her own prejudicial views. Mrs B attempts to evade blame by stating that it should be the father's responsibility. At the end of the Act, it is revealed that the father of Eva's baby was Eric.
	ACT 3	Eric suggests that he raped Eva Smith which resulted in her pregnancy. The Inspector gives his final speech about fire, blood and anguish. He warns the family that if they don't start to take responsibility for others, they will live to regret it. The Inspector then leaves. Gerald seemingly discovers that the Inspector wasn't a real inspector. Mr B rings to check and there is no Inspector Goole. Mr and Mrs B (and Gerald) celebrate. Sheila and Eric still feel guilty and can't go back to how they were before. Right at the end, the telephone rings and they are told that a girl has just committed suicide and an inspector is on his way over to ask some questions.
<u>Key themes</u>		
GENERATIONAL DIFFERENCES: the older generation (Mr and Mrs Birling) are a symbol of capitalism, so they do not change their ways and they are reluctant to accept blame for their role in Eva's demise. The younger generation, on the other hand (Sheila and Eric) become a symbol of Socialism as the play progresses. They accept blame and want to change; they change throughout the play, for the better.		
RESPONSIBILITY / JUSTICE - the Inspector, as Priestley's mouthpiece, is a symbol of Socialism – he wants everyone to look after each other and to view community as very important. He is sent to uncover the family's wrongdoings and to make them see that they should take responsibility for others. Sheila and Eric realise this, but Mr and Mrs B do not.		
GENDER INEQUALITY -Priestley anted to show his audience that there was a lot of inequality back in 1912 when it came to how women were treated. By making certain characters out to be sexist, he highlighted this problem and tried to shame audiences into changing their own views about gender equality too. This is perhaps why the victim of their actions is a woman, and why she is working class (working class women were at the bottom of the pile in those times).		
CLASS DIFFERENCES - Priestley wanted to highlight that inequality between the classes still existed and that the upper-classes looked down upon the working-class in post-war Britain. In <i>An Inspector Calls</i> , Priestley explores the theme of class through the treatment of working-class Eva Smith by the wealthy Birlings and Gerald Croft.		



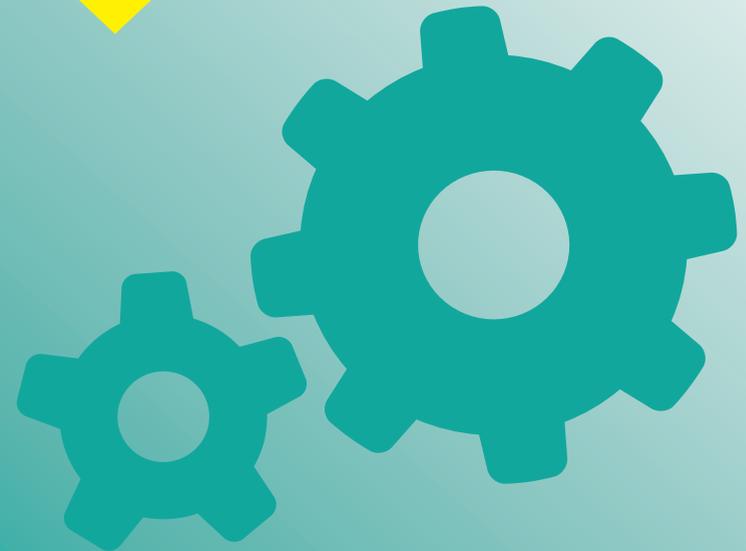
English - An Inspector Calls



Dramatic Techniques	Non-Fiction Writing
Dramatic Irony	When the audience knows something that the characters don't. Used usually to create tension or humour.
Tension	A dramatic device used to create a sense of suspense or to make the audience feel on edge; tension is often created through the use of cliff-hangers
Monologue	A speech of some length which is usually directed to a second person, without them interrupting.
Interruptions	When characters cut into the speech of other characters and stop them from speaking.
Contrast	When two things are strikingly different to one another, serving to heighten their differences further.
Repetition	When a word or phrase is noticeably repeated throughout a sentence/ paragraph/ whole text
Cyclical structure	When the opening of the story is mirrored, or is repeated at the end of the story – usually in order to convey a message about change (or lack thereof)

Language Techniques	Definition	Example	Text Types
Rhetorical question	A question asked in order to prompt further thought or to make a point rather than to get an answer.	If not me, then who? If not now, then when?	Letter <ul style="list-style-type: none"> <input type="checkbox"/> the use of addresses & date <input type="checkbox"/> a formal mode of address e.g. Dear Sir/Madam or a named recipient <input type="checkbox"/> effectively/fluently sequenced paragraphs <input type="checkbox"/> an appropriate mode of signing off: Yours sincerely/faithfully.
Anecdote	A very short story that is significant to the topic at hand; usually adding personal knowledge or experience to the topic.	I once had a border collie. She was so smart. Every morning, I'd open up the front door and she'd run out, pick up the newspaper, and deliver it to my husband at the breakfast table.	
Simile	A descriptive technique that compares one thing with another, usually using 'as' or 'like'.	He is as determinedly dishonest as a politician attempting to cover his latest immoral decision.	
Emotive language	Words/ phrases deliberately used to evoke a powerful feeling from the reader i.e. sympathy, anger.	I find the notion that I am not worthy of voting for my country's next leader because of my age, both <u>demeaning</u> and deeply <u>insulting</u> .	Article <ul style="list-style-type: none"> <input type="checkbox"/> Broadsheet = formal/Local or tabloid = informal <input type="checkbox"/> a clear/apt/original title <input type="checkbox"/> a strapline & subheadings <input type="checkbox"/> an introductory (overview) paragraph <input type="checkbox"/> effectively/fluently sequenced paragraphs.
Statistic	A fact that is supported by numerical data.	The Trussell Trust's foodbank network distributed 1,332,952 three day emergency food supplies to people in crisis, a 13% increase on the previous year. 484,026 of these went to children.	
Flattery	Deliberately complimenting the reader.	The very fact that you are reading this article suggests that you are compassionate and understanding of the plight of your fellow man.	
Hyperbole	Deliberately exaggerated language.	He was so obnoxious; I was hoping he would be arrested on the spot and given a very long prison sentence purely for not saying please or thank you.	
Humour	Describing a surprising or unexpected reaction to an event/ person/ object to create amusement	My brother may look angelic but do not be fooled by his toddler aesthetic: he is a tiny-but very real-psychopath.	Speech (text only) <ul style="list-style-type: none"> <input type="checkbox"/> a clear address to an audience <input type="checkbox"/> effective/fluently linked sections to indicate sequence <input type="checkbox"/> rhetorical indicators that an audience is being addressed
Rule of three	Using three words/phrases to add substance to what you're saying.	Increased costs; customer dissatisfaction and a decrease in employee morale are just three reasons why this simply could not go ahead.	
Fact	Something that is known or proven to be true.	People enjoy feeling good. This is scientifically proven.	
Eye-witness quotation/ expert quotation	Direct speech from a person who witnessed an event/ direct speech from someone who has an in-depth understanding of the topic.	The British Nursing Association said the move was "hugely concerning" and a stark example of the "extreme workforce pressure" at NHS emergency services, which are facing rising demand while recruitment and retention of nurses gets harder.	

Science





Meiosis halves the number of chromosomes

Gametes are made in reproductive organs (in animals ovaries and testes)

Cells divide by meiosis to form gametes

Copies of the genetic information are made.

The cell divides twice to form four daughter cells each with half the number of chromosomes.

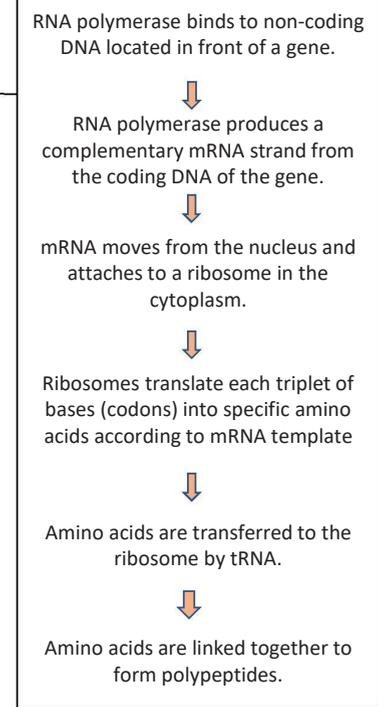
All haploid gametes are genetically different from each other.

(Biology HT) A sequence of 3 bases is the code for a particular amino acid. The order of bases controls the order in which each amino acids combine and fold to produce a specific shaped protein such as enzymes..

Genetic variants.	In non coding DNA	Affects phenotype by influencing the binding of RNA polymerase and altering the quantity of protein produced.
	In coding DNA	Affects phenotype by altering the sequence of amino acids and therefore the activity of the protein produced.

Making new proteins (protein synthesis) transcription and translation

Composed of chains of amino acids. A sequence of 3 bases (codon) codes for a particular amino acid.



Gametes join at fertilisation to restore the number of chromosomes

Meiosis

The new cell divides by mitosis. The number of cells increase. As the embryo develops cells differentiate.

Meiosis leads to non-identical cells being formed while mitosis leads to identical cells being formed

Advantages and disadvantages of sexual and asexual reproduction (Biology only)

Reproduction advantages/disadvantages	
Sexual	Asexual
Needs two parents.	Only one parent needed (quicker).
Produces variation in the offspring.	Identical offspring (no variation).
If the environment changes variation gives a survival advantage by natural selection.	Vulnerable to rapidly changing conditions due to lack of variation.
Negative mutations are not always inherited.	Negative mutation can affect all offspring.
Natural selection can be speeded up using selective breeding to increase food production.	Food/medicine production can be extremely quick.

DNA and the genome

Sexual and asexual reproduction

Edexcel GCSE BIOLOGY, GENETICS Part 1

Genetic material in the nucleus is composed of a chemical called DNA.

DNA structure

Polymer made up of two strands forming a double helix.

Contained in structures called chromosomes. A gene is a small section of DNA on a chromosome. Each gene codes for a sequence of amino acids to make a specific protein.

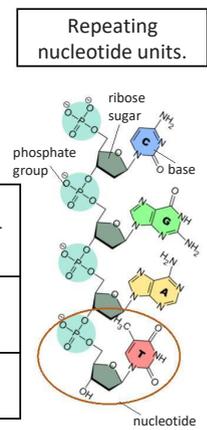
DNA structure

Legend:
 - Adenine (green)
 - Thymine (purple)
 - Cytosine (pink)
 - Guanine (blue)
 - Phosphate and sugar back bone (yellow)

(HT only) Not all parts code for proteins. Non-coding parts can switch genes on and off. Mutations may affect how genes are expressed.

Protein synthesis (Biology HT only)

DNA is polymer made from four different nucleotides. Each nucleotide consists of a common sugar, phosphate group and one of 4 different bases A, C, G & T



Extracting DNA	DNA can be extracted from fruit	Dissolve salt and washing up liquid together with a mashed up sample of fruit (kiwi fruit is good) and place in a 60°C water bath for 15 minutes.
		Filter and add protease solution to the filtrate in a boiling tube. Tilt the boiling tube and carefully add ice cold ethanol.
		The white layer that forms at the interphase is DNA and can be pulled out on a glass rod

In DNA the complementary strands C, A, T, G always link in the same way. C always linked to G on the opposite strand and A to T.



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The genome is the entire DNA of an organism.

All genetic variation arises in mutation, most have no effect on phenotype, some influence but very rarely a single mutation determines phenotype.

The whole human genome has now been studied.

It is of great importance for future medical developments

Searching for genes linked to different types of disease.
Understanding and treatment of inherited disorders.
Tracing migration patterns from the past.

(Biology HT) Some disorders are inherited on the chromosomes that determine sex (sex linked genetic disorders)

One pair of chromosomes carry the genes that determine sex

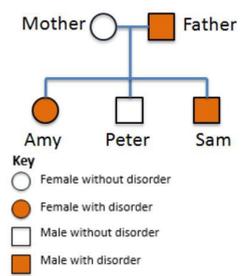
	Female	Male
	XX	XY
Gametes	X	Y
X	XX	XY
X	XX	XY

The probability of a male of female child is 50%. The ratio is 1:1

Variation: difference in the characteristics of individuals in a population may be due to

- Genetic causes (inheritance)**
- Environmental causes (condition they have developed in)**
- A combination of genes and environment**

There is usually extensive genetic variation within the population of a species e.g. hair colour, skin colour, height that can also be affected by environment e.g. nutrition, sunlight.



Using a family tree: If the father was homozygous dominant then all of the offspring would have the disorder. He must be heterozygous

Colour blindness in men.

The X chromosome carries one normal or one faulty allele (the normal is dominant). The shorter Y chromosome does not carry the allele and so X chromosome allele is always expressed in men.

Sex determination

Blood groups

Determined by multiple alleles (A,B,O) and codominance

AO, AA blood group A
BO, BB blood group B
OO blood group O
AB blood group AB. A and B are codominant

Using a punnet square (using mouse fur colour as an example)

Parent phenotype	Black fur	White fur
Parent genotype	BB	bb
What gametes are present	In each egg B	In each sperm b
Gametes	b	b
B	Bb	Bb
B	Bb	Bb

The probability of black fur offspring phenotype is 100%. All offspring genotypes are heterozygous (Bb).

Crossing two heterozygous mice (Bb)

Gametes	B	b
B	BB	Bb
b	Bb	bb

The probability of black fur is 75% and white fur 25%. The ratio of black to white mice is 3:1

Inherited disorders

EDEXCEL GCSE BIOLOGY GENETICS Part 2

The understanding of genetics (biology only)

Gregor Mendel

In the mid 19th century carried out breeding experiments on plants

Inheritance of each characteristic is determined by units that are passed on to descendants unchanged.

Chromosomes had not yet been discovered so the mechanism for inheritance was still unknown.

Define terms linked to genetics

Gamete	Sex cells produced in meiosis.
Zygote	Single cell that results from fusion of egg and sperm cell.
Chromosome	A long chain of DNA found in the nucleus.
Gene	Small section of DNA that codes for a particular protein.
Allele	Alternate forms of the same gene.
Dominant	A type of allele – always expressed if only one copy present and when paired with a recessive allele.
Recessive	A type of allele – only expressed when paired with another recessive allele.
Homozygous	Pair of the same alleles, dominant or recessive.
Heterozygous	Two different alleles are present 1 dominant and 1 recessive.
Genotype	Alleles that are present for a particular feature e.g. Bb or bb
Phenotype	Physical expression of an allele combination e.g. black fur, blonde hair, blue eyes.

Some characteristics are controlled by a single gene e.g. fur colour, colour blindness.

The alleles present, or genotype operate at a molecular level to develop characteristics that can be expressed as a phenotype.

Most characteristics are as a result of multiple genes interacting.

Genetic inheritance

Dominant and recessive allele combinations

Dominant	Recessive
Represented by a capital letter e.g. B.	Represented by a lower case letter e.g. b.

3 possible combinations:
Homozygous dominant BB
Heterozygous dominant Bb
Homozygous recessive bb



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Ionic	<i>Particles are oppositely charged ions</i>	Occurs in compounds formed from metals combined with non metals.
Covalent	<i>Particles are atoms that share pairs of electrons</i>	Occurs in most non metallic elements and in compounds of non metals.
Metallic	<i>Particles are atoms which share delocalised electrons</i>	Occurs in metallic elements and alloys.

<i>High melting and boiling points</i>	This is due to the strong metallic bonds.
<i>Pure metals can be bent and shaped</i>	Atoms are arranged in layers that can slide over each other.
<i>Good conductors of electricity and heat</i>	Delocalised electrons transfer energy.

<i>Low melting and boiling points</i>	Small amounts of energy needed to overcome the intermolecular forces.
<i>Poor conductors of electricity</i>	No free electrons to transfer energy.

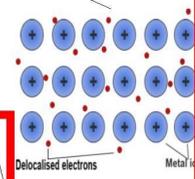
<i>High melting and boiling points</i>	Large amounts of energy needed to break the bonds.
<i>Do not conduct electricity when solid</i>	Ions are held in a fixed position in the lattice and cannot move.
<i>Do conduct electricity when molten or dissolved</i>	Lattice breaks apart and the ions are free to move.

Metallic bonding	
<i>Giant structure of atoms arranged in a regular pattern</i>	Electrons in the outer shell of metal atoms are delocalised and free to move through the whole structure. This sharing of electrons leads to strong metallic bonds.

Size of atoms and molecules	<i>Simple molecular structures consist of atoms joined by strong covalent bonds. This means that atoms are smaller than simple molecules.</i>
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EDEXCEL TOPIC SC5-7 BONDING

Ion	<i>An atom with a positive or negative charge</i>	Ionic bonding
Electrons are transferred so that all atoms have a noble gas configuration (full outer shells).	<i>Metal atoms lose electrons and become positively charged ions</i>	Group 1 metals form +1 ions Group 2 metals form +2 ions
	<i>Non metals atoms gain electrons to become negatively charged ions</i>	Group 6 non metals form -2 ions Group 7 non metals form -1 ions



Atoms share pairs of electrons

<i>Can be small molecules e.g. ammonia</i>	<p>Dot and cross : + Show which atom the electrons in the bonds come from - All electrons are identical</p>
	<p>2D with bonds: + Show which atoms are bonded together - It shows the H-C-H bond incorrectly at 90°</p>
	<p>3D ball and stick model: + Attempts to show the H-C-H bond angle is 109.5°</p>
<i>Can be giant covalent structures e.g. polymers</i>	<p>Simple polymers consist of large chains of hydrocarbons.</p>

Dot and cross diagram

Giant structure

Ionic compounds	Cation	<i>Positively charged ion</i>
	Anion	<i>Negatively charged ion</i>

Compound suffixes		
-ide	<i>If a compound name ends in -ide, it usually contains only two elements.</i>	For example: calcium + oxygen → calcium oxide
-ate	<i>If a compound name ends in -ate, it usually contains three or more elements one of which is always oxygen.</i>	For example: Calcium + carbon + oxygen → calcium carbonate

Structure	<ul style="list-style-type: none"> Lattices consist of a regular arrangement of atoms Held together by strong electrostatic forces of attraction between oppositely charged ions Forces act in all directions in the lattice
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<p><i>Each carbon atom is bonded to four others</i></p>	Used for cutting tools due to being very hard.	Very hard.	Rigid structure.
		Very high melting point.	Strong covalent bonds.
		Does not conduct electricity.	No delocalised electrons.

<p><i>Each carbon atom is bonded to three others forming layers of hexagonal rings with no covalent bonds between the layers</i></p>	Slippery.	Layers can slide over each other.
	Very high melting point.	Strong covalent bonds.
	Does conduct electricity.	Delocalised electrons between layers.

Graphene	<p>Single layer of graphite one atom thick</p>	Excellent conductor.	Contains delocalised electrons.
		Very strong.	Contains strong covalent bonds.

Fullerenes		Hexagonal rings of carbon atoms with hollow shapes. Can also have rings of five (pentagonal) or seven (heptagonal) carbon atoms.
		<p>Buckminsterfullerene, C₆₀</p> <p>First fullerene to be discovered.</p>

Graphene and fullerenes	Diamond
	Graphite

EDEXCEL TOPIC SC5-7 TYPES OF SUBSTANCES

Calculations involving masses

The balancing numbers in a symbol equation can be calculated from the masses of reactants and products

Convert the masses in grams to amounts in moles and convert the number of moles to simple whole number ratios.

Giant covalent structures	Diamond, graphite, silicon dioxide	Very high melting points	Lots of energy needed to break strong, covalent bonds.

M _r	<p>The sum of the relative atomic masses of the atoms in the numbers shown in the formula</p>	<p>The sum of the M_r of the reactants in the quantities shown equals the sum of the M_r of the products in the quantities shown.</p>	2Mg + O ₂ → 2MgO
			<p>48g + 32g = 80g</p> <p>80g = 80g</p>

Chemical equations show the number of moles reacting and the number of moles made	<p>Mg + 2HCl → MgCl₂ + H₂</p> <p><i>One mole of magnesium reacts with two moles of hydrochloric acid to make one mole of magnesium chloride and one mole of hydrogen</i></p>	<p>If you have a 60g of Mg, what mass of HCl do you need to convert it to MgCl₂?</p> <p>A_r : Mg = 24 so mass of 1 mole of Mg = 24g</p> <p>M_r : HCl (1 + 35.5) so mass of 1 mole of HCl = 36.5g</p> <p>So 60g of Mg is 60/24 = 2.5 moles</p> <p>Balanced symbol equation tells us that for every one mole of Mg, you need two moles of HCl to react with it.</p> <p>So you need 2.5x2 = 5 moles of HCl</p> <p>You will need 5 x 36.5g of HCl = 182.5g</p>
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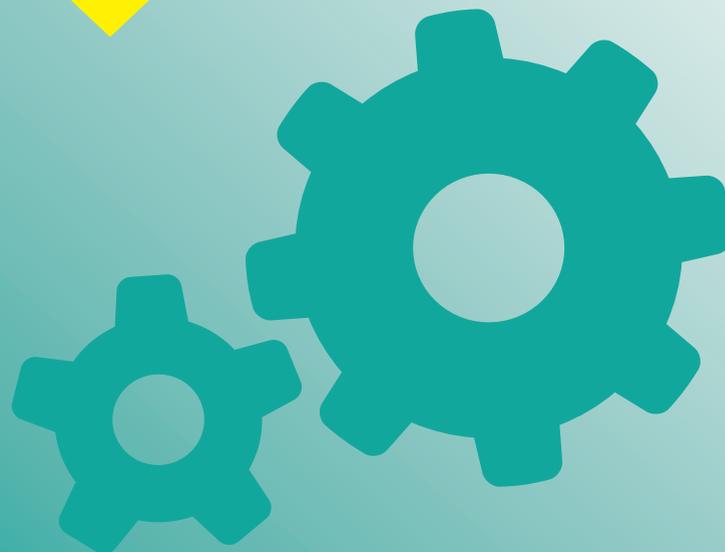
Conservation of mass	<i>No atoms are lost or made during a chemical reaction</i>	Mass of the products equals the mass of the reactants.
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Balanced symbol equations	<p><i>Represent chemical reactions and have the same number of atoms of each element on both sides of the equation</i></p>	<p>H₂ + Cl₂ → 2HCl</p> <p>Subscript numbers show the number of atoms of the element to its left.</p> <p>Normal script numbers show the number of molecules.</p>
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Avogadro constant	<p><i>One mole of any substance will contain the same number of particles, atoms, molecules or ions.</i></p>	<p>6.02 x 10²³ per mole</p> <p>One mole of H₂O will contain 6.02 x 10²³ molecules</p> <p>One mole of NaCl will contain 6.02 x 10²³ Na⁺ ions</p>
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Measured in mass per given volume of solution (g/dm ³)	<p>Conc. = $\frac{\text{mass (g)}}{\text{volume (dm}^3\text{)}}$</p>	<p>HT only</p> <p>Greater mass = higher concentration.</p> <p>Greater volume = lower concentration.</p>
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History





WORLD WAR I KNOWLEDGE ORGANISER

Main Participating Countries					
ALLIED POWERS			CENTRAL POWERS		
Country	Date Joined	Flag	Country	Date Joined	Flag
FRANCE	3 rd Aug, 1914		GERMAN EMPIRE	1 st Aug, 1914	
BRITISH EMPIRE	4 th Aug, 1914		AUSTRIA-HUNGARY	28 th Jul, 1914	
RUSSIA	1 st Aug, 1914		OTTOMAN EMPIRE	31 st Oct, 1914	
USA	6 th Apr, 1917		BULGARIA	12 th Oct, 1915	

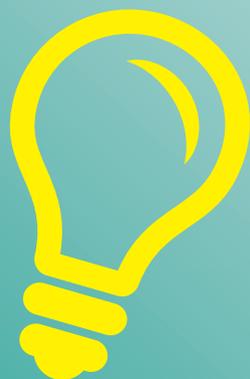
Key People	
<p>Archduke Franz Ferdinand – (1863-1914) was the heir to the Austro-Hungarian throne. He began his military career young (aged just 12). He was murdered in Sarajevo in 1914, alongside his wife, Sophie. The killer was Gavrilo Princip, a member of the Serbian Black Hand secret society. Only a month later Austria-Hungary declared war on Serbia, which started the chain of events leading to World War I.</p> 	<p>Kaiser Wilhelm II – (1859-1941) was the last German Emperor (Kaiser), reigning between 15th June 1888 until 9th November 1918. Wilhelm was a grandchild of Queen Victoria, and was related to many of the monarchs of Europe. His support for Austria-Hungary in the crisis of July 1914 was a leading factor in the outbreak of World War I. He was not a very well respected leader, and it is thought that his army generals led German war policy.</p> 
<p>Woodrow Wilson – (1856-1924) was the President of the United States throughout WWI. At first, the US was neutral. However, after 2 ½ years of war, America declared war on Germany. In early 1918, Wilson offered 14 points that he thought would bring lasting peace. This influenced the eventual Treaty of Versailles. He received the 1919 Nobel Peace Prize for his efforts.</p> 	<p>David Lloyd George – (1863-1945) was the Prime Minister of the United Kingdom during the final years of the war (and afterwards). He made a number of effective changes to the Allies organisation. He also played an important role after the war, being one of the 'Big 3' leaders (with the leaders of US and France) to negotiate the Treaty of Versailles with Germany.</p> 
<p>Tsar Nicholas II – (1868-1918) was the last Emperor of Russia. Throughout his reign, Russia fell from being one of the most powerful countries in the world, to being on the brink of collapse. His weak leadership caused the events of the Russian Revolution, Nicholas' abdication (stepping down as King), and his execution. Russia became a part of the communist Soviet Union.</p> 	<p>Wilfred Owen – (1893-1918) Wilfred Owen was a British poet and soldier. He is one of the best known World War I poets, telling of the horrors of trench warfare in an extremely realistic tone – poets before him had described the 'glory of war.' He wrote almost all of his poetry in just over a year, from August 1917 to September 1918. He was killed just one week before the end of the war.</p> 

Major Events				
Event	Image	Description	Date/s	Fact
European Alliances		To protect themselves, powerful European countries had 'alliances' (pacts) with one another before the war. On one side was the allied powers of France, Great Britain, Russia and others. On the other side was the central alliance of Germany and Austria-Hungary.	1879-1914	The pacts meant that countries must help an ally under attack.
Assassination of Archduke Franz Ferdinand		Franz Ferdinand, the Austro-Hungarian heir, and his wife Sophie, were murdered by Gavrilo Princip, a member of the Serbian 'Black Hand Society.' It had catastrophic consequences.	28 th June 1914	An earlier attempt to kill Franz had failed.
July Crisis		After the murder, Austria-Hungary declared war on Serbia. Russia therefore declared war on Austria-Hungary, before Germany declared war on Russia! By the 4 th August, all of the European powers were involved.	July-August 1914	Britain declared war on 4 th August 1914.
Trench Warfare		Both sides built large trenches, which stretched from the North Sea, through Belgium and France. Neither side made much ground from late 1914 until early 1918. Attacks involved going across No Man's Land (in the middle) where attackers were open to machine gun fire, mines, and shells. Casualties were huge. Life in the trenches were awful, with lots of illnesses and diseases like trench foot.	From September 1914 until November 1918 (the end of the war).	The enemy trenches were about 50 to 250 metres apart. In between was barbed wire and mines.
Gallipoli Campaign		The Gallipoli Campaign was an unsuccessful attempt by the Allies to control the sea from Europe to Russia. They suffered big losses at the hands of the Ottoman Empire.	19 th February 1915 – 9 th January 1916	The Allies had to retreat in Dec 1915/ Jan 1916.
Battle of the Somme		The Battle of the Somme was the largest battle of World War I on the Western Front. More than 3 million fought in the battle, with more than 1 million killed or injured.	1 st July 1916 – 18 th November 1916	This battle is where tanks were first used.
America Declares War		The USA declared war on Germany, after Germany continued to attack neutral boats in the seas around Europe.	6 th April 1917	The fresh US troops turned the war.
Second Battle of Marne		The Second Battle of Marne was the last major German attack in the war. They were defeated as the Allies counter-attacked.	15 th July - 6 th August 1918	After this battle, the Allies had the upper hand.
Armistice of 11 th November		The Armistice of the 11 th November 1918 saw an end to the fighting between Germany and the Allies. It came into force at 11am. It marked a victory for the Allies and defeat for Germany.	11 th November 1918	Fighting ended at 11am on the 11 th day of the 11 th month.
The Treaty of Versailles		The Treaty of Versailles was the most important of the peace treaties bringing to an end World War I, ending conflict between Germany and the Allied Powers. Germany had to accept responsibility for all of the loss and damage in the war and make large repayments to other countries.	28 th June 1919	Many people felt that the treaty was far too harsh on Germany.

Timeline of Major Events

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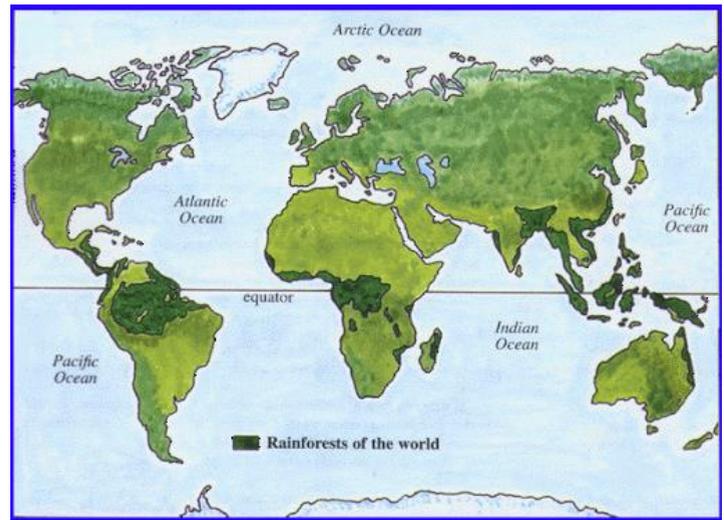
Geography



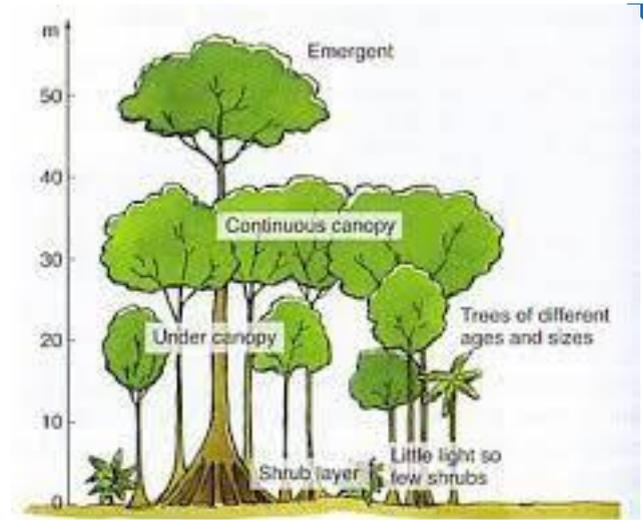
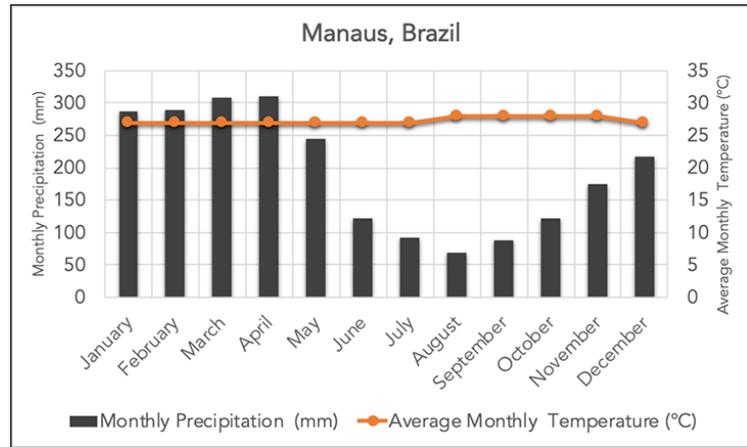


Key words:
 Adaptation
 Afforestation
 Biodiversity
 Canopy
 Carbon sink
 Commercial farming
 Conservation
 Debt reduction
 Deforestation
 Ecotourism
 Evapotranspiration
 Global warming
 Hardwood
 Indigenous tribes
 Infertile soil
 International agreements
 Leaching
 Mineral extraction
 Oil palm
 Protection
 Selective logging
 Slash and burn
 Soil erosion
 Subsistence farming
 Sustainability
 Transmigration

Average temp 27°C
 and over 2000mm
 rainfall per year



Rainforest soils are **poor**. Nutrients are found in the thin top layer of soil. Soils are known as **LATASOLS**



Drip tip leaves
 Waxy surface



Smooth bark
 Tall



Buttress roots



The harpy eagle has a relatively short wingspan...



The sloth grows green moss on its fur...



The toucan has a long strong beak...



The spider monkey has long strong limbs...

Geography Tropical Rainforests



Malaysia is a country in South East Asia. The natural vegetation is Tropical Rainforest.

The main threats to the forests in Malaysia are: Logging, road building, energy production (*Bakun Dam*), Mineral extraction (*oil and gas in Borneo*) population pressure and farming (*Commercial Palm oil*) Subsistence farming

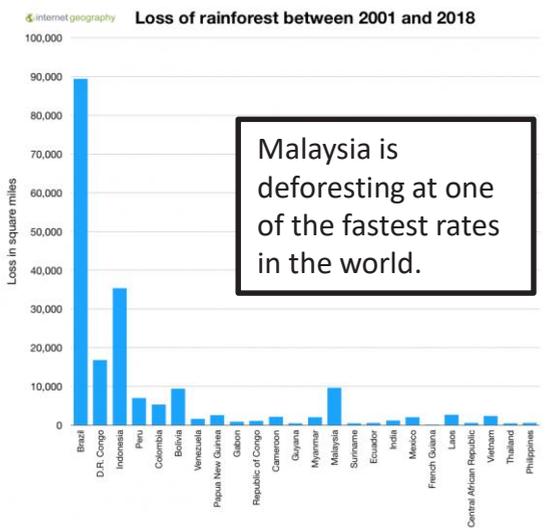


Rainforests are known as the lungs of the earth...why?



Impacts of deforestation on the environment are: soil erosion, loss of Biodiversity, contribution to climate change

Malaysia wants to develop its economy. Its uses the forests to do this. There are **benefits**: ✓ Jobs, taxes, improved infrastructure, raw materials for processing, hydro electricity, minerals eg gold is valuable. There are also **economic losses**: ✗ Pollution of the water could lead to water shortages, Fires can burn out of control, smoke into the cities, rising temps could impact farming, Plants that could bring medical benefits are lost,, economic costs of climate change, tourism to the Rainforest could decrease.



Malaysia is deforesting at one of the fastest rates in the world.

Sustainable management: Selective logging: the most damaging tree removal is clear felling. Selective logging takes only trees that are needed and then there is replanting. ,conservation and education involves creating national parks that are protected and educating visitors, Ecotourism, International agreements such as Hardwood forestry and the Forest stewardship council, debt reduction also known as debt for nature

Ecotourism can provide jobs for locals, it uses local materials including food. It supports the local economy and doesn't harm the environment. So why is it not a perfect solution?



Religious Studies





Religious Studies - Existence of God and revelation



Design Argument

The world looks designed → therefore it must have a designer → this can only be God → therefore God must exist

- Paley: the watch analogy- you would expect a watch to be designed not made by chance
- Newton: the human thumb must have been designed '...the thumb alone would convince me of God's existence'
- F.R. Tennant- all the conditions on earth are right for human development

But others argue:

- Evolution happened by chance
- Why would God have designed a world with suffering and flaws such as earthquakes?
- The order in the universe is imposed by humans, not God

Argument from miracles- Miracles can't be explained by science or nature so they are supernatural and must be performed by God
Some argue that miracles do happen:

- Christianity based on miracles of the *incarnation and resurrection*
- Jesus performed miracles e.g. *raising of Lazarus, calming the storm, healing the paralysed man*
- Many miracles have taken place and happen today e.g. healings (Lourdes)

But:

- Atheists say that miracles are just coincidences or that they have scientific explanations, but we don't know them
- Hume says it is unfair if God only worked miracles for some people

First Cause Argument (Thomas Aquinas)

Everything has a cause → the universe must have a cause → that cause must be uncaused → this must be God who is eternal → therefore God must exist

But some people argue:

Why doesn't God have a cause if everything else does?/The Big Bang caused the universe by chance/The universe has always existed and so doesn't need a cause

General revelation- when God reveals himself in ways available to anyone

- Nature- creation shows what God is like: '*the heavens declare the glory of God*'
- Bible- *word of God* which teaches and comforts Christians
- Lives of Christians- these may show that God is working in them e.g. Mother Theresa
- Conscience- can be seen as the voice of God telling us what is right and wrong
- Worship- e.g. praying and Holy Communion may reveal God's presence

Arguments against the existence of God

Science: Atheists argue-

- There is no need to believe in God now we know the Big Bang started everything
- Genesis has been disproved by scientific theories

But Christians respond-

- Science just shows how God made things- Kepler 'science is the process of thinking God's thoughts after him'
- Science can't prove or disprove God, we need science and religion

Suffering: Problem of evil- if God is all loving and all powerful why is there evil?

Either he is not powerful enough or not loving enough to stop it. So, some believe that suffering disproves God

But Christians respond:

- God gave humans freewill to choose good or evil
- *Adam and Eve disobeyed God* which led to suffering
- If there was no evil people could not show good qualities such as love

Special revelation- when God gives an individual or a group and direct personal experience of himself

- Visions- e.g. *on the road to Damascus Paul saw a vision of Jesus*
 - Dreams- e.g. *Joseph was told he should not be afraid to marry Mary*
 - Hearing God's call- e.g. *Jeremiah: 'Before you were born I set you apart'*
 - Miracles- e.g. Jesus raised Lazarus from the dead: '*I am the resurrection and the life*'
 - Prophecy – e.g. God told OT prophets what would happen
- Importance: point to God's existence, show people how God wants them to live, can lead to becoming a Christian
However, atheists argue revelations can be explained by e.g. drugs, wishful thinking, mistake, mental illness, lying

Ideas of the divine

Muslims and Christians believe God is: omnipotent, omniscient, benevolent, personal, immanent and transcendent

Evidence that God is transcendent:

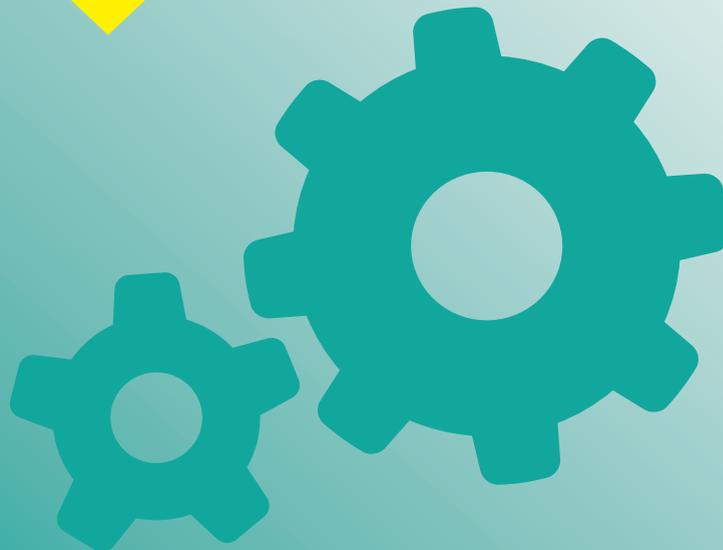
-God is creator and so outside creation: '*in the beginning God created the heavens and the earth*'

-Jesus said to pray '*our Father in heaven*'

-Evidence that God is immanent:

- humans can talk to God '*our Father*'
- Jesus lived on earth and revealed God
- Jesus sent the Holy Spirit to earth to help Christians
- Miracles and answered prayer

Spanish





Ma famille, mes amis et moi

LES NOMS	
Dans ma famille / j'ai / il y a Nous sommes cinq dans ma famille.	
Ma famille	My family
Mes proches	My relations
Ma mère / Mon père	My mum/ my dad
Mes parents	My parents
Mon jeune frère	My younger brother
Ma soeur aîné(e)	My older sister
Mon demi-frère/Ma demi-soeur	My stepbrother/sister
Mon/ma petit(e) ami(e)	My boyfriend/ girlfriend
Mon/ma meilleur(e) ami(e)	My best friend
Mon grand-père/Ma grand-mère	My grandfather/grandmother
Mon oncle/Ma tante	My uncle /auntie
Mon petit-fils/Ma petite-fille	My grandchild
Mon neveu/Ma nièce	My nephew/niece
Mes frères jumeaux	My twin brothers
Les adolescents/Les jeunes	Young people
Les personnes âgées	Old people
Les autres	The others
Prénom	Name
Nom	Surname
Surnom	Nickname
Date de naissance	Date of birth

Égoïste	Selfish
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Los adjetivos	
Agréable/ méchant(e)	Nice/ Nasty
Poli(e)	Polite
Joli(e) / Laid(e)	Pretty / Ugly
Grand(e) / Petit(e)	Tall /Short/Small
Audacieux/Audacieuse	Daring/ Cheeky
Méchant(e)	Naughty
Travailleur/Travailleuse	Hard working
Bavard(e)	Talkative/chatty
Paresseux/Paresseuse	Lazy
Chauve	Bald
Gourmand(e)	Greedy
Jaloux/ouse	Jealous
Affectueux/Affectueuse	Caring
Généreux/Généreuse	Generous
Compréhensif/ive	Understanding
Fier/Fière	Proud
Bête	Silly/Stupid
Timide	Shy
Confiant(e)	Confident
Content(e) / Triste	Happy / Sad
Agréable/ Désagréable	Pleasant/ Unpleasant
Courageux/Courageuse	Brave
Lâche	Coward
Gentil/Gentille	Kind
Sensible	Sensitive
Maladroit(e)	Clumsy

Quand on décrit les autres		
Je	Ma mère (singular)	Mes amis (plural)
Je suis – I am	est – Is	sont – are
J'étais– I was	était– was Elle était = She was	étaient - were
Je m'appelle – I am called	s'appelle – is called Elle s'appelle = She is called	s'appellent – are called
J'aime – I like	aime – likes Elle aime = She likes	(Ils) aiment - (they) like
Je porte (des lunettes) – I wear (glasses)	porte (un chapeau) – wears (a hat) Elle porte = She wears	(Ils) portent – (they) wear
Je m'entends bien avec – I get on well with	(Elle) s'entend bien – (She) gets on well	(ils) s'entendent bien – (they) get on well.
Je dis – I say	dit – says. Elle dit = She says	(ils) disent que – (they) say that
Je pense que– I think	(Elle) pense que– (She) thinks that (Elle) m'aide – (she) helps me	(ils) pensent que – (they) think that
	(Elle) me donne de bons conseils = (She) gives me good advice	

Je	Ma mère (singular)	Mes amis (plural)
J'ai – I have	a = has	ont – have

Un bon sens de l'humour	a good sense of humour
Les cheveux longs /courts/ frisés/ raides	Long/short/curly/straight hair
Les cheveux bruns/marron/ noirs/blonds/roux	Brown/ brown/ black/blond/ ginger hair
De grands yeux/ de petits yeux	Big/small eyes
Les yeux bleus/verts/châtaignes/ marron	Blue/green/chestnut/brown eyes

Make sure the adjective agrees

Ma mère est grandE Mon père est grand
J'ai les yeux bleuS J'ai les cheveux brunS



Les relations et le mariage

Les verbes	
Chercher	To look for
Rencontrer	To find
Habiter ensemble	To live together
Adopter	To adopt
Avoir des enfants	To have children
Avoir de la chance	To be lucky
Se marier	To get married
Divorcer	To get divorced
Réussir	To succeed
Ressembler à quelqu'un	To look like someone

Les adjectifs	
Ma mère est ... Mes parents sont ...	
Célibataire(s)	Single
Marié(e)(s)	Married
Veuve/veufs	Widow
Fiancé(e)(s)	Engaged
Retraité(e)(s)	Retired

Les relations	
Je m'entends bien/mal	I get on well/badly
Je ne supporte pas	I can not stand
J'en ai marre de	I am fed up with
Mon (oncle) ça m'est égal	I don't mind (my uncle)

Les noms	
La relation	The relationship
La vie romantique	Romantic life
Le mariage	Marriage
L'amour	Love
Une bague (en or)	Golden ring
Un mariage	A wedding
Un mariage à l'église	A church wedding
Être pacsé	To have a civil partnership
Une date	A date
Une application de rencontres	A dating app
Un partenaire	A partner
L'homme	The man
Mon mari	My husband
La femme	The woman / wife
Une famille monoparentale	A single parent family
Un partenariat entre personnes de même sexe	Same sex partnership
L'adoption	Adoption
Un écart de génération	Generation gap
La situation de famille	Marital status

Attention: Faux amis:

- sensible = sensitive
- Je ne supporte pas mon frère = I can't stand my brother



Making Plans for the Future		
Time Phrases	Future Tense	Infinitives (inf)
À l'avenir... (In the future)	Je vais + inf I am going to..	me marier
Quand je serai plus âgé(e) (When I am older)	Tu vas + inf you are going to	habiter ensemble
Quand j'aurai 25 ans. (When I am 25)	Il/elle va + inf he/ she is going to	avoir des enfants
L'année prochaine (Next year)	On va + inf we are going to ..	chercher un partenaire
Dans deux ans (In 2 years time)	Vous allez + inf you all are going to	
	Ils/elles vont + inf they are going to	
J'ai l'intention de + inf. (I have the intention of)		adopter
J'espère +inf (I hope)		réussir

Planning for Tenses, Subjunctive and If Clauses

Mes parents ont divorcés **il y a trois ans** (My parents got divorced 3 years ago)
 Mes parents se sont mariés **il y a trois mois** (My parents got married 3 months ago)
 Me parents ont décidé de ne pas se marier... (My parents decided not to get married)
 Je ne pense pas que ce soit nécessaire (I do not think it is necessary)

'If' sentences

Si je me marie, je vais avoir des enfants. (If I marry, I am going to have children)
 Si je ne trouve pas de partenaire, je vais adopter (If I do not find a partner, I am going to adopt)





Mi familia, mis amigos y yo

Los sustantivos	
En mi familia hay/ tengo.... Mi familia esta compuesta por (5) personas	
Mi familia	My family
Mis parientes	My relatives
Mi madre / Mi padre	My mum/ my dad
Mis padres	My parents
Mi hermano menor	My younger brother
Mi hermana mayor	My older sister
Mi hermanastro/a	My stepbrother/sister
Mi novio/a	My boyfriend/ girlfriend
Mi mejor amigo	My best friend
Mi abuelo/a	My grandfather/mother
Mi tío/a	My uncle /auntie
Mi nieto/a	My grandchild
Mi sobrino/a	My nephew/niece
Mis hermanos gemelos	My twin brothers
Los adolescents/Los jovenes	The young people
Los mayores	Old people
Los demás	The others
Nombre	Name
Apellido	Surname
Apodo	Nickname
Fecha de Nacimiento	Date of birth

Egoista	Selfish
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Los adjetivos	
Simpatico-a/ Antipatico-a	Nice/ Nasty
Educado/a	Polite
Guapo-a / Feo-a	Pretty / Ugly
Alto-a / Bajo/a	Tall /Short
Atrevido/a	Daring/ Cheeky
Travieso/a	Naughty
Trabajador/	Hard working
Hablador/a	Talkative
Perezoso-a/ Vago-a	Lazy
Calvo/a	Bald
Glotón/a	Greedy
Celoso/a	Jealous
Cariñoso/a	Caring
Generoso/a	Generous
Comprensivo/a	Understanding
Orgullosa/a	Proud
Tonto/a	Silly
Timido/a	Shy
Seguro/a de mi mismo	Confident
Alegre / Triste	Happy / Sad
Agradable/ Desagradable	Pleasant/ Unpleasant
Valiente	Brave
Cobarde	Coward
Amable	Kind
Sensible	Sensitive
Torpe	Clumsy

Describiendo a otras personas		
Yo	Mi madre (singular)	Mis amigos (plural)
Soy – I am	Es – Is	Son – They are
Era – I was	Era – I was	Eran - were
Me llamo – I am called	Se llama – is called	Se llaman – are called
Me gusta – I like	Le gusta – likes	Les gusta - they like
Llevo (gafas) – I wear	Lleva (sombrero) – She wears a	Llevan – they wear
Me llevo bien – I get on well	Se lleva bien – She gets on well	Nos llevamos bien – we get on well.
Digo – I say	Dice – says.	Dicen que – they say that
Pienso – I think	Piensa – thinks	Piensan – they think
	Me ayuda – she helps me	
	Me da buenos consejos	

Describiendo a otras personas		
Yo	Mi madre (singular)	Mis amigos (plural)
Tengo – I have	Tiene – she has	Tienen – have
Sentido del humor		Sense of humour
El pelo largo / corto/ rizado/ liso		Long/short/curly/straight hair
El pelo castaño/marron/ negro/ rubio/pelirrojo		Brown/ brown/ black/blond/ ginger hair
Los ojos grandes/ pequeños		Big/small eyes
Los ojos azules/verdes/castaños/ marros		Blue/green/brown/brown eyes

Common mistakes to avoid:

Make sure the adjectives agree:

Mi madre es guapa y mi padre es alto. Mi hermana tiene los ojos marrones y el pelo castaño

Care with **mi/ mis (my)** ; **Es** – he /she is - **Son** – they are



Las relaciones y el Matrimonio

Los verbos	
Buscar	To look for
Encontrar	To find
Vivir juntos	To live together
Adoptar	To adapt
Tener hijos	To have children
Tener suerte/exito	To be lucky/successful
Casarse	To get married
Divorciarse	To get divorced
Parecerse	To look like/seem

Los adjetivos	
Mi madre está ... Mis padres están ...	
Soltero/a/os/as	Single
Casado/a/os/as	Married
Viudo/a/os/as	Widow
Comprometido/a/os/as	Engaged
Jubilado/a/os/as	Retired

Los sustantivos	
La relación	The relationship
La vida amorosa	Romantic life
El matrimonio	Marriage
El amor	love
El anillo (de oro)	Golden ring
La boda	Wedding
Una boda por la iglesia	A church wedding
Una boda civil	A civil marriage/partnership
Una cita	A date
Una aplicación de citas	A dating app
La pareja	Partner
El hombre	The man
Mi marido	My husband
La mujer	The woman / wife
Una familia monoparental	A single parent family
Una pareja del mismo sexo	Same sex partnership
La adopción	Adoption
Barrera generacional	Generation gap
Estado civil	Marital status

Las relaciones	
Me llevo bien/mal	I get on well/badly
No aguanto/soporto	I cannot stand
Estoy harto de	I am fed up with
Mi (tío) me da igual	I don't mind (my uncle)

Cuidado: Amigos Falsos:

- Actualmente – currently
- La piel – skin
- Exito – success
- Soportar – To stand (No soporto= I cant stand my brother)
- Sensible – sensitive
- Comprometido - Engage
- Plata - Silver



Making Plans for the Future			
Time Phrases	Future Tense		Infinitives (inf)
En el futuro... (In the future)	Voy a + inf	I am going to..	Casarme
Cuando sea mayor (When I am older)	Vas a + inf	you are going to	Vivir juntos
Cuando tenga 25 años. (When I am 25)	Va a + inf	he/ she is going to	Tener hijos
El año que viene El año próximo (Next year)	Vamos a + inf	we are going to ..	Buscar pareja
Dentro de dos años (In 2 years time)	Vais a + inf	you all are going to	Adoptar
Tengo la intención de + inf. (I have the intention of)			Tener exito
Espero +inf (I hope)			
Ojalá pueda + inf (I hope I can..)			



Planning for Tenses, subjunctive and If Classes	
Mis padres se divorciaron hace tres años (My parents got divorced 3 years ago)	
Mis padres se casaron hace dos meses (My parents got married 2 months ago)	
Mis padres decidieron no casarse... (My parents decided not to get married)	
No creo que sea necesario (I do not think it is necessary)	
If sentences	
Si me caso voy a tener hijos. (If I marry I am going to have children)	
Si no encuentro una pareja, voy a adoptar (If I do not find a partner, I am going to adopt)	

IT





Summary

In computing, modelling is used to look at large amounts of data to help with scientific or engineering projects. A computer model is a representation of a real-life system or situation, such as the workings of a nuclear reactor or the evacuation of a football stadium.

Simple models can be built in a spreadsheet. A spreadsheet model could be used to plan a school prom. To make sure it came in on budget the spending on food, drinks, entertainment, and the price of tickets could be varied.

A spreadsheet can be used as a modelling tool. The model is controlled by a set of rules introduced by formulae. These rules can be changed easily to vary the model and, for example, provide information about running costs and profit margins.

Spreadsheets are used to store information and data. Once you have your information in a spreadsheet you can run powerful calculations and make charts.

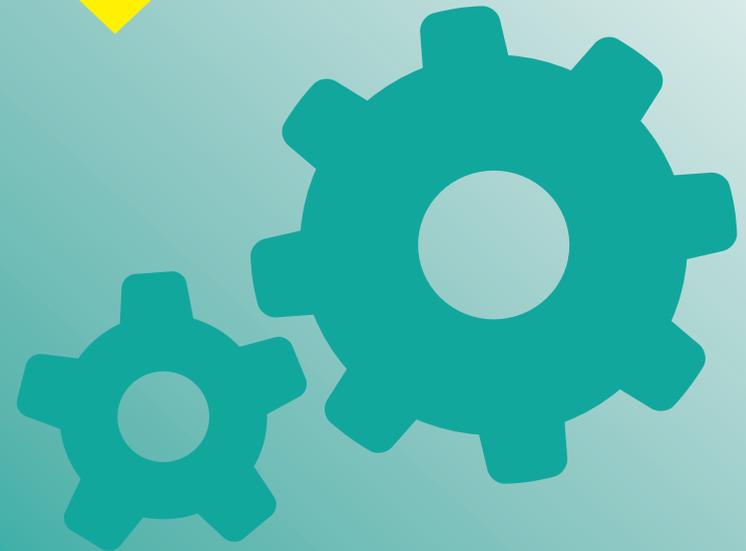
Key Words

Axis labels	A label for a graph's horizontal or vertical axis that explains what the value relates to.
Cell	An individual spreadsheet box where you enter data.
Cell reference	Names of individual cells (A5 for example).
Chart	A graphical way of displaying data.
Column	Cells that go down the spreadsheet page.

Key Words continued

Computer model	Predicts and investigates how real-life devices or processes might behave in different situations.
Data	Values, typically letters or numbers.
Field	A Collection of one data type across multiple records.
Format	The appearance of a document, including the fonts, colours, size and rotation.
Formula	Makes automatic calculations that update when the data does.
Function	Makes more complex calculations.
Label	Text used to identify cell contents.
Range	Set of cells next to each other.
Record	A collection of data on one person or item.
Row	Cells that go across the spreadsheet page.
Spreadsheet	A piece of software used to manipulate data, often used in modelling.
Workbook	A collection of worksheets

Computer Science





Python is a popular programming language released in 1991.
It is used for:

- web development (server-side),
- software development,
- mathematics,
- system scripting.

Script colours:
Functions
Keywords
Strings
Comments – must be preceded with a # and do not affect the running of your program
 Everything else is in black!

Using the Shell
 The 'Python Shell' Works like a calculator: type an expression at the prompt >>> You Get the answer as soon as you hit return. It is enough to type an expression; the value is echoed. The Shell is good for trying out small bits of program.



A program is a document that is held in a file (just like a word processor or spread sheet file). We will assume that a Python program is a single file, with extension '.py'.

As you complete each exercise, create a new file for each stage. That way you can look back at the programs you have written. You can create a new program as follows:

1. Menu: File/New window
2. Edit text in the new window
3. Menu: Run/Run Module or Run/Check module. You will be prompted to save the file. Give it extension .py

1. Python
2. Programming
3. Idle
4. Loop
5. Variable
6. String
7. Operators
8. Shell
9. While
10. Assignment

Writing Scripts
 A Program or script is a document. The text of the program is in a file, with a name. To see what the program does, you must tell IDLE to 'run' The program. A Program must have a 'print' In it; otherwise nothing happens. Large programs are always written in files

Print()
 The print() function is very flexible

input ()
 The input() function is not quite as flexible. It can only accept a single string

Strings:
 Can be added to and multiplied

While loop:
 While loops continue looping through a block of code while a test is true

For loop:
 The for loop is most useful for looping through items in a container data-type

If, elif, else:
 These control statements are used with logical operators to provide control in programs

Operator	Meaning	Example	Evaluates to
==	equal to	7==7	True
!=	not equal to	6!=7	True
>	Greater than	7>6	True
<	Less than	5<8	True
>=	Greater than or equal to	6>=8	False
<=	Less than or equal to	7<=7	True

Text (strings)

Single quoted
`'perfect'`

Double quoted
`"credit"`

Multi-line
`'''Hello, World!'''`

Add (concatenate) strings
`'Hello' + 'World'`

Multiply string by integer
`'Echo...'*4`

Length of a string
`len('Hello')`

Convert string to integer
`int('365')`

Whole numbers (integers)

Addition and subtraction
`365 + 1 - 2`

Multiplication and division
`25*9/5 + 32`

Powers (2 to the power of 8)
`2**8`

Convert integer to string
`str(365)`

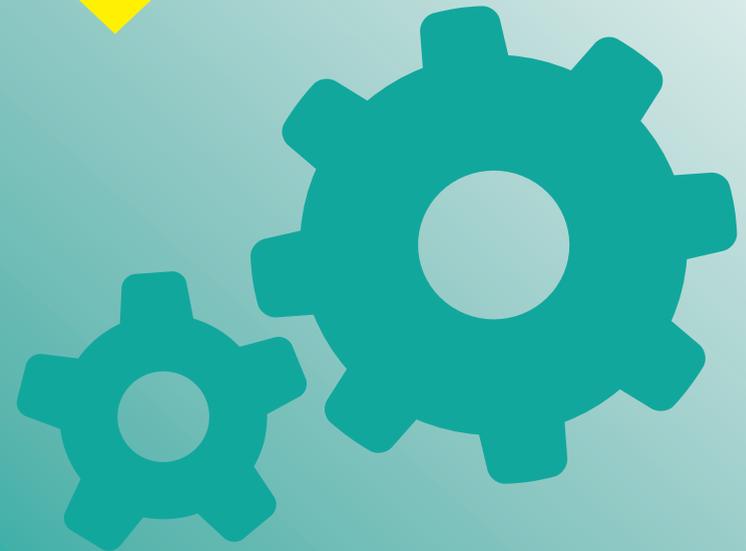
Interact with the user (input and output)

Print a message
`print('Hello, world!')`

Print multiple values (of different types)
`ndays = 365
 print('There are', ndays, 'in a year')`

Asking the user for a string
`name = input('What is your name? ')`

Asking the user for a whole number (an integer)
`num = int(input('Enter a number: '))`



Business



Dynamic Nature

New businesses evolve due to:

- Products or services becoming obsolete
Due to technology and the changes in customer needs, more and more products are being introduced, which means the older alternatives are being replaced.
- Introduction of new technology
Customers now want convenience and technology is the easiest and best way of them getting this. Also technology allows production methods to change, altering products.
- Changes in customer wants and needs
People want and need different products and services constantly, meaning businesses have to provide these to ensure they do not fail and fulfil those needs/wants

Adding Value

Adding value is making a product worth more than the cost the business purchased it for.

A business can add value through the following methods;

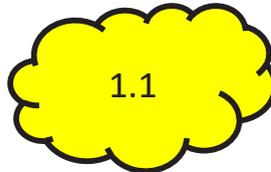
- Convenience
Making the product/service quicker than any others to access.
- Branding
Giving the product a name/identity
- Quality
Making the quality stand out against competitors
- Design
Adding features that attract customers and meet their needs and wants
- Unique selling points.
Making the product different to competition

Risk

A risk is a possibility of something going wrong.

- Business failure
- Financial loss
- lack of security

Calculated risks are those that have been statistically analysed, so strategies can be put into place to reduce the impact/level of risk.



Reward

A reward is the gain/benefit from taking a risk.

The correlation between risk and the reward is that the larger the risk the larger the reward.

Rewards when starting up include

- Business success (Financial)
- Profit (Financial)
- Independence (Non Financial)



Enterprise

Enterprise simply means business

The 3 purposes of business are

1. To meet customer wants and needs
2. To provide and produce goods /services
3. To add value



These are provided by the person who starts the business, who is called the entrepreneur. The role of an entrepreneur is to

1. Organise resources,
2. makes business decisions,
3. takes risks.

Characteristics are the traits that successful business people have, allowing them to start and build a growing business.

Wants and Needs

The most successful businesses are the ones who adapt to the changes of customer wants and needs the quickest.

Wants are often luxuries and items/services customers desire to have.

Needs are necessities, products or services that you cannot live/survive without.

businesses can meet customer wants and needs by focussing on specific factors such as quality or design (see 1.2)

Art





During Half term 1 and 2 you will be exploring the theme of Nature. You need to show an understanding of the GCSE assessment objectives.



Drawing to research and record

Deliberate Practice – Produce a range of drawings in your sketchbook. Make some drawings from first hand observation and some from your photographs.

Consider Tone, Form, Texture, Line, shape.



Photography

Photography is a form of Recording and should be used whenever possible to explore **visual elements**. Tone, Texture, Shape, Form, Viewpoints.

Techniques – crop, filter, enlarge, zoom.

Deliberate Practice – Take a series of photos of food, consider how you can apply the techniques above.

Key vocabulary

Organic, spiky, rough, texture, representational, flowing, irregular, shadow, recording, observed.

Artist Research

Explore the work of artists who have used Nature and Natural forms as a source of inspiration. Creatively present your research in your sketchbook.

Artists to consider

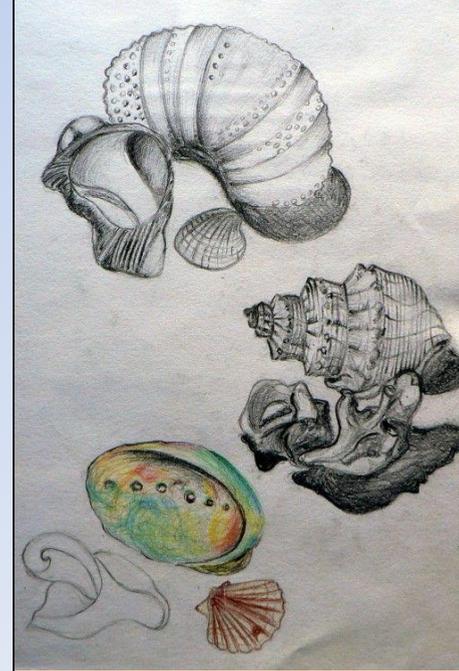
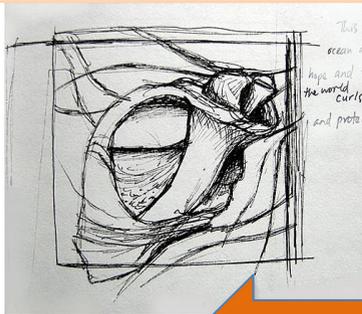
- Karl Blossfeldt
- Amira Gale
- Georgia O Keefe
- Marcia Baldwin
- Martin La Spina
- Ernst Haeckel

Art styles to consider

- Art Nouveau
- Surrealism

Deliberate Practice

Produce a google slide on 2 of your favourite artists. You can choose from the list above or find your own.



Design Technology



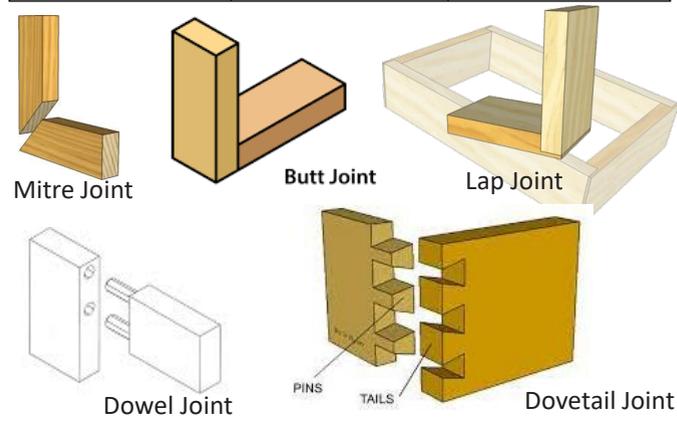


Types of Softwoods

Natural Timbers		Manufactured Boards
Hardwood	Softwood	
		
<p>Hardwoods are usually obtained from deciduous trees, which lose their leaves in autumn.</p> <ul style="list-style-type: none"> usually grow in warmer more humid climates, mainly in South America and Asia grow slowly (80+ years) are more difficult to sustain than softwoods are more expensive than softwoods are strong and hardwearing. 	<p>Softwoods are usually obtained from coniferous trees, which keep their leaves in winter and are also known as evergreens. These grow quickly which makes them sustainable as they are renewable. This also makes them cheaper when compared to hardwoods.</p> <ul style="list-style-type: none"> Usually grow in colder climates and are mainly grown in Scandinavia and Northern Europe Grow thin, needle-like leaves Grow relatively quickly (30 years) Are easier to sustain than hardwood trees Are easy to cut and shape Are usually cheaper than hardwoods 	<p>Manufactured boards are made from the waste sections of felled trees – the parts which are of little use as planks. The wood is reduced to pulp, particles or thin strips and bonded together using special adhesives or resins. Manufactured boards are made as alternative to natural timber.</p> <ul style="list-style-type: none"> Come in sheet form (usually 1.2 x 2.4m) Are extremely stable and of uniform thickness Are less expensive than laminating planks of timber Can be covered with veneers Are available in a variety of thicknesses (3, 6, 9, 12, 15, 18, 22mm)

	Example	Properties	Uses
Larch		Tough and durable, good water resistance and finishes well	Fencing, cladding, decking, furniture
Pine		Lightweight easy to work with but can be knotty	Interior joinery and furniture and window frames.
Spruce		Easy to work with and is lightweight	Furniture, musical instruments and construction

	Example	Properties	Uses
Medium Density Fibreboard (MDF)		This compressed board is rigid and stable and is easy to work with. It has a smooth surface but it is very absorbent.	Flat pack furniture, kitchens and toys
Plywood		This is a laminated board it is stable due to its alternate layering a 90°. It has good water resistance.	Furniture, shelving, skateboards and exterior fencing
Chipboard		This compressed board not as strong as MDF or plywood is prone to chipping	Flooring, low end furniture kitchen units & cupboards



Types of Hardwoods

	Example	Properties	Uses
Ash		Tough and flexible, wide grained, shock resistant and finishes well	Sports equipment, hand tools and ladders
Beech		Strong, dense close grain but is prone to warping and splitting	Furniture, children's toys, bench tops
Mahogany		Strong and durable, easy to work with finishes well.	High end furniture
Oak		Strong and lightweight	Flooring, furniture and timber framed buildings
Balsa		Strong and durable but very lightweight. If too thin can snap & break.	Model making, floats and rafts

Finishing Natural Timbers

Timbers can be treated with a number of surface finishes these include Paint, Stain, Wax & Varnish. Applying these finishes can:

- Seals the wood to protect the surface from heat and water
- Enhance the grain & surface
- To colour the surface
- To give a specific aesthetic appeal.

Finishing Manufactured Boards

Veneer
A sharp blade cuts very thin layers wood called veneer. A layer of veneer can be glued onto less expensive manufactured board to produce a more attractive finish and imitate natural timbers but maintain the properties of a manufactured board.



Lamination
Laminating involves bonding by gluing strips of materials together in layers to create a strong structure. An example of this is wooden beams. If thinner materials are used for lamination the curves can be more complex.



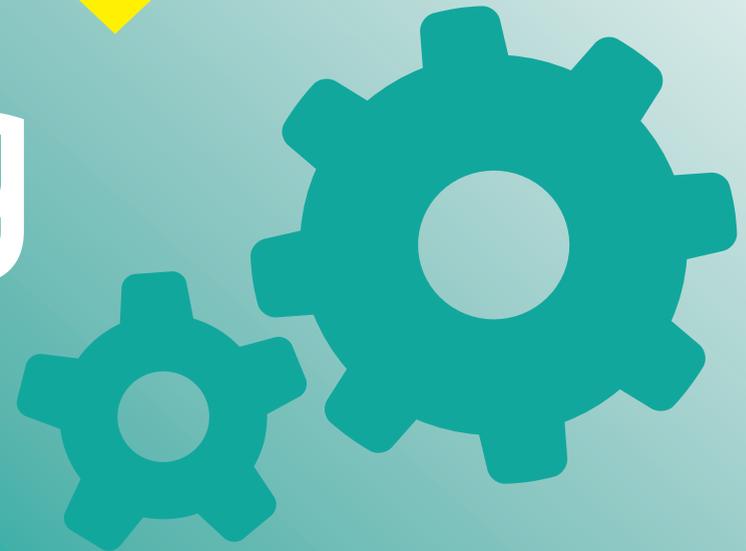
Sustainable Timber

Wood is considered to be sustainable material as trees can be grown to replace those used for timber or fuel. A big issue is in many parts of the world timber is being used faster than trees are being replanted. This causes deforestation which is seen as a key factor to global warming.

To regulate this The Forest Stewardship Council (FSC) are dedicated to ensuring that timber supplies are regulated and sustainably harvested.

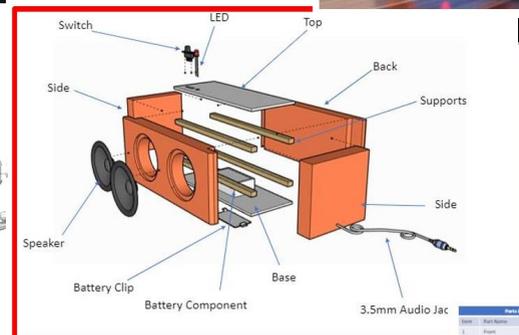
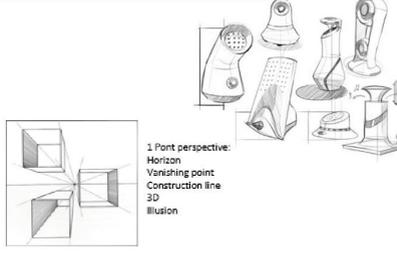
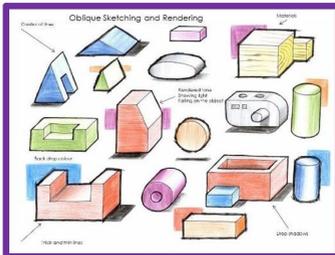
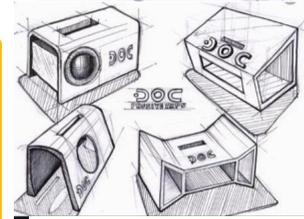
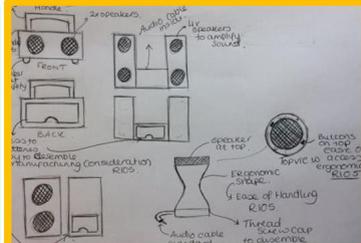
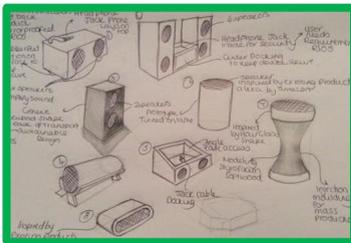
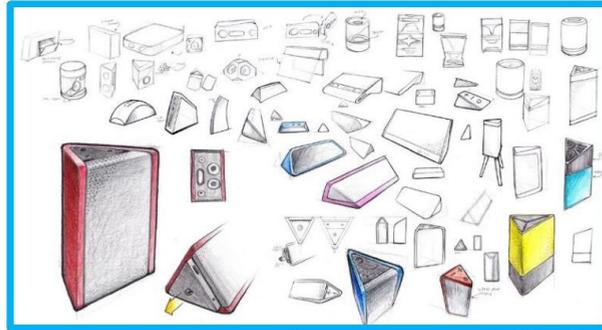
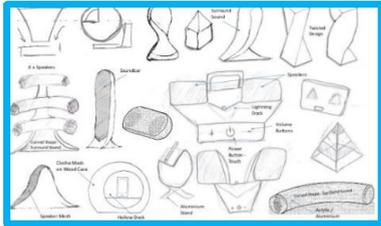


Engineering Design

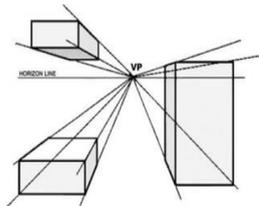




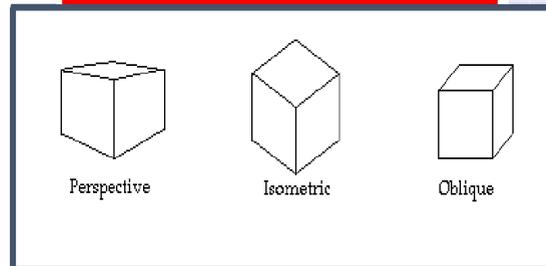
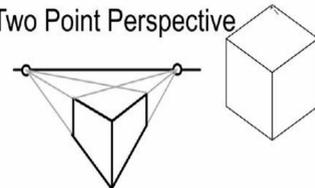
R107: OCR Engineering design Designing and developing Ideas



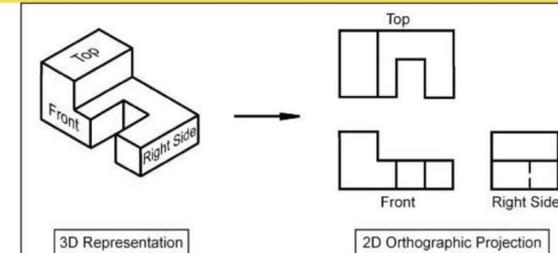
One Point Perspective



Two Point Perspective

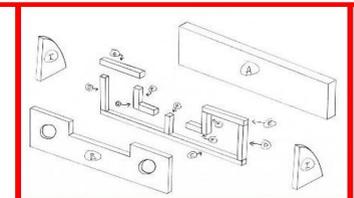
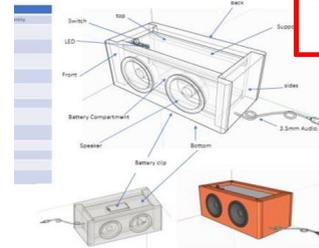
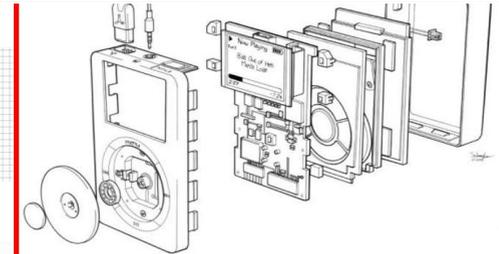
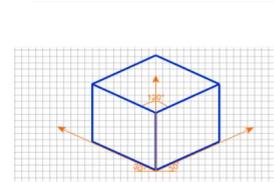
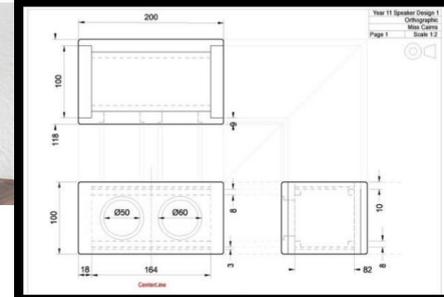


ORTHOGRAPHIC PROJECTION.



Key Words:

- Thumbnail sketch
- Initial idea
- Developed idea
- Working drawing
- Dimension
- CAD
- Standardised
- Component
- Oblique
- One Point Perspective
- Two point perspective
- Orographic Projection
- Freehand
- Thick and Thin lines
- Rendering
- Annotation
- Two Dimensions
- Three Dimensions
- Exploded View



Music





Surdo
(Pilot Tom)

Caixa
(Snare Drum)

Reco/Reco

Apito
(Whistle)

- Syncopated timing
- Call and response
- Groove
- Accent
- Cross rhythms
- Polyphonic texture
- Rubato

Three Little Birds

Words and Music by
BOB MARLEY

Moderately slow Reggae

C major

A Minor Scale:

I	ii	iii	IV	V	vi	vii°	I
C	Dm	Em	F	G	Am	Bdim	C
tonic	supertonic	mediant	subdominant	dominant	submediant	leading note	tonic

Natural Minor

A m	B dim	C	D m	E m	F	G	A m
I	ii.dim	III	iv	v	VI	VII	I





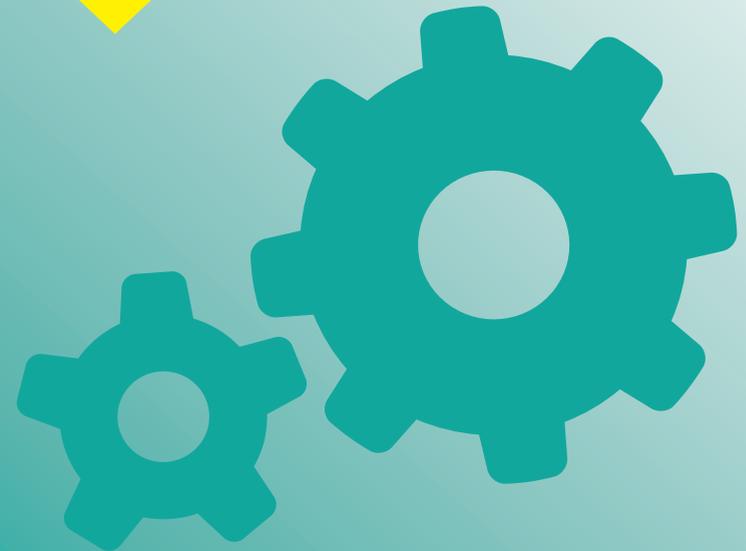
Music - Component One



Instrumentation, scales and modes, harmony, rhythmic techniques, melodic techniques, production

Word	Definition	In a sentence	Synonyms
Accompany	Verb: be present at the same time	The vocals are accompanied by the chords on the lead guitar and a riff on the bass guitar.	Backing
Chord	Noun: three notes performed together at the same time	This piece of music uses the 1 st , 4 th and 5 th chords of the D Major Scale	Triad of notes
Depict	Verb: represent by a drawing or other art form	The bass leaps from the tonic to the dominant of the C major scale in crotchet beats depicting a march	Describe
Harmonise	Verb: add notes to produce harmony	The tonic and dominant chords are used to harmonise with the melody	Integrate, blend
Instrumentation	Noun: the combination of instruments used in a piece of music	The instrumentation is typical of pop music with bass guitar, rhythm guitar, drums and vocals.	mechanisms
Manager	Noun: a person who oversees the an artist/band's diary, finances	Checking for performance dates was an issue for the manager as the band were fully booked.	Supervisor
Melody	Noun: a sequence of notes which sound pleasing to the ear	The melody is performed by the vocal line.	Tune
Rhythm	Noun: a combination of note values which is pleasing to the ear	There is a distinct swing rhythm which is performed throughout the piece of music on all chord based instruments.	Pattern
Root	Noun: the start note of a scale or the start note of a chord	The root note of the C major chord is C. The root note of the D major scale is D.	Tonic note
Syncopated	Adjective: displaced rhythms or accents so the strong beats are on the weak beats.	The melodic basslines are syncopated rhythms of reggae	Off beat

Sport



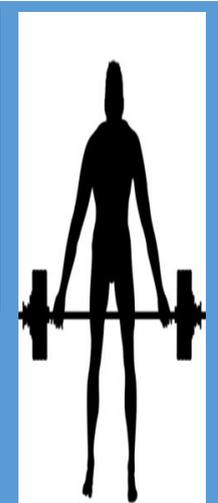


COMPONENTS OF FITNESS

- **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'll keep out enthusiasm and motivation.



The FITT Principle

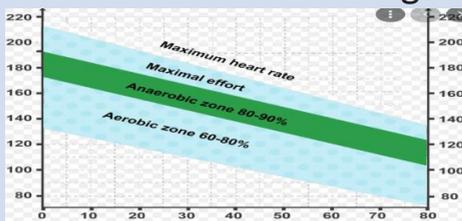
- F – FREQUENCY**
How regularly/ how many times a week
- I – INTENSITY**
How hard you train.
- T – TIME**
How long each session must be in order to benefit
- T – TYPE**
What sort of training you do?



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.

Rating	Description	Notes
6	Very, very light	How you feel when lying in bed or sitting in a chair relaxed. Little or no effort.
7	Very light	
8	Very light	
9	Fairly light	Target range: How you should feel with exercise or activity.
10	Fairly light	
11	Fairly light	
12	Fairly light	
13	Somewhat hard	How you felt with the hardest work you have ever done.
14	Somewhat hard	
15	Hard	
16	Hard	
17	Very hard	Don't work this hard!
18	Very, very hard	
19	Very, very hard	
20	Maximum exertion	



Dance





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



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

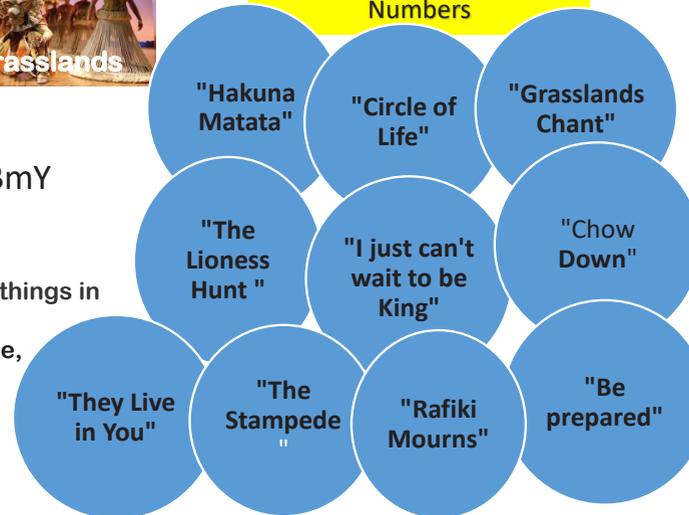
<https://www.garthfaganandance.org>

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

Production Musical Numbers





Tech Award Dance Component 1 - Roles



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





Key Terms

Growth - an **increase** in some part of an individual that can be measured. (i.e. height/weight and head circumference)

Development - the complex changes including **increase** in skills, abilities and capabilities.

Principles of growth

- **Growth** is a major feature of childhood.
- **Growth takes place because certain cells in the body keep dividing.**
 - This division of cells means that during childhood children **increase in height and weight.**
 - Bones become longer and so their skeleton changes
 - Growth also affects the development of muscles
 - During childhood, the brain also grows.

- **No** two individuals grow at the **same rate** (even identical monozygotic twins have separate growth spurts)
- Growth between boys and girls is **different** (especially evident during puberty)
- Different parts of the body **vary** in growth. (head circumference in the first few months against other parts of the body)
- Generally, as children grow taller they also become heavier, but not always- weight also depends on how fat or thin the child becomes.

Growth is a gradual process which starts at birth until a point in early adulthood when you reach your maximum height.
However, some individuals can increase in mass
Why is this?

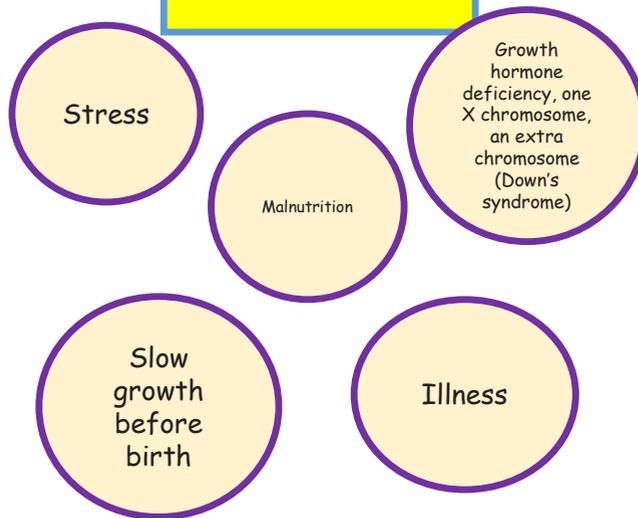
Growth describes an **increase** in quantity, including; height, weight/length and mass
Although growth is continuous, the rate is **not smooth** (sporadic).
What life stages is growth more prominent/ rapid?
*During **infancy** and again **puberty** are the greatest periods of growth.*
A baby's increase in weight and height is greatest in the first six months and then gradually slows down
The reproductive organs remain small and undeveloped until adolescence, there is a massive increase over a 4-5 year period



How tall will a child grow?

- The most important factors which affect growth in height are the genes and chromosomes inherited from the parents.
- For example... *short parents have short children, tall parents have tall children*
- It is usual for a child's adult height to be somewhere between the height of his mothers and that of his father. This is called the child's potential or target height.

Factors that affect growth





Methods of measuring growth



How to measure growth in infants and toddlers:
Height/ Length

Watch the video clip and **make notes** on the way a baby's and child's height/ length can be measured

https://www.youtube.com/watch?v=cbE_L_io8Y



How to measure growth in infants and toddlers:
Weight

- If your baby is steadily gaining weight, it is a good sign that she is healthy and feeding well.
- Weighing your baby can be especially helpful if she is a newborn that lost weight after birth or if there are other health concerns.
- Use a baby scale to weigh your baby. This will give the most accurate reading because they can read smaller increments of weight
- Be aware that a baby's weight can fluctuate throughout the day just like an adult. In order to get the most accurate measurements, try weighing your baby under the same conditions each time. For example, you could weigh the baby at the same time every day, right before a feeding, or after changing her nappy.
- Remove the nappy whilst weighing to make sure the reading is as accurate as possible



At birth and between 6-8 weeks, a baby's head circumference will be measured to check the size and growth of the brain.

Infants grown on average 12cm and gain 5lbs between 1-2 years of age

Principles of Growth

Weight is also measured, usually healthy new-borns double their birth weight by 4-5months and triple by 1 year.

<https://www.youtube.com/watch?v=1w6YfaHvcsE>



Principles of development

Development: the skills and knowledge gained by a child over time

Development is the changes that can be complex and levels of ability change through time.

The term 'development' is used to talk about the **skills** and **knowledge** that children gain.

Over time, children gain skills and knowledge, such as being able to walk, draw a picture or count.

Development happens:

From head to toe

- An infant will first be able to control their head
- Then develop control over body to enable them to sit
- Then control over their legs and feet to allow them to crawl and eventually walk

Development happens:

From inside to the outside

An infant learns to control movements in their **body** first, then in their arms and legs (**gross motor skills**) Finally they learnt to control the **small muscles** in their fingers (**fine motor skills**)

In the same sequence, but can happen at different rates for different children

Key Terms

Can you define:

- Physical development
- Intellectual development
- Emotional development
- Social development



Food Technology





KS4 Y10 Food Knowledge Organiser HT1

Protein complementation = LBV+LBV=HBV

If you are on a plant based diet, all of the essential amino acids (AA) can still be gained through something called '**protein complementation**'. This is where two or more LBV foods are combined in one meal. In doing so all of the essential AA can be consumed. Example of protein complementation could include:

What is protein?
A macronutrient needed by all animals to survive

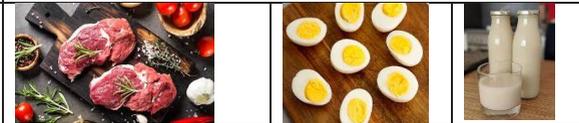
PROTEIN
PROTEIN IS MADE UP OF **AMINO ACIDS (AA)** ;
THERE ARE **20 AMINO ACIDS** IN TOTAL;
10 OF THE 20 AAS ARE REFERRED TO AS 'ESSENTIAL'
ESSENTIAL AA ARE ONES THAT CANNOT BE MADE IN THE BODY AND HAVE TO COME READY MADE FROM THE FOODS WE EAT

FATS – KEY WORDS & TERMS
Fatty acids
Triglyceride (fat molecule)
Monounsaturated fatty acids (are healthy fats most commonly found in olive oil, nuts, seeds)
Saturated fats (unhealthy, found mainly in solid fats like butter)
Visible fats (fat you can see on foods like raw meat)
Invisible fats (fats you can't see in food, like cake or biscuits)

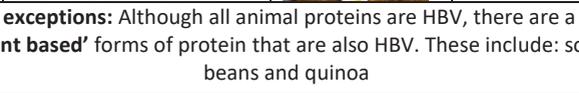
HBV=
High Biological Value

Examples of HBV proteins include: milk (dairy), meat (including fish, chicken eggs etc.)

EASY FACT TO REMEMBER:
All forms of animal protein is HBV, as they contain all of the essential amino acids



HBV exceptions: Although all animal proteins are HBV, there are a few '**plant based**' forms of protein that are also HBV. These include: soya beans and quinoa



LBV=
Low Biological Value
EASY FACT REMEMBER:
Most forms of plant protein LBV, as they lack one or more of the essential amino acids

Examples of LBV proteins include: nuts, beans, lentils, seeds and cereal grains

Functions of protein in the body:

- Growth
- Repair cells
- Energy

EFFECTS OF PROTEIN DEFICIENCY: stunted growth – hair loss – vulnerability to infections – digestion problems

PROTEIN - KEY WORDS & TERMS: macronutrient; HBV; LBV; protein complementation; amino acids, essential amino acids

Minerals are chemical elements that our bodies need in small amounts. They help in various chemical reactions in our body and are needed for a variety of reasons: **CALCIUM**= strong bones & teeth; **IRON**= helps form red blood cells; **SODIUM**= controls body's water content; **PHOSPHORUS**= like calcium, phosphorus is also needed for healthy bones and teeth; **FLUORIDE**= strengthens teeth, hardens tooth enamel & prevents tooth decay; **IODINE**= needed in very small amounts (trace elements) to help make some of the body's hormones

FAT-quick facts: Fats are called 'fats' when they are solid at room temperature. But 'fats' are called 'oils' when they are liquid at room temperature.

3 Types of Carbohydrate:

Monosaccharides	Disaccharides	Polysaccharides

Saturated fats tend to be solid at room temperature	Unaturated fats tend to be liquid at room temperature

Visible fats	Invisible fats	Functions of Carbohydrates in the body:
 LARD RAW MEAT BUTTER	 	<ul style="list-style-type: none"> • Energy • Dietary Fibre

FATS
Fat is a **macronutrient** that is needed by all animals.
What are the '**functions**' of fat in the body?

1. A store of energy
2. To insulate the body
3. Provides protective cushioning for the body
4. fat soluble vits: A,D,E & K

Too much fat:

- Gain weight, lead to obesity
- Linked to coronary heart disease CHD

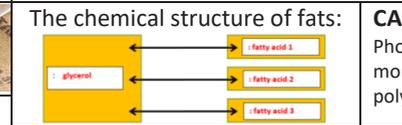
Too little fat:

- Loss of weight
- Get cold easily
- Not receive enough fat vits: ADEK

CARBOHYDRATES

50% of our energy should come from carbs

CARBOHYDRATE: A MACRONUTRIENT NEEDED BY ALL ANIMALS. IT IS MADE BY GREEN PLANTS DURING A PROCESS CALLED **PHOTOSYNTHESES**



CARBOHYDRATES – KEY WORDS & TERMS:
Photosynthesis; sugars (simple carbs); complex carbs; monosaccharides & disaccharides (simple sugars); polysaccharides (complex carbohydrates); dextrinisation

Essential fatty acids: There are two fatty acids that cannot be made by the body and therefore have to come from the food we eat. These are referred to as 'essential' fatty acids and are found in oily fish as well as plant and seed oils

Fat soluble Vitamins:
"Yo **ADEK!** You is well fat mate!"

VIT A: good eyesight
VIT D: healthy bones & teeth
VIT E: healthy skin & eyes
VIT K: clots blood and heals wounds

Water soluble Vitamins:

B1 Thiamine: nervous system
B2 Riboflavin: energy release from food & repair of tissue
B3 Niacin: energy release from food, skin, nervous system
B9 Folic Acid: growth, healthy babies (work with B12 make blood)
B12 Cobalamin: nervous system (works with B9)
C Ascorbic Acid: protects against infection & allergies