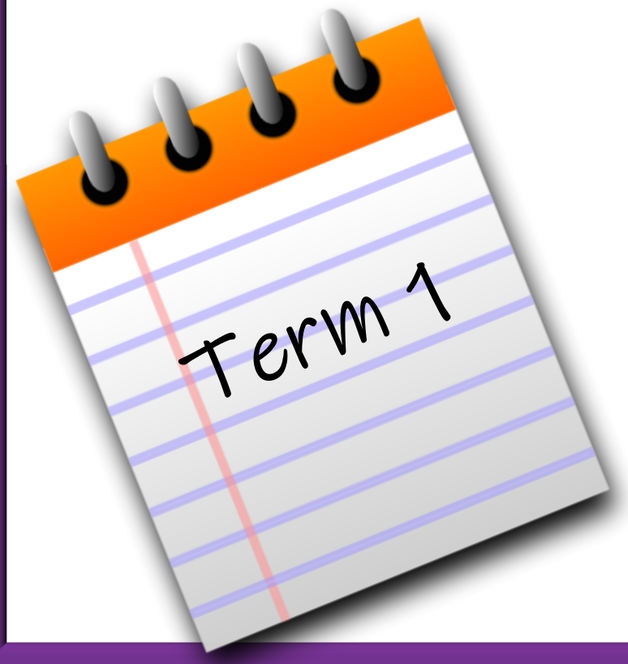
The Knowledge Organisers Pack



Year 10

ATHERTON
HIGH SCHOOL

Contents Page

A Christmas Carol

Context – *A Christmas Carol* was written by Charles Dickens in 1843	
Charles Dickens – Charl es Dicken was born in 1812 and spent the first years of his life in Kent, England. At 9, he moved to London. At 12, his father was sent to debtors' prison for racking up huge debts, and Charles was given a painful job labelling bottles near the prison. He found this period in his life hellish, and it doubtlessly led him to draw readers' attention to the plight of the poor when he later found success as an author. Many of his works are about social hardships and inequalities.	**Class Divides** – Despite industrial changes altering the social landscape, there were still relatively distinct social classes in operation: the nobility upper class, the middle class, and the working class. Life was terrible for the poorest: Lack of money resulted in a negligible food supply. For some working families, money was so tight that they required their children to work in order to survive.
The Victorian Era– The Victorian era describes the period in which Queen Victoria sat on the English throne – between 1837 and 1901 (most of Dickens' life). Whilst this was a time of industrial revolution, it was also an extremely harsh time to live, and the differences between the lives of the richest and the poorest were exacerbated. The Victorian era was a period of great change. In this time, the population of England doubled – from 16.8 million 1851 to over 30 million in 1901.	**Health and Medicine** –Healthcare was more of a luxury at the time, and medicine was nowhere near as advanced today, Many diseases were rife, and childbirth and poverty were very real dangers to people living in the era. As a result, a middle class person may expect to live to 45 at the time, whereas a working class person would have been lucky to have lived half that time. In *A Christmas Carol*, the restrictions in healthcare are evident in Tiny Tim's continued suffering.
Workhouses– A workhouse was a place where a person went if they could not afford to financially support themselves and their families. Men, women and children (mostly orphans) lived and worked in the workhouses, which were very crowded – making living conditions unhealthy and unpleasant. People slept in dormitories, where disease was easily spread. In *A Christmas Carol*, Scrooge voices his support for workhouses.	**Christmas**– We now associate Christmas as being a time of seasonal goodwill, love and friendship. However, before the Victorian era, when writers such as Dickens spread these messages through their novels, there was no Santa Claus, Christmas cards, and no holidays from work! Christmas Day was a far more low-key affair. Writers such as Dickens encouraged middle-class families to share their wealth and act selflessly.

Main Characters – Consider what Dickens intended through his characterisation of each of the below…	
Ebenezer Scrooge – Scrooge is the lead protagonist of the novella. He is a miserly owner of a counting house (what would now be called an accountant's office). Initially greedy, selfish and cold, Scrooge hates Christmas and lacks any form of Christmas spirit. He experiences a moral and psychological transformation through his visits from the Ghosts of Christmases Past, Present and Yet to Come	**The Cratchits**– Bob Cratchit is Scrooge's kind, mild-mannered clerk, who is treated terribly by his employer. He is a very poor man, with a large family, including Tiny Tim. Tiny Tim is a young boy who has been born with physical disabilities that his family are too poor to have treated. Despite these hardships, the family are cheery and determined to enjoy the few positives that they can get from life.
Jacob Marley and Fred– Joseph Marley is Scrooge's late business partner, and Fred is Scrooge's nephew. They represent the two extremes of Christmas spirit. Joseph Marley symbolises the limitations of a life-lived focused on greed and selfishness, whilst Fred's life appears fulfilled through his perpetual joy, kindness and interactions with others. After his death, Joseph Marley has been condemned to wander the world as a miserable ghost.	**The Ghost of Christmas Past –** This is the first spirit to visit Scrooge. He is a curious child-like figure that has an illuminated head, symbolising how shining a light on memories from the past can be used to illuminate one's thoughts and behaviours in the future. The Ghost of Christmas Past takes Scrooge to a number of places from his childhood and early adulthood, including his old school, hometown, and the scene of his engagement being broken off.
Quote: "you have yet a chance and hope of escaping my fate."	**Quote:** "Strange to have forgotten it for so many years!"
The Ghost of Christmas Present – The Ghost of Christmas Present is the second of the three ghosts to visit Scrooge. He is a majestic jolly giant, who is dressed in a green robe. His lifespan is restricted to Christmas Day, and he has 'over 1800 brothers', representative of the other Christmas Days that were once in the present. He escorts Scrooge on a tour of how his contemp oraries spend Christmas day, to force him to contemplate his own solitary existence. He also shows him the need to consider 'Want' and 'Ignorance.'	**The Ghost of Christmas Yet to Come** – The Ghost of Christmas Yet to Come is the third and final spirit to visit Scrooge. He is a silent phantom that is clad in robes (he rather resembles common characterisations of 'Death'). He presents Scrooge with an ominous view of his own death: the only people who his death remotely affects are those he owes money to (who are relieved), those who can make money from him (such as those dealing with his estate) and those who he could have saved (Tiny Tim).
Old Major Quote: ""Come in! and know me better, man!"	**Quote:** "The Spirit answered not, but pointed onward with its hand.'

A Christmas Carol

Themes – A theme is an idea or message that runs throughout a text.		
Greed and Selfishness – Characters such as Scrooge represent the selfish middle classes, who sought to amass, rather than share their wealth. Jacob Marley demonstrates the burden that such a selfish life will inevitably bring. Through these characters and the events of the novel, Dickens criticises how wealth had become associated with the root of happiness, at the expense of close relationships and goodwill.		
Divisions– Divisions are evident throughout the novel, as those with power and money seek simply to exert and recycle their advantages over those without (rather than aiding them). The book shines a light on the plight faced by poor families such as the Cratchits, which demonises the negative attitudes towards the poor held by the rich.		
Transformation – Physical transformations are evident throughout *A Christmas Carol*, as objects, settings, and characters appear and vanish under the manipulation of the ghosts. Spiritual transformations take place too, as the reader witnesses a lonely boy's transformation into an embittered old man, and the efforts made to transform his character to reconnect with those around him.		
Time – Time is stretched by the ghosts – the events that Scrooge experiences appear to have taken days, and yet all takes place in the space of one night. A race against time is also taking place, as the spirits work to prevent Scrooge (and in turn, Tiny Tim) from experiencing their fateful demise. The reader is taught to value the time that we have, and use it to spread happiness to others.		
Scene-by-Scene Summary – Alongside key quotations from each scene.		
STAVE ONE	It is a foggy Christmas Eve, and Scrooge is working in his counting house. He refuses to buy another lump of coal to heat Bob Cratchit's (his clerk's) office. Scrooge's cheerful nephew, Fred, enters, inviting Scrooge to Christmas party, but he declines. After he leaves, two gentlemen enter, asking if Scrooge is willing to make a charitable donation to the poor. Scrooge again declines. He begrudgingly gives Bob Cratchit the day off. Scrooge follows his usual routine on the way home. At home, he sees the ghost of his old business partner (Jacob Marley) in the knocker. Marley is in chains as punishment for his selfishness and greed when living. He says that he seeks to save Scrooge from the same fate, and hence Scrooge will be visited by 3 ghosts over the next 3 nights.	*"Marley was dead: to begin with. There is no doubt whatever about that. The register of his burial was signed by the clergyman, the clerk, the undertaker, and the chief mourner. Scrooge signed it."*
STAVE TWO	Scrooge is confused to wake at midnight, as it was after 2am when he went to sleep. At one o clock, Scrooge is visited by a strange child-like figure that emanates wisdom – The Ghost of Christmas Past. The spirit touches Scrooges heart, granting the power to fly. The ghost takes Scrooge back to where he was raised – Scrooge is touched by memories of his childhood. He sees himself as a schoolboy spending Christmas alone, being visited by his sister, being at a party held by Scrooge's old boss Fezziwig, and with his old partner Belle, who is breaking off their engagement on account of his greed. He sees Belle in a more modern time, with her husband, discussing how Scrooge is now 'quite alone in the world.' Scrooge is upset by the visions, and begs with the ghost to take him back home. Scrooge finds himself back in his bedroom, where he once again falls asleep almost instantly.	*"But the strangest thing about it was, that from the crown of its head there sprung a bright clear jet of light, by which all this was visible; and which was doubtless the occasion of its using, in its duller moments, a great extinguisher for a cap, which it now held under its arm."*
STAVE THREE	The bell strikes one, and Scrooge is awake once more. At fifteen minutes past one, he wanders into the next room, where he finds the Ghost of Christmas Present waiting for him. He is a majestic jolly giant, and sits atop of a mountain of food. The spirit takes Scrooge to the bustling streets on Christmas morning, where passers-by joyfully greet each other. The spirit then takes Scrooge to the home of Bob Cratchit, where the family savour the Christmas that they can afford. Their visibly-ill son, Tiny Tim, is cheering despite his ailments. Scrooge begs to know whether he will survive. They also visit Fred's Christmas party, which Scrooge enjoys (though no one can see him). Eventually, Scrooge is brought to a vast expanse, where two sickly children, 'Want' and 'Ignorance' emerge. When Scrooge asks if there is anything that can be done, the spirit mocks his prior selfishness.	*"Its dark brown curls were long and free; free as its genial face, its sparkling eye, its open hand, its cheery voice, its unconstrained demeanour, and its joyful air."*

A Christmas Carol

Scene-by-Scene Summary – Alongside key quotations from each scene.		
STAVE FOUR	Scrooge is approached by a hooded phantom. The spirit is silent, and Scrooge is terrified by him. Scrooge pleads with him to provide his next lesson. The ghost takes him to the stock exchange, where men discuss the accounts of a rich man, a dingy pawn shop, where the rich man's stolen goods are being sold, and the Cratchit household, where the family struggles with the death of Tiny Tim. Scrooge is then taken to a freshly dug grave in a graveyard. The gravestone reveals that it is his own grave. Appalled, Scrooge begs with the spirit to give him another chance to show that he has learnt his lesson. The phantom begins to tremble and disappears, and once again Scrooge finds himself in the relative safety of his own bed.	*I fear you more than any spectre I have seen. But as I know your purpose is to do me good, and as I hope to live to be another man from what I was, I am prepared to bear you company, and do it with a thankful heart"*
STAVE FIVE	Scrooge realises that he has been returned to Christmas morning, and is utterly overjoyed. He pays the first boy that he meets a huge sum to deliver a great big turkey to Bob Cratchit's household. He bumps into the gentlemen collecting for charity, apologises for his prior behaviour, and promises to donate lots of money to the poor. He attends Fred's party and is so happy and kind that the other guests can barely believe his behaviour. The next morning, he pretends to scold Bob Cratchit for arriving late, before promising to give him a large raise and to care for his family. As time passes by, he stays true to his word – he helps the Cratchits and becomes like a second father to Tiny Tim, who does not die. Scrooge brings Christmas cheer to every day, and shrugs off the doubts that others have about his changed behaviour. The narrator concludes by suggesting that Scrooge's changed attitude and behaviour should be shared by everyone.	*"He had no further intercourse with Spirits, but lived upon the Total Abstinence Principle, ever afterwards; and it was always said of him, that he knew how to keep Christmas well, if any man alive possessed the knowledge....God bless us all, every one!"*

Dickens' Literary Devices		**Structural Features**
Simile	This gives the reader a better image of characters and places, e. g Scrooge described as 'hard and sharp as a flint.'	**Five Staves** – The story is set out in five Staves – a structure that mimics musical organization – the opening sets the scene, the middle is the turning point, and the last stave concludes.
Clear Narrative Viewpoint	The narrator gives views to tell the reader how to think – e.g. Scrooge was a 'tight-fisted hand at the grindstone.'	**Surface Level Story** – A literal story that works on a surface level, e.g. The story of one cruel and harsh man being visited by ghosts who teach him a lesson, making him kind and compassionate.
Metaphor	Used to represent deeper meanings and ideas. For example, the children 'Want' and 'Ignorance' represent the poor in society.	**Symbolic Level Story** – A deeper, more hidden meaning to the story, e.g. There exists a selfish society, who needs to heed this warning, in order to become more caring.
Personification	To emphasise the atmosphere of places and settings: e.g. 'the crisp air laughed to hear it.'	**The Number 3** – Scrooge is visited by 3 ghosts: Past, Present, and Yet to Come. This is a common feature in magical fairy stories: e.g. 3 wishes, 3 choices etc. This adds to the mystical feel of the novella.

Maths - Foundation

Angles and Scale

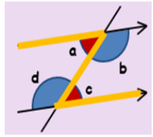
Key vocabulary

Angle, degree, calculate, parallel, polygon, perpendicular, isosceles, corresponding, alternate, co-interior, vertically opposite, bearing, scale, three figure bearing, north line

Deeper Learning

Next steps = Angles in polygons, trigonometry, similar shapes.

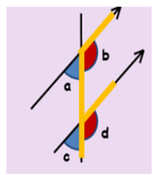
Picture perfect



Alternate angles are equal

Angle a = c and b = d

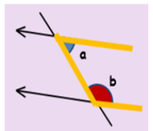
They make a Z shape



Corresponding angles are equal

Angle a = c and b = d

They make an F shape

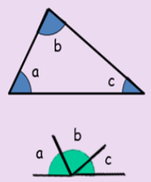


Supplementary angles add up to 180°

Angle a + b = 180°

They make a C shape

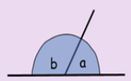
Angles in a triangle



Angles in a triangle add up to 180°

Angles a + b + c = 180°

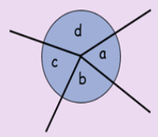
Angles on a straight line



Angles on a straight line add up to 180°

Angles a + b = 180°

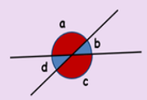
Angles around a point



Angles at a point add to 360°

Angle a + b + c + d = 360°

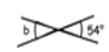
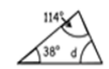
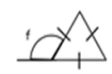
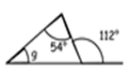
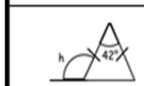
Vertically opposite angles



Vertically opposite angles are equal

Angle a = c and b = d

Always remember

Question	Answer	Reason
	150°	Angles on a straight line add up to 180°
	54°	Vertically opposite angles are equal
	150°	Angles around a point add up to 360°
	28°	Angles in a triangle add up to 180°
	40°	Angles in a triangle add up to 180°
	120°	Equilateral triangles have all equal angles and angles in a triangle add up to 180° and angles on a straight line add up to 180°
	58°	Angles on a straight line add up to 180° and angles in a triangle add up to 180°
	111°	Isosceles triangles have two equal angles and angles in a triangle add up to 180° and angles on a straight line add up to 180°

Maths - Foundation

Scale drawings

Key vocabulary

Angle, degree, calculate, parallel, polygon, perpendicular, isosceles, corresponding, alternate, co-interior, vertically opposite, bearing, scale, three figure bearing, north line

Picture perfect

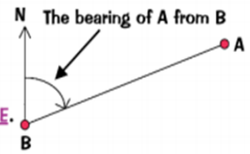
Bearings

To find or plot a bearing you must remember the three key words:

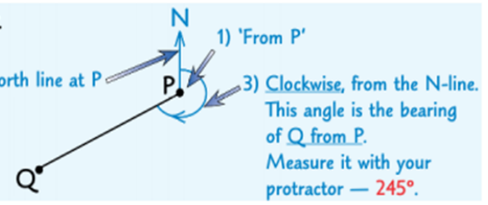
1) 'FROM' — Find the word 'FROM' in the question, and put your pencil on the diagram at the point you are going 'from'.

2) NORTH LINE — At the point you are going FROM, draw in a NORTH LINE. (There'll often be one drawn for you in exam questions.)

3) CLOCKWISE — Now draw in the angle CLOCKWISE from the north line to the line joining the two points. This angle is the required bearing.



Find the bearing of Q from P.



1) 'From P'

2) North line at P

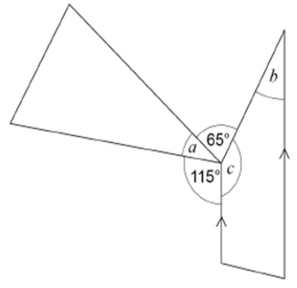
3) Clockwise, from the N-line. This angle is the bearing of Q from P. Measure it with your protractor — 245°.

ALL BEARINGS SHOULD BE GIVEN AS 3 FIGURES
e.g. 176°, 034° (not 34°), 005° (not 5°), 018° etc.

° Angles

Assessment style question:

The diagram shows a triangle and a trapezium.



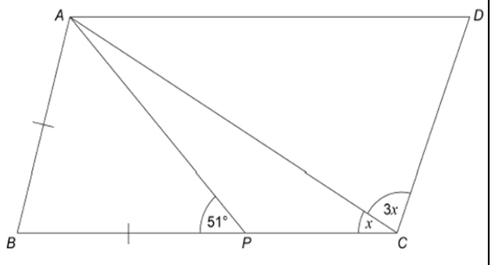
Not drawn accurately

Prove that $a = b$

ABCD is a parallelogram.

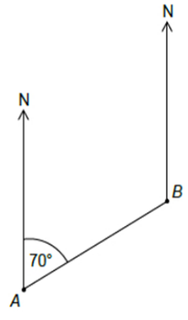
$AB = BP$

Not drawn accurately



Work out the size of angle x.

The bearing of *B* from *A* is 070°



Circle the bearing of *A* from *B*.

Maths - Foundation

Basic Number

Key vocabulary

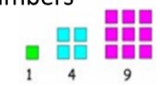
Integer, positive, negative, greater than, less than, inequality, place value, inverse, simplify, approximate, estimate, ascending, descending, powers of 10, factor, multiple, highest common factor, lowest common multiple, prime, square, square root, cube, cube root, prime factor decomposition.

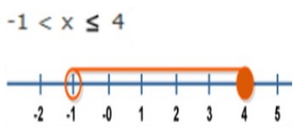
Deeper Learning

Next steps = Graphing inequalities and shading regions

Picture perfect

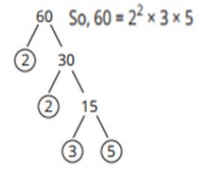
Square numbers





Writing a Number as a Product of its Prime Factors

Use a prime factor tree, but don't forget to write your final answer as a product (multiplied) using indices where necessary.



Types of Number

odd	end in 1, 3, 5, 7, 9
even	end in 0, 2, 4, 6, 8
prime	has exactly two factors, 1 and itself. E.g. 2, 3, 5, 7, 11...
factor	a number that divides exactly into another number, e.g. 3 is a factor of 9
highest common factor	the largest factor common to two or more numbers.
multiple	a number in the times table of another, e.g. 10 is a multiple of 5
lowest common multiple	the smallest number in two different times tables.

Always remember

Standard Form

This is always in the form $x \times 10^n$, where $1 \leq x < 10$.

For very big numbers, n will be positive and for very small numbers n will be negative.

Squares, Cubes and Roots

Square Numbers

Square numbers are found by multiplying a number by itself.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100...

The square root is the inverse, for example, the square root of 25 is 5.

Cube Numbers

Cube numbers are found by multiplying a number by itself, and multiplying by itself again.

1, 8, 27, 64, 125...

The cube root is the inverse, for example, the cube root of 64 is 4.

Mathematical Symbols

≠ is not equal to

< is less than

≤ is less than or equal to

> Is greater than

≥ is greater than or equal to

Estimation

To estimate a calculation, round all numbers to one significant figure.

E.g. Estimate 3.1 × 495

3.1 × 495 ≈ 3 × 500

3.1 × 495 ≈ 1500

Place Value

Place value is the value of each digit in a number.

E.g. In the number 321, the 3 represents 300, the 2 represents 20 and 1 is the unit value.

Assessment style question: Diaries are sold in boxes of 12, Pencils are sold in boxes of 10, Rulers are sold in boxes of 6

A teacher wants to buy the same number of diaries, pencils and rulers. Work out the **smallest** number of boxes of each item he could buy.

Maths - Foundation

Factors and multiples

Key vocabulary

Multiples – The times tables of a specific number.

LCM – Lowest common multiple.

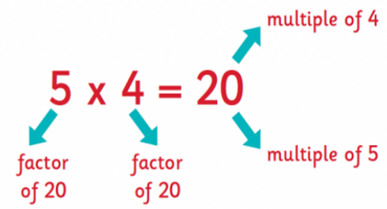
Factor – An integer which divides into another fully with no remainder.

HCF – Highest common factor.

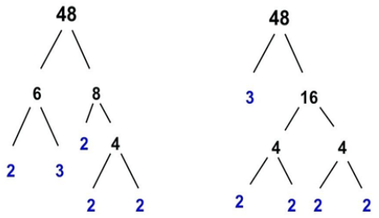
Prime number – An integer with only 2 factors.

Prime factorisation – Writing a number as a product of it's prime factors.

Picture perfect



Prime factorisation



48 = 2 x 2 x 2 x 2 x 3

Assessment style question

Mary is organising a charity hot dog sale.
There are 18 bread rolls in each packet.
There are 15 hot dogs in each packet.
Mary buys exactly the same number of bread rolls as hot dogs.

What is the smallest number of each packet that Mary can buy?

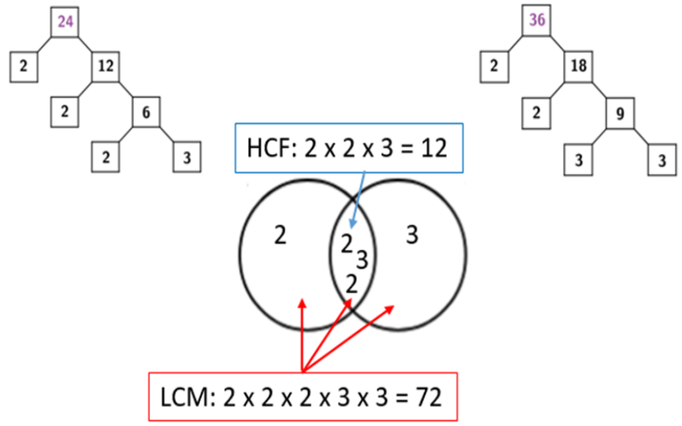
The Highest Common Factor (HCF) of two numbers is 6.
The Lowest Common Multiple (LCM) of the same numbers is 60.

What are the two numbers?

Always remember

HCF and LCM

Find the HCF and LCM of 24 and 36



2 is the only even prime number.

1 is NOT a prime number because it only has 1 factor.

Maths - Foundation

Basic Algebra

Key vocabulary

Powers, Indices, Reciprocal, Roots, Brackets, Multiply out, Expand, Simplify, Factor, Factorise, Algebra, Notation, Coefficient, Expression, Equation, Formula, Identity, Inequality, Term, Collecting like terms,

Deeper Learning

Next steps = Expanding two brackets, factorising quadratics, solving equations,

Picture perfect

Expanding brackets:

- Expanding means remove brackets
- Use the claw

e.g. $3(5a-2) = (3\times 5a) - (3\times 2)$

$= 15a - 6$

Factorising expressions:

- The opposite (inverse) of expanding
- Answer will include brackets
- Look for common factors (numbers and algebra)
- Always choose the HCF

e.g. 1 $10a + 15 = 5(2a+3)$

10 & 15 both in the 5 times table

$10a = 5\times 2a$ $\quad 15 = 5\times 3$

Always remember

Algebraic Notation

Algebra uses a shorthand system where variables (symbols) are represented by letters.

E.g. $a + a = 2a$

$2 \times b = 2b$

$c \times c = c^2$

$3d \times 2e = 6de$

Factorising Brackets

To factorise into one bracket, find the highest common factor for each term.

E.g. $4x + 10 = 2(2x + 5)$

Expanding Brackets

To expand one bracket:
make sure the term on the outside multiplies everything on the inside.

E.g. $4(2x - 3) = 8x - 12$

Simplifying expressions (adding/subtracting)

- Can only simplify like terms.
- Be sure to include the sign before the term

e.g. $2a + 3b - a + 4b = a + 7b$

$2a - a = a \qquad +3b + 4b = +7b$

Term = 3a
Expression = 5x + 2
Equation = 5x – 3 = 47
Formula = C = πd
Identity= $10x + 4 \equiv 2(5x + 2)$

Assessment style question: Circle the correct words to complete each sentence:

(a)	$x^2 + 3x = 16$ is	an expression	an equation	a formula	an identity
(b)	$x^2 + 3x = 16$ is	an expression	an equation	a formula	an identity
(c)	$(x + 3)^2 \equiv x^2 + 6x + 9$ is	an expression	an equation	a formula	an identity

$(3x + 1)(x - 2) + ax + b \equiv 3x^2 + 8x - 5$

Work out the values of a and b.

Maths - Foundation

Fractions

Key vocabulary

Fraction – A quantity which is not a whole number.

Decimal – A decimal number is often used to mean a number that uses a decimal point followed by digits that show a value smaller than one.

Percentage – Amount out of one hundred.

Improper fraction - The numerator is larger than the denominator.

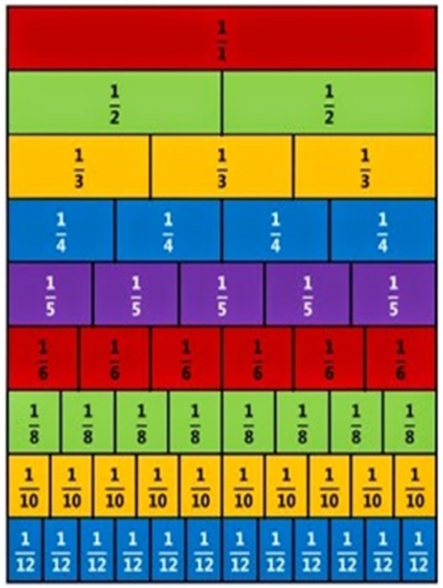
Mixed Number – A whole number and a fraction together.

Equivalent – When 2 amounts are equal they are equivalent

Numerator - The top number of a fraction.

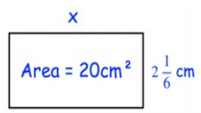
Denominator - The bottom number of a fraction.

Picture perfect



Assessment style question

Shown is a rectangle.
Find the value of x

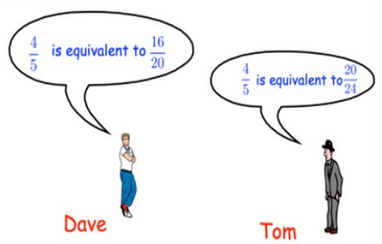


A wall measures $3\frac{3}{4}\,m$ by $4\frac{1}{3}\,m$

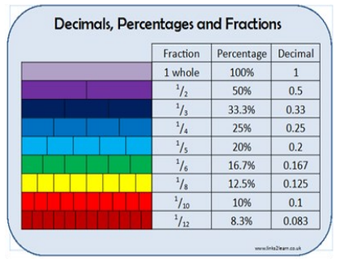
Each can of paint cover 2.5m² and costs £5.50

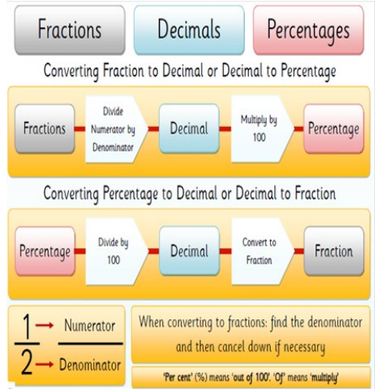
Work out the cost of painting the wall.

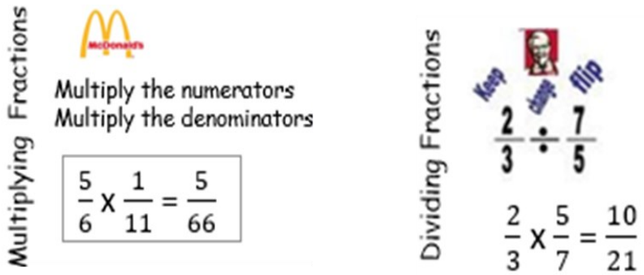
Dave and Tom are discussing fractions.
Is either man correct?



Always remember







Adding and subtracting simple fractions

We can use **equivalent** fractions to add fractions that do not have the same **denominator**.

For example:

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

We need to change $\frac{3}{4}$ into an equivalent fraction with a denominator of 8.

$\frac{3}{4} = \frac{6}{8}$ (×2)

Now we have:

$\frac{6}{8} + \frac{1}{8} = \frac{7}{8}$

Maths - Foundation

Coordinates & Linear Graphs

Key vocabulary

Coordinates - a set of value that show an exact position on a coordinate grid

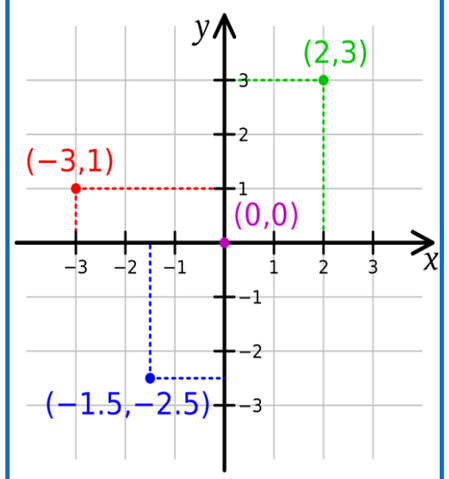
Linear equation - an equation, when plotted, makes a straight line

Gradient - the steepness of the line of a linear equation

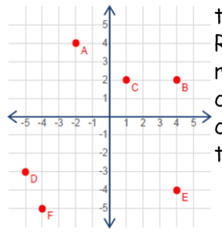
y-intercept - where the linear equation cuts the y-axis

Substitution - when you replace an unknown for a given value

Picture perfect



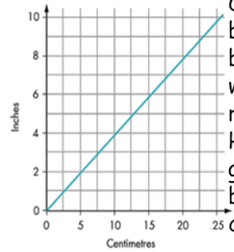
Reading and plotting coordinates



Coordinates are written in the form of (x, y). Remember the rule for reading and plotting coordinates is 'along the corridor and up or down the stairs'.

A = (-2, 4) B = (4, 2)
C = (1, 2) D = (-5, -3)
E = (4, -4) F = (-4, -5)

Using a conversion graph



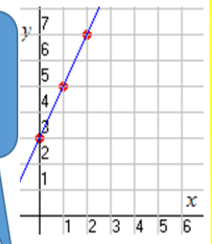
Conversion graphs can be used to convert between any 2 units which have a linear relationship.
Here, you can use the graph to convert between inches and centimetres

Drawing a graph to represent a linear equation

When you are asked to draw the line of a linear equation you follow these steps:

1. Complete a table of values by substituting in the value of x into the equation
2. Write the list of coordinates
3. Plot the coordinates
4. Draw a line through the all the coordinates

This means 2 multiplied the value of x, then add on 3



Example
Complete the table of values for the equation y = 2x + 3 for the values of x from 0 to 2

X	0	1	2
y	2x0+3 =3	2x1+3 =5	2x2+3 =7

Coordinates are (0,3) (1,5) and (2,7)

Assessment style question

Question 1:

(a) Plot the coordinates A (−4, 1), B (1, −2) and C (2, 1)
(b) ABCD is a kite.
(c) Plot D
(d) Write down the coordinates of the point D.

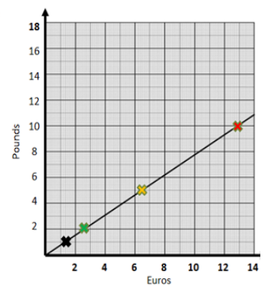
Question 2:

The distance between the points (−3, −4) and (q, 5) is 15. Find the possible values of q.

Drawing a conversion graph

You can plot known conversions on a graph to help you to convert other unknown amounts.

Current exchange rate
£1 = € 1.29
£2 = € 2.58
£5 = € 6.45
£ 10 = € 12.90



Can you use the graph to convert 10 Euros into Pounds?

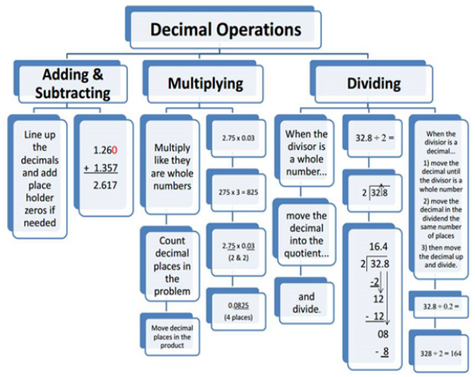
Maths - Foundation

Basic Decimals

Key vocabulary

Integer: A **whole number** that can be positive, negative or zero.
Decimal: A number with a **decimal point** in it. Can be positive or negative.
Decimal Point: a full point or dot placed after the figure representing units in a decimal fraction

Picture perfect



Always remember

To add decimals, follow these steps:
•Write down the numbers, one under the other, with the **decimal points lined up**
•**Put in zeros** so the numbers have the same length
•**Then add** using column addition, remembering to put the decimal point in the answer

Example: Add 1.452 to 1.3

Line the decimals up:	1.452
	+ 1.3
"Pad" with zeros:	1.452
	+ 1.300
Add:	1.452
	+ 1.300
	2.752

To subtract, follow the same method: line up the decimals, then subtract

Example: What is 7.368 – 1.15 ?

Line the decimals up:	7.368
	– 1.15
"Pad" with zeros:	7.368
	– 1.150
Subtract:	7.368
	– 1.150
	6.218

To check we can add the answer to the number subtracted

Putting In Zeros

Why can we put in extra zeros?

A zero is really saying "there is no value at this decimal place".

- In a number like 10, the zero is saying "no ones"
- In a number like 2.50 the zero is saying "no hundredths"

So it is safe to take a number like 2.5 and make it 2.50 or 2.500 etc

But DON'T take 2.5 and make it 20.5, that is plain wrong.

How to Multiply Decimals
Just follow these steps:
•Multiply normally, ignoring the decimal points.
•**Then** put the decimal point in the answer - it will have as many decimal places as the two original numbers combined.
In other words, just count up how many numbers are after the decimal point in *both* numbers you are multiplying, then the answer should have that many numbers after *its* decimal point.

Example: Multiply 0.03 by 1.1

start with:	**0.03 × 1.1**
multiply without decimal points:	**3 × 11 = 33**
0.03 has **2 decimal places**, and 1.1 has **1 decimal place**, so the answer has **3 decimal places**:	**0.033**

Let us multiply the 0.2 by 10, which shifts the decimal point out of the way:

0.2 × 10 = 2

But we must **also** do it to the 15:

15 × 10 = 150

So 15 ÷ 0.2 has become 150 ÷ 2 (they are **both** 10 times larger):

150 ÷ 2 = 75

And so the answer is:

15 ÷ 0.2 = 75

How to Divide Decimals
The trick is to get rid of the decimal point from the number we are dividing by.
How? We can "shift the decimal point" out of the way by multiplying by 10, as many times as we need to.
But we must do the **same thing** to both numbers in the division.

Example above: 15 divided by 0.2

Assessment style question

A grain of rice has a mass of 0.015g
How many grains are there in 300g of rice?

A type of pebble has a mass of 0.8g
How many pebbles are there in 40kg?

Class 8A are going on a trip to a windmill

The trip costs £3.70 each and there are 26 students in 8A.
How much money should be collected?

Mr.Jenkins is building a fence for his garden.
The fence costs £12.60 per metre to build.
The fence is 5.3 metres long.

Work out the total cost of building the fence.

Maths - Foundation

Rounding and Estimating

Key vocabulary

Rounding - to alter a number making it less accurate but easier to use in calculations.

Estimation - A rough calculation using a mathematical method.

Decimal place - Place value after the decimal point.

Integer - A whole number.

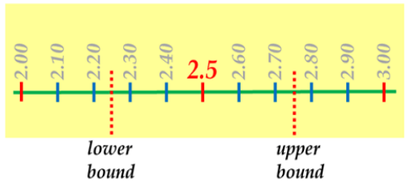
Significant figures (S.F of Sig Fig) - Digits that carry meaning.

Bounds - Upper and lower values of rounded numbers.

Picture perfect

ROUNDING OFF:

If the time is given correct to the nearest half an hour,



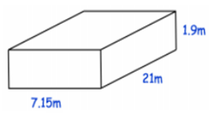
Assessment style question

Nicole has rounded a number to one decimal place.
Her answer is 9.2
Write down 10 different possible numbers that she could have rounded.

In an election 43.8% of people voted for a candidate.
Round this figure to one significant figure

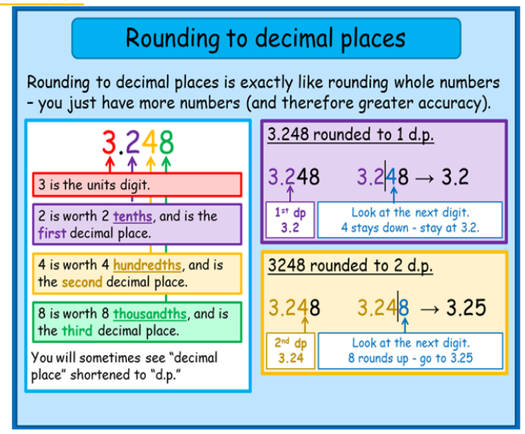
A roll of wallpaper cost £7.85.
Richard buys 29 rolls of wallpaper.
Work out an estimate for the total cost.

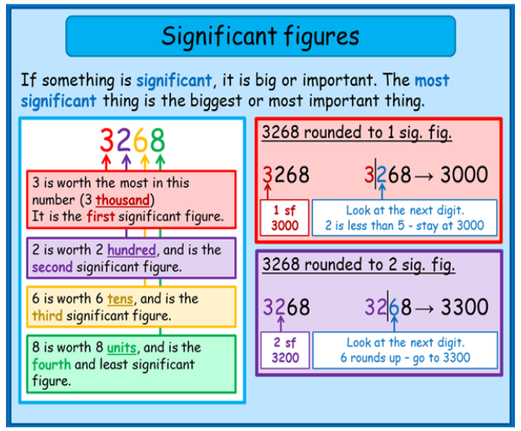
Andrew fills the swimming pool with water at a constant rate of 2.1 litres per second.



Given $1m^3 = 1000$ litres, estimate how long it takes to fill the pool.

Always remember





We estimate by rounding all values to 1 significant figure before completing the calculation.

Maths - Foundation

Frequency Tables

These are a useful and clear way of displaying data

E.g. The table below shows the scores out of ten for 20 students

Mark	Tally	Frequency
4	II	2
5	II	2
6	IIII	4
7	𝍸	5
8	IIII	4
9	II	2
10	I	1

Frequency means how often something occurs

This means 5 students scored 7 marks in their test

Grouped Frequency Tables

These contain sorted data in groups called **classes**

E.g. The table below shows the ages of people taking swimming lessons

Class Interval	Frequency
15 – 25	60
25 – 35	35
35 – 45	22
45 – 55	18
55 – 65	15

Total frequency will tell you the total number of people taking swimming lessons

This means 18 people who took swimming lessons were between the ages of 45 and 55

Classes or class widths

Comparative Bar Charts

The table shows the number of cars sold by Kitty and George in the first four months of 2014.

	January	February	March	April
Kitty	2	5	13	10
George	4	7	9	10

The chart has a key to make it easier to understand.

A **comparative bar chart** allows you to easily compare the number of cars Kitty and George sold each month.

Charts

Two-Way Tables

These are used to show how data falls into 2 different categories

For example gender and favourite sport to watch

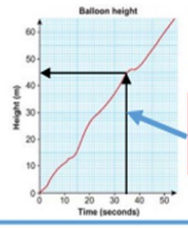
What is your favorite sport to watch on television?			
	Football	Basketball	Baseball
Males	40	22	15
Females	12	16	45
Total	52	38	60

A two-way table divides data into groups in rows going across and columns going down the table

Time-Series Graph

These are used to show how something changes over time. It is a line graph with time plotted along the horizontal axis

For example the height of a balloon at different times



You can estimate the height of the balloon at different times using the graph

E.g. the height of the balloon at 35 seconds is approximately 45m as shown by the arrows on the graph

Stem and Leaf Diagrams

This shows numerical data split into a 'stem' and 'leaves'. The leaf is usually the last digit and the stem is the other digits.

Here are the heights of some students (in cm).
169, 163, 153, 173, 166, 178, 177
Construct a stem and leaf diagram for this data.

15 | 3
16 | 9 3 6
17 | 3 8 7

Decide on a stem. Write the numbers in your diagram as you work along the data list.

15 | 3
16 | 3 6 9
17 | 3 7 8

Put the leaves in your diagram in order.

Key 15|3 means 153 cm

Write a key for your diagram.

A back-to-back stem and leaf diagram compares 2 sets of data. E.g. the ages of males and females

Females		Males
8 5	5	6 7 9
7 5 4 3	6	8 3 5
9 8 6 1	7	9 2 3 5 7 8
	8	
	9	
	10	1 3 7

5|7 means 75

10|1 means 101

Pie Charts

This is a circle divided into **sectors.** Each sector represents a set of data. Pie charts are excellent for displaying the most/ least popular type of something.

Plotting pie charts example

The table show the match results of a football team.

Result	Won	Drawn	Lost
Frequency	28	12	20

28 + 12 + 20 = 60 ← The total number of games is the total frequency.

1 game = 360° ÷ 60 games = 6° per game ← Work out the angle for **one** game.

360° in a circle

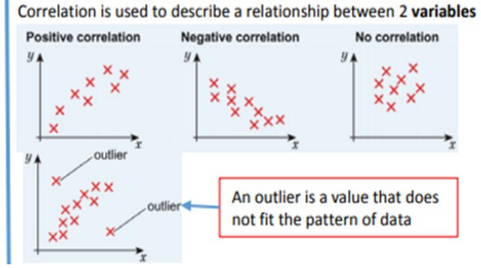
28 games won = 28 × 6° = 168°
12 games drawn = 12 × 6° = 72°
20 games lost = 20 × 6° = 120°
← Work out the angle for each result.

Draw the pie chart. Give it a title and a key. Or label each section

Scatter Graphs

A scatter graph allows you to see the **relationship** between 2 sets of data. E.g. your height and your stride length.

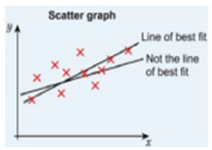
Correlation is used to describe a relationship between 2 **variables**



An outlier is a value that does not fit the pattern of data

A line of best fit

This is a straight line drawn through the middle of the points on a scatter graph. It should pass as near as many points as possible and represents the **trend** of the points.



A line of best fit can be used to predict data values within the range of data given.
This is called **interpolation**
It can also be used to predict data values outside the range of data given.
This is called **extrapolation.**

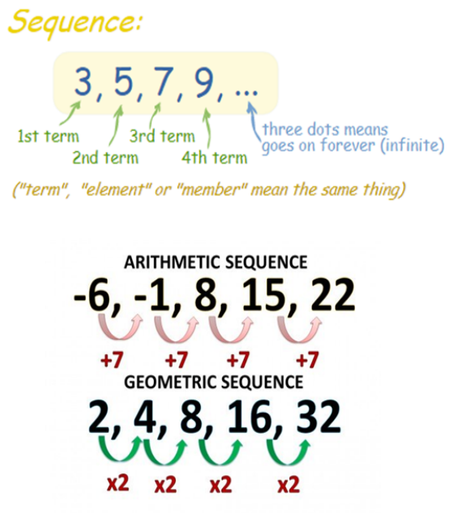
Maths - Foundation

Sequences

Key vocabulary

Sequence
Term
Rule
Term to term rule
Nth term
Arithmetic sequence
Geometric sequence
Triangular numbers
Fibonacci sequence

Picture perfect



Assessment style question

The nth term of a sequence is $2n^2$

(i) Find the 4th term of the sequence.

.....

(ii) Is the number 400 a term of the sequence?

.....

Give reasons for your answer.

.....

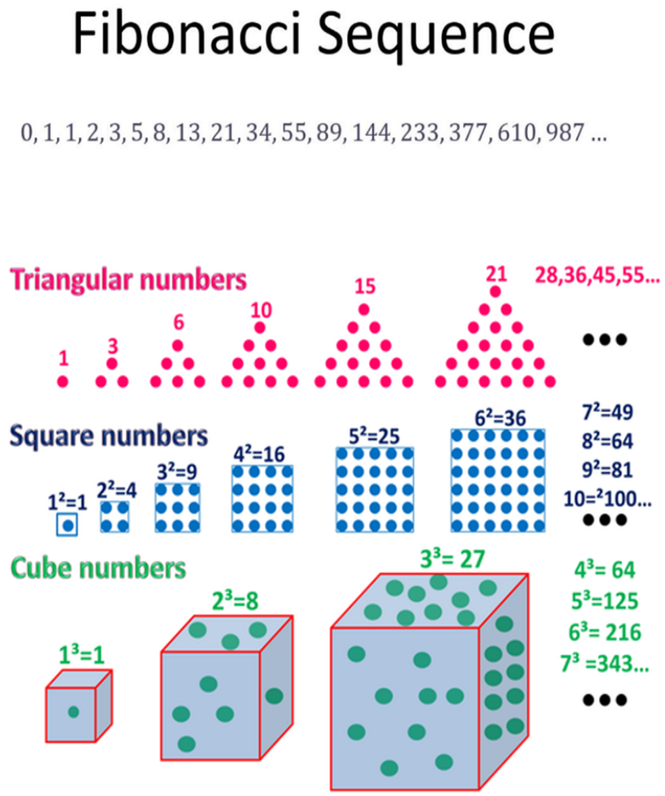
.....

The first five terms of an arithmetic sequence are

2 7 12 17 22

Write down, in terms of n, an expression for the nth term of this sequence.

Always remember



Maths - Higher

Angles and Scale

Key vocabulary

Angle, degree, calculate, parallel, polygon, perpendicular, isosceles, corresponding, alternate, co-interior, vertically opposite, bearing, scale, three figure bearing, north line

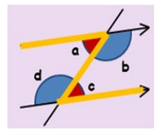
Assessment style question:

The diagram shows a triangle and a trapezium.

Not drawn accurately

Prove that $a = b$

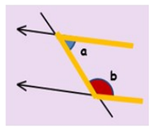
Picture perfect



Alternate angles are equal

Angle a = c and b = d

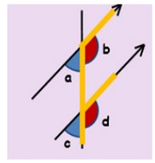
They make a Z shape



Supplementary angles add up to 180°

Angle a + b = 180°

They make a C shape



Corresponding angles are equal

Angle a = c and b = d

They make an F shape

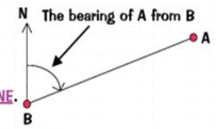
Bearings

To find or plot a bearing you must remember the three key words:

1) 'FROM' Find the word 'FROM' in the question, and put your pencil on the diagram at the point you are going 'from'.

2) NORTH LINE At the point you are going FROM, draw in a NORTH LINE. (There'll often be one drawn for you in exam questions.)

3) CLOCKWISE Now draw in the angle CLOCKWISE from the north line to the line joining the two points. This angle is the required bearing.

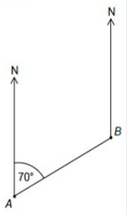


Find the bearing of Q from P.

ALL BEARINGS SHOULD BE GIVEN AS 3 FIGURES
e.g. 176°, 034° (not 34°), 005° (not 5°), 018° etc.

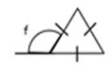
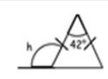
Angles

The bearing of *B* from *A* is 070°



Circle the bearing of *A* from *B*.

Always remember

Question	Answer	Reason
	150°	Angles on a straight line add up to 180°
	54°	Vertically opposite angles are equal
	150°	Angles around a point add up to 360°
	28°	Angles in a triangle add up to 180°
	40°	Angles in a triangle add up to 180°
	120°	Equilateral triangles have all equal angles and angles in a triangle add up to 180° and angles on a straight line add up to 180°
	58°	Angles on a straight line add up to 180° and angles in a triangle add up to 180°
	111°	Isosceles triangles have two equal angles and angles in a triangle add up to 180° and angles on a straight line add up to 180°

Maths - Higher

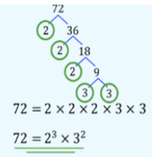
Basic Number

Key vocabulary

Multiple - a number which can be divided by another number without a remainder.
Divisor – the number you divide by.
Factor - An exact divisor of a number.
Prime - a number which only has two factors
Product – the result of multiplying to numbers together
Prime Factorisation – a list of prime numbers which multiply together to create another number

Picture perfect

Prime Factor Decomposition
Break numbers down into prime factors
Tree method and ladder method



$72 = 2 \times 2 \times 2 \times 3 \times 3$
$72 = 2^3 \times 3^2$

$84 = 2 \times 2 \times 3 \times 7$
$84 = 2^2 \times 3 \times 7$

Divide by a prime
Multiply Primes
Write in index form
Prime factor decomposition

HCF
Highest common factor
The largest number that divides into two or more numbers
Use long format of Prime Factor Decomposition

HCF of 48 and 120
$48 = 2 \times 2 \times 2 \times 2 \times 3$
$120 = 2 \times 2 \times 2 \times 3 \times 5$
$2 \times 2 \times 3 = 12$

HCF of 84 and 980
$84 = 2 \times 2 \times 3 \times 7$
$980 = 2 \times 2 \times 5 \times 7 \times 7$
$2 \times 2 \times 7 = 28$

Identify shared factors
Multiply values

LCM
Lowest common multiple
The smallest number that occurs in the times table of two or more numbers.

LCM of 6 and 45
$6 = 2 \times 3$
$45 = 3 \times 3 \times 5$
$2 \times 3 \times 3 \times 5 = 90$

LCM of 48 and 180
$48 = 2^4 \times 3$
$180 = 2^2 \times 3^2 \times 5$
$2^4 \times 3^2 \times 5 = 720$

Multiply together all prime factors apart from duplicates
In index form: Multiply Highest Power of each prime

Always remember

Primes

A **prime** number is a number which only has two factors – itself and 1.

The first 10 **prime** numbers are:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29

A common mistake is that people think 1 is a **prime** number. The only way to make 1 is by doing 1 x 1 , so the number 1 only has one factor NOT two factors, therefore it is NOT **prime**.

Examples
Is 11 **prime**? - 1 x 11 Yes it's **prime**
Is 12 **prime**? - 1 x 12, 2 x 6, 3 x 4 No it's not **prime**

Factors

An exact divisor of a number is called a **factor**.

Factors can be written in pairs to help find all the factors of a given number.

E.g. **Factors** of 12 can be written like this…..

Factors of 12

1, 2, 3, 4, 6, 12

Assessment style question

A bus leaves Antrim Bus Station every 12 minutes.
A train leaves Antrim Train Station every 18 minutes.
At 8am a bus and a train leave the stations at the same time.

(a) When is the next time that a bus and a train leave at the same time?
(b) Between 8am and 11am, on how many occasions does a bus and a train leave at the same time?

The lowest common multiple of two numbers is 60.
Only one of the numbers is a multiple of 4.
Write down two possible numbers.

Penny and Kenny have the same number of football cards.
Penny has sorted her cards into piles of 10.
Kenny has sorted his cards into piles of 18.
Penny has less than 100 cards.
How many football cards do they have?

Olivia thinks of two numbers.
The lowest common multiple (LCM) of the two numbers is 36.
The highest common factor (HCF) of the two numbers is 3.
Both numbers are less than 15.
Write down two possible numbers that Olivia could be thinking of.

Multiples

A **multiple** is a number which can be divided by another number without a remainder.

For example: 15, 20 100, 150 are **multiples** of 5 because they can be divided by 5 and have no remainder

Maths - Higher

Basic Algebra

Key vocabulary

Powers, Indices, Reciprocal, Roots, Brackets, Multiply out, Expand, Simplify, Factor, Factorise, Algebra, Notation, Coefficient, Expression, Equation, Formula, Identity, Inequality, Term, Collecting like terms,

Picture perfect

Expanding brackets:

- Expanding means remove brackets
- Use the claw

e.g. $3(5a-2) = (3\times 5a) - (3\times 2)$

$= 15a - 6$

Factorising expressions:

- The opposite (inverse) of expanding
- Answer will include brackets
- Look for common factors (numbers and algebra)
- Always choose the HCF

e.g. 1 $10a + 15 = 5(2a+3)$

10 & 15 both in the 5 times table

$10a = 5\times 2a$ $15 = 5\times 3$

Always remember

Algebraic Notation

Algebra uses a shorthand system where variables (symbols) are represented by letters.

E.g. $a + a = 2a$

$2 \times b = 2b$

$c \times c = c^2$

$3d \times 2e = 6de$

Factorising Brackets

To factorise into one bracket, find the highest common factor for each term.

E.g. $4x + 10 = 2(2x + 5)$

Expanding Brackets

To expand one bracket:
make sure the term on the outside multiplies everything on the inside.

E.g. $4(2x - 3) = 8x - 12$

Simplifying expressions (adding/subtracting)

- Can only simplify like terms.
- Be sure to include the sign before the term

e.g. $2a + 3b - a + 4b = a + 7b$

$2a - a = a$ $+3b + 4b = +7b$

Term = 3a
Expression = 5x + 2
Equation = 5x – 3 = 47
Formula = C = πd
Identity= $10x + 4 \equiv 2(5x + 2)$

Assessment style question: Circle the correct words to complete each sentence:

(a) $x^2 + 3x = 16$ is	an expression	an equation	a formula	an identity
(b) $x^2 + 3x = 16$ is	an expression	an equation	a formula	an identity
(c) $(x + 3)^2 \equiv x^2 + 6x + 9$ is	an expression	an equation	a formula	an identity

$(3x + 1)(x - 2) + ax + b \equiv 3x^2 + 8x - 5$

Work out the values of a and b.

Maths - Higher

Decimals and fractions

Key vocabulary

Mixed number

Equivalent fraction

Simplify, cancel

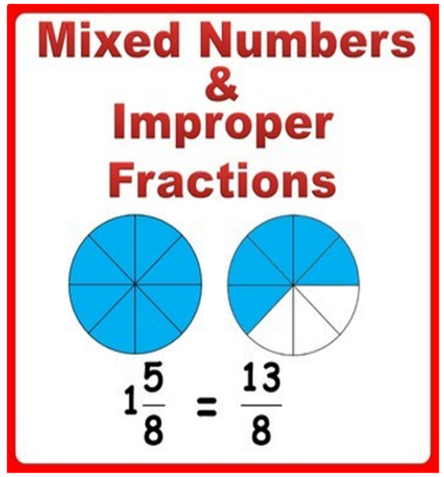
Lowest terms

Proper fraction, improper fraction, top-heavy fraction, vulgar fraction

Numerator, denominator

Percent, percentage

Picture perfect



Assessment style question

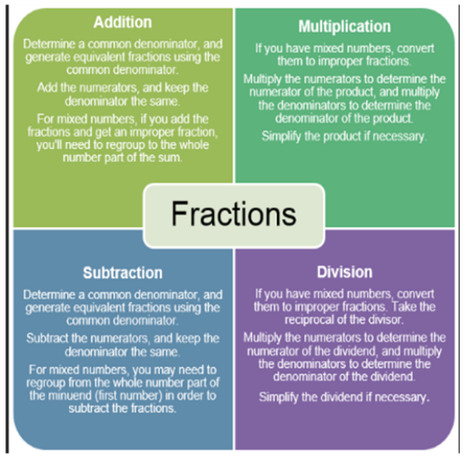
Work out $4\frac{2}{3} - 1\frac{4}{5}$

Give your answer as a mixed number.

Is Sophia correct?
Explain your answer.

(1)

Always remember



Multiplying decimals	Dividing decimals
0.3 x 1.5 Remove the decimal points by multiplying by powers of 10. 3 x 15 = 45 Replace the total number of decimal places from the question. 45 = 0.45	1.5 ÷ 0.05 Remove the decimal points by multiplying by the same power of 10. 1.5 ÷ 0.05 x100 x100 150 ÷ 5 Answer = 3 We do not need to replace the decimal point as we have multiplied each part by the same power of 10.

Maths - Higher

Linear graphs

Key vocabulary

Co-ordinates
Quadrant
Origin
Equation
Horizontal
Vertical
Parallel
Intersect
Gradient
Plot
Sketch
Linear

Picture perfect

All straight-line graphs have an equation that is written that is written like this:

$$y = mx + c$$

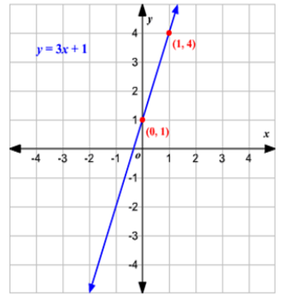
Y gives you the y-coordinate we need to plot the graph

M is the **gradient** of the line, the 'steepness' of it.

X is the x-coordinate we need to plot the graph

C is called the **y-intercept.** It's the point where the line crosses the y-axis.

Drawing Graphs
Step 1 – Draw a table up
Step 2 – Plot co-ordinates on axes
Step 3 - Join the points

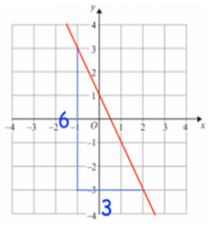


Assessment style question

(a) Draw $y = x + 1$ and $y = 2x - 1$ on the same set of axes.

(b) Where do the two graphs intersect?

Alisha says that the gradient of the line is 2. Explain her mistake.



Always remember

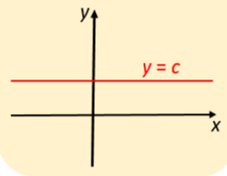
A line sloping upwards from left to right has a **positive** gradient.	⟋	m is positive
A line sloping downwards from left to right has a **negative** gradient.	⟍	m is negative
Parallel lines have the **same** gradient.	⫽	$m_1 = m_2$
A **horizontal** line has a gradient of 0.		m = 0
The gradient of a **vertical** line is undefined.		m is undefined

Coordinates are given in the form (x, y). The first number is the position in the x-direction (horizontal) and the second is the position in the y-direction (vertical).

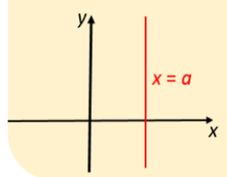
$$\text{Gradient} = \frac{\text{change up}}{\text{change right}} \text{ or } \frac{\text{change in } y}{\text{change in } x}$$

Graph Horizontal and Vertical Lines

A horizontal line has an equation of the form $y = c$. It has a slope of 0.



A vertical line has an equation of the form $x = a$. It has a an undefined slope.



Maths - Higher

Rounding and Estimating

Key vocabulary

Rounding – to alter a number making it less accurate but easier to use in calculations.

Estimation – A rough calculation using a mathematical method.

Decimal place – Place value after the decimal point.

Integer – A whole number.

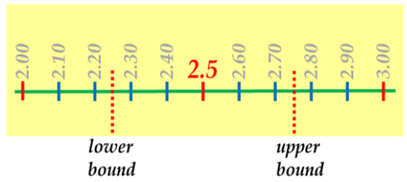
Significant figures (S.F of Sig Fig) – Digits that carry meaning.

Bounds – Upper and lower values of rounded numbers.

Picture perfect

ROUNDING OFF:

If the time is given correct to the nearest half an hour,

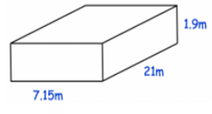


Assessment style question

Nicole has rounded a number to one decimal place.
Her answer is 9.2
Write down 10 different possible numbers that she could have rounded.

A roll of wallpaper cost £7.85.
Richard buys 29 rolls of wallpaper.
Work out an estimate for the total cost.

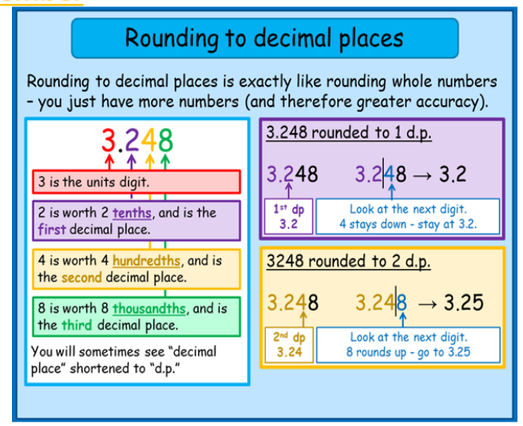
In an election 43.8% of people voted for a candidate.
Round this figure to one significant figure

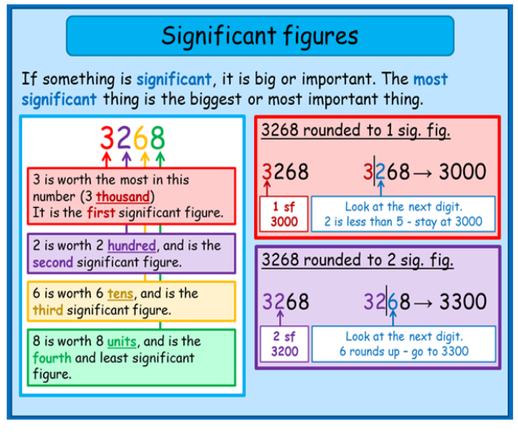


Andrew fills the swimming pool with water at a constant rate of 2.1 litres per second.

Given $1m^3 = 1000$ litres, estimate how long it takes to fill the pool.

Always remember





We estimate by rounding all values to 1 significant figure before completing the calculation.

Maths - Higher

Frequency Tables

These are a useful and clear way of displaying data

E.g. The table below shows the scores out of ten for 20 students

Mark	Tally	Frequency
4	II	2
5	II	2
6	IIII	4
7	IIII	5
8	IIII	4
9	II	2
10	I	1

Frequency means how often something occurs

This means 5 students scored 7 marks in their test

Grouped Frequency Tables

These contain sorted data in groups called **classes**

E.g. The table below shows the ages of people taking swimming lessons

Class Interval	Frequency
15 – 25	60
25 – 35	35
35 – 45	22
45 – 55	18
55 – 65	15

Total frequency will tell you the total number of people taking swimming lessons

This means 18 people who took swimming lessons were between the ages of 45 and 55

Classes or class widths

Comparative Bar Charts

The table shows the number of cars sold by Kitty and George in the first four months of 2014.

	January	February	March	April
Kitty	2	5	13	10
George	4	7	9	10

The chart has a key to make it easier to understand.

A **comparative bar chart** allows you to easily compare the number of cars Kitty and George sold each month.

Charts

Two-Way Tables

These are used to show how data falls into 2 different categories

For example gender and favourite sport to watch

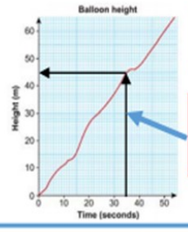
What is your favorite sport to watch on television?			
	Football	Basketball	Baseball
Males	40	22	15
Females	12	16	45
Total	52	38	60

A two-way table divides data into groups in rows going across and columns going down the table

Time-Series Graph

These are used to show how something changes over time. It is a line graph with time plotted along the horizontal axis

For example the height of a balloon at different times



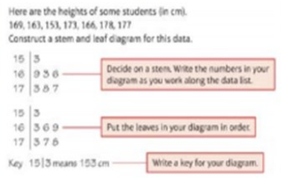
You can estimate the height of the balloon at different times using the graph

E.g. the height of the balloon at 35 seconds is approximately 45m as shown by the arrows on the graph

Stem and Leaf Diagrams

This shows numerical data split into a 'stem' and 'leaves'. The leaf is usually the last digit and the stem is the other digits.

Here are the heights of some students (in cm).
169, 163, 153, 173, 166, 178, 177
Construct a stem and leaf diagram for this data.



A back-to-back stem and leaf diagram compares 2 sets of data. E.g. the ages of males and females

Pie Charts

This is a circle divided into **sectors.** Each sector represents a set of data. Pie charts are excellent for displaying the most/ least popular type of something.

Plotting pie charts example

The table show the match results of a football team.

Result	Won	Drawn	Lost
Frequency	28	12	20

28 + 12 + 20 = 60 ← The total number of games is the total frequency.

1 game = 360° ÷ 60 games = 6° per game ← Work out the angle for **one** game.

360° in a circle

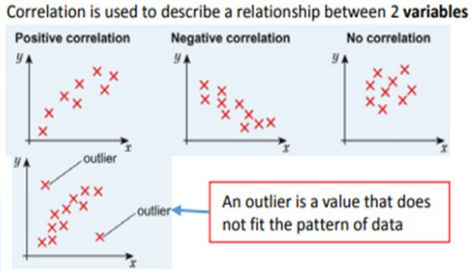
28 games won = 28 × 6° = 168°
12 games drawn = 12 × 6° = 72°
20 games lost = 20 × 6° = 120°
← Work out the angle for each result.

Draw the pie chart. Give it a title and a key. Or label each section

Scatter Graphs

A scatter graph allows you to see the **relationship** between 2 sets of data. E.g. your height and your stride length.

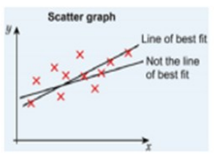
Correlation is used to describe a relationship between 2 **variables**



An outlier is a value that does not fit the pattern of data

A line of best fit

This is a straight line drawn through the middle of the points on a scatter graph. It should pass as near as many points as possible and represents the **trend** of the points.



A line of best fit can be used to predict data values within the range of data given.
This is called **interpolation**
It can also be used to predict data values outside the range of data given.
This is called **extrapolation.**

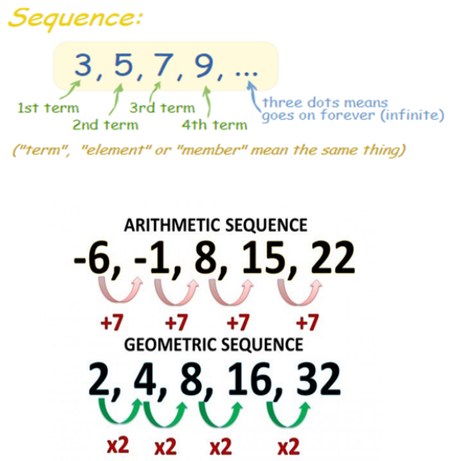
Maths - Higher

Sequences

Key vocabulary

Sequence
Term
Rule
Term to term rule
Nth term
Arithmetic sequence
Geometric sequence
Triangular numbers
Fibonacci sequence

Picture perfect



Assessment style question

The nth term of a sequence is $2n^2$

(i) Find the 4th term of the sequence.

.....

(ii) Is the number 400 a term of the sequence?

.....

Give reasons for your answer.

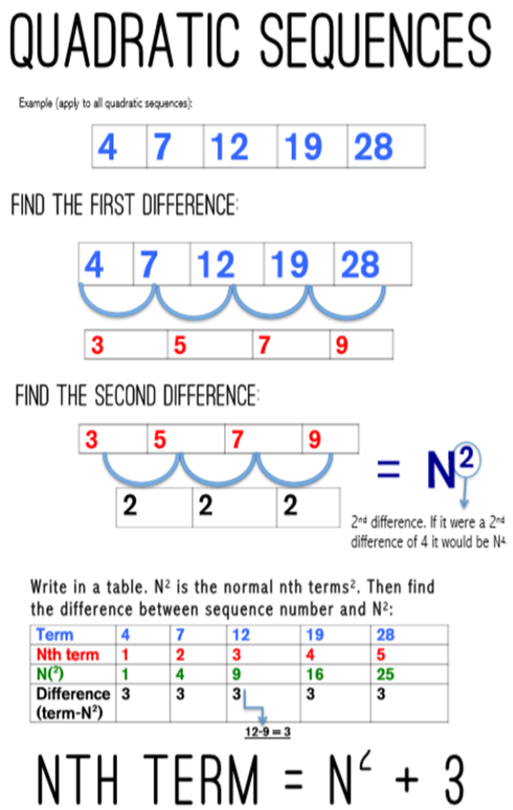
.....

The first five terms of an arithmetic sequence are .....

2 7 12 17 22

Write down, in terms of n, an expression for the nth term of this sequence.

Always remember

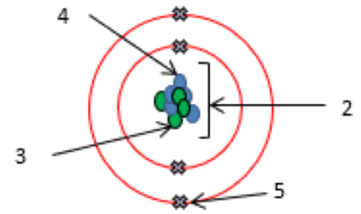


Science: GCSE Atomic Structure and Radiation

1. Structure of the atom

	Key word	Definition
1	Atom	The smallest possible piece of an element. Has a radius of 0.1nm (or 1x10-10m)
2	Nucleus	The centre of an atom. Contains protons and neutrons
3	Proton	A positively charged particle found in the nucleus
4	Neutron	A neutral particle found in the nucleus. Has no charge
5	Electron	A negatively charged particle found in energy levels (shells) around the nucleus

Sub-atomic particle	Relative atomic mass	Charge
Proton	1	+1
Neutron	1	0
Electron	~0	-1

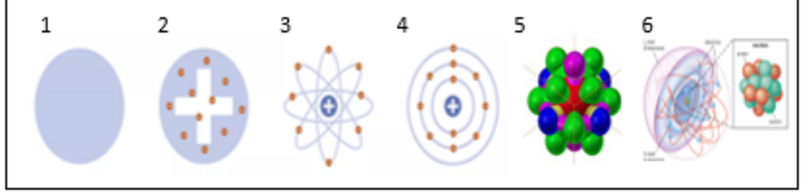


2. Key Words

Atomic number	Number of protons in the nucleus of an atom
Atomic mass	Total number of protons **and** neutrons in the nucleus of an atom
Isotope	Different forms of the same element with the same number of protons, but different numbers of neutrons

3. Discovery of the Atomic Model

	Model	Discovery
1	Solid sphere	Dalton stated that the atom was the smallest particle and it could not be broken up further
2	Plum Pudding Discovery of the electron	JJ Thompson stated that the atom was a cloud of positive charge with negatively charged electrons randomly dotted around the cloud.
3	Nuclear model Discovery of a positively charged nucleus	Rutherford conducted experiments with gold foil that proved that the atom contained a positively charged nucleus with the electrons randomly around the outside of the nucleus
4	Planetary Model (Bohr) Discovery that electrons orbit the nucleus on energy levels called 'shells'	Bohr stated that electrons orbited around the nucleus like planets around the sun and that there were different numbers of shells in different elements
5	Quantum Model Discovered that electrons are found in clouds of probability called orbitals	Schrodinger stated that electrons do not orbit the nucleus but move around in waves and it is impossible to know the exact location of an electron.
6	Modern Atomic Model Discovery of the neutron	Chadwick discovered the neutron in the nucleus which helped to explain the atomic mass of an atom.



Challenge Questions

1	What needs to be taken before the count rate can be measured?
2	What safety precautions should a teacher take when demonstrating radioactive sources to the class?
3	Explain why isotopes of large elements are generally radioactive.
4	Explain why a radioactive source with a short half-life is used as tracers in the body?

Science: GCSE Atomic Structure and Radiation

4. Radiactivity Key Words

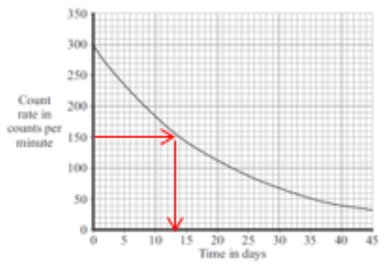
Background radiation	Radiation that is found in the environment such as from rocks, cosmic rays and fallout from nuclear weapons testing
Becquerel (Bq)	Units for measuring the radioactivity of a source
Count rate	The speed at which a radioactive source decays (gives out radiation)
Unstable atom	An atom that a very large nucleus with a high neutron to proton ration meaning that radiation is emitted from the nucleus
Geiger counter	Instrument used to measure radioactivity of a substance

5. Types of Radiation

Type of radiation	Symbol	Structure and charge	Range and penetration	Ionising power
Alpha	α	2 protons and 2 neutrons from the nucleus Charge = +2	Travels up to 5cm in air, blocked by paper and skin	High
Beta	β	Fast moving electron from the nucleus Charge = -1	Most travel up to 15cm in air, blocked by a thin sheet of aluminium	Medium
Gamma	γ	High energy wave Charge = 0	Can travel at the speed of light so can travel vast distances. Stopped by 1m thick concrete or thick lead plates	Low

6. Half-Life

The half-life of a radioactive source is the time it takes for the count rate to decrease by half.



1. The starting count rate is 300, so half of that is 150.
2. You find 150 on the y-axis and read across to the line.
3. Then read down from the line to calculate the time.

So for this graph, the half-life is 15 days. This means that every 15 days the count rate will decrease by half.
In 60 days the count rate will be 18.75Bq

7. Half-life Equations (HT)

Alpha decay	When an alpha particle is emitted from the nucleus 2 protons and 2 neutrons are given out. This means the atomic number will decrease by 2 and the atomic mass will decrease by 4.

$$^{235}_{92}U \longrightarrow {}^{231}_{90}Th + {}^{4}_{2}He$$

beta decay	When a beta particle is emitted from an atom, 1 neutron changes into a proton. This means the atomic number will increase by 1 and the atomic mass will stay the same.

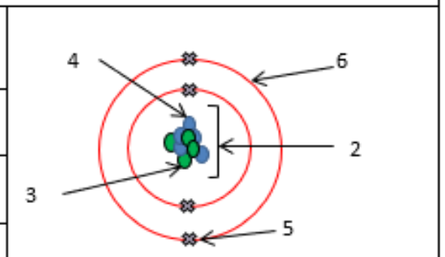
$$^{235}_{92}U \longrightarrow {}^{235}_{93}Np + {}^{0}_{-1}e$$

Science: GCSE Atomic Structure and the Periodic Table

1. Structure of the atom

	Key word	Definition
1	Atom	The smallest possible piece of an element. Has a radius of 0.1nm (or 1x10-10m)
2	Nucleus	The centre of an atom. Contains protons and neutrons
3	Proton	A positively charged particle found in the nucleus
4	Neutron	A neutral particle found in the nucleus. Has no charge
5	Electron	A negatively charged particle found in energy levels (shells) around the nucleus
6	Shell	Energy levels surrounding the nucleus of the atom

Sub-atomic particle	Relative atomic mass	Charge
Proton	1	+1
Neutron	1	0
Electron	~0	-1

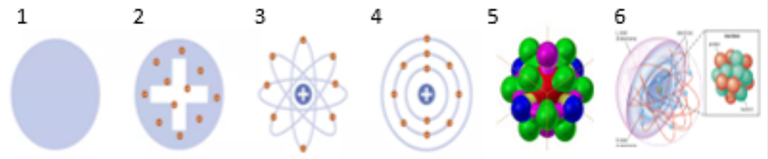


2. Key Words

Atomic number	Number of protons in the nucleus of an atom
Atomic mass	Total number of protons **and** neutrons in the nucleus of an atom
Isotope	Different forms of the same element with the same number of protons, but different numbers of neutrons
Ion	A charged atom that forms when electrons are lost or gained

3. Discovery of the Atomic Model

	Model	Discovery
1	Solid sphere	Dalton stated that the atom was the smallest particle and it could not be broken up further
2	Plum Pudding Discovery of the electron	JJ Thompson stated that the atom was a cloud of positive charge with negatively charged electrons randomly dotted around the cloud.
3	Nuclear model Discovery of a positively charged nucleus	Rutherford conducted experiments with gold foil that proved that the atom contained a positively charged nucleus with the electrons randomly around the outside of the nucleus
4	Planetary Model (Bohr) Discovery that electrons orbit the nucleus on energy levels called 'shells'	Bohr stated that electrons orbited around the nucleus like planets around the sun and that there were different numbers of shells in different elements
5	Quantum Model Discovered that electrons are found in clouds of probability called orbitals	Schrodinger stated that electrons do not orbit the nucleus but move around in waves and it is impossible to know the exact location of an electron.
6	Modern Atomic Model Discovery of the neutron	Chadwick discovered the neutron in the nucleus which helped to explain the atomic mass of an atom.



4. Properties of metals and non-metals

Metals	Non-Metals
High density, sonorous, malleable, shiny, conducts heat and electricity	Low density, brittle, dull, poor conductors of heat and electricity

Science: GCSE Atomic Structure and the Periodic Table

5. Electron configuration diagrams

Rules	1. Do not draw protons and neutrons in the nucleus 2. Use small x's to show electrons 3. Only 2 electrons can fit on the 1st shell, then 8 on 2nd, 8 on 3rd 4. Draw the electrons from the nucleus outward

Beryllium

Sodium

6. The Periodic Table

Developed by Mendeleev, who arranged the elements in order of atomic mass. He left gaps for undiscovered elements and predicted their properties. When these predictions proved correct, Mendeleev's periodic table was widely accepted.

Arrangement	Elements are placed in order based on atomic number
Groups	**The columns downwards:** Elements in each group have similar properties and electronic configurations
Periods	**The rows across:** Elements in the same period have the same number of shells.
Transition metals	Highlighted in yellow are the transition metals of the periodic table. These elements can form more than one type of ion.

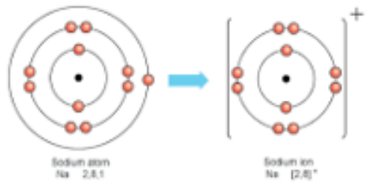
7. Patterns in the periodic table

Group	Name	Elements	Key feature	Patterns
1	Alkali metals	Li, Na, K, Rb, Cs, Fr	Contains 1 electron on the outer shell	Reactivity increases down the group and atom gets bigger
7	Halogens	F, Cl, I, Br	Contain 7 electrons on the outer shell	Reactivity decreases down the group and atom gets bigger
0	Nobel Gases	He, Ne, Ar, Kr, Xe, Rn	All atoms have a full outer shell	Unreactive elements **(inert)**

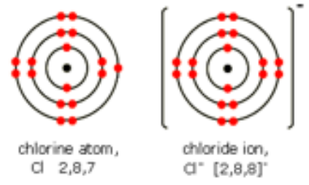
8. Forming ions

Rules	**Positively** charged ions have lost electrons from the outer shell **Negatively** charged ions have gained electrons from the outer shell

Sodium (Na^+)



Chlorine (Cl^-)



Challenge Questions

1	Draw an electron configuration diagram for Fluorine and calculate the number of protons, neutrons and electrons.
2	Compare the plum pudding model to the Bohr model of the atom
3	Explain how Rutherford's gold foil experiments disproved the plum pudding model
4	Explain in detail the patterns in reactivity for group 1 and 7.

Science: GCSE Infection and Response

1. Key Words

Key word	Definition
Communicable disease	Disease than can be passed spread by a pathogen
Pathogen	Microbe that causes a disease
Protist	Group of microbes that have features of plants, animals and fungi.
Transmission	The method by which a pathogen is spread
Vector	Type of transmission where an organism that carries a pathogen but is not affected by it. e.g. rats

2. Communicable diseases

Pathogen	Disease	Symptoms	Treatment	Prevention
Bacteria	Salmonella (food poisoning)	Vomiting, diarrhoea, fever	Antibiotics	Good hygiene, cook food thoroughly
	Gonorrhoea	Yellow mucus from penis or vagina, pain when urinating	Antibiotics	Use a condom when having sex
Virus	HIV	Flue like symptoms, decreased immunity, lesions	Anti-retroviral drugs	Use a condom when having sex, do not share needles
	Measles	Fever, red rash on chest and face	Painkillers	Vaccination
	Tobacco Mosaic Virus (TMV) - Plants	Yellowing leaves stunted growth	Remove infected leaves and burn	Keep away from infected plants
Fungi	Rose Black Spot - Plants	Black spots on leaves and stunted growth	Fungicides	Keep away from infected plants

3. Malaria

- Malaria is a disease caused by the protist *Plasmodium*
- It is transmitted by female mosquitos when they bite a human
- It causes a fever and flu like symptoms that can be fatal.
- It can be treated using drugs that kill the parasite.

Method of prevention	How it works
Mosquito Nets	Meshing is too small for mosquitoes to pass through
Draining swamp land	Reduces breeding grounds for mosquitoes and therefore reduces the mosquito population
Anti-malarial drugs	Kills the parasite during its developmental stage in the liver and red blood cells
Insect repellent	Discourages mosquitoes from biting the person

4. External body defences (non specific)

1	Skin	Layers of dead skill cells provide a barrier. Antiseptic oils are secreted on to the skin that kill pathogens
2	Nose	Cilia cells line the nose, throat and lungs. Mucus covering these cells traps the pathogens and the hairs on the upper surface of the cells sway back and forth to sweep the mucus to the nose or to the throat to be swallowed
3	Mouth	The stomach contains strong hydrochloric acid, this kills pathogens that are swallowed.
4	Cuts	Platelets in the blood clump together at the site of a cut, these for a carrier at the cut called a scab.

Science: GCSE Infection and Response

5. Internal body defences (specific)

Lymphocyte	White blood cell that makes and releases antibodies
Phagocyte	White blood cell that engulf and digests pathogens
Antigen	Unique protein marker on the pathogen
Antibody	Protein that attaches to an antigen to prevent growth and the release of toxins
Toxin	Poison released by a pathogen that induces symptoms
Antitoxin	Protein that binds to toxins to prevent them from being absorbed in to the body tissues

6. Vaccines

Vaccines are used to provide immunity against viral infections

Stage	Description
1	Small amount of WEAKENED or DEAD pathogen is injected in to the blood
2	White blood cells respond and start to make antibodies to kill the pathogen
3	Antibodies remain in the blood
4	If re-infected the levels of antibodies drop and the white blood cells make the antibodies QUICKLY to fight of the pathogen

7. Antibiotics and Painkillers

Antibiotics	ONLY used to treat bacterial infections. Interferes with the bacterial production or attacks the cell walls of the cell
Painkillers	ONLY treats the symptoms of a disease, it does not kill the pathogen
Antibiotic resistance	Where a bacteria evolves to no longer be killed by an antibiotic

8. Drug development

Drug	Chemical that has a physiological effect on the body
Toxicity	How poisonous or deadly the drug is
Efficacy	How well a drug works
Dose	The volume or mass of a drug that is needed to cause an effect
Placebo	A pill or liquid that does not contain the drug, e.g a sugar pill
Double blind trials	A method of testing a drug where neither the doctors nor the patients know who has taken the drug or placebo. (Prevents bias)

Why are drug trials conducted?

1. To ensure the drug is not toxic
2. To check for the side effects of the drug
3. To establish an effective dose
4. To assess the effectiveness of a drug compared to those currently on the market.

Stages of a drug trial

Pre-clinical	Drugs are tested on tissues and animals to check for toxicity
Clinical trials stage 1	Small group of healthy volunteers (<10) with a small dose compared to the placebo. Check for toxicity and side effects
Clinical trials stage 2	Group of 100 – 300 healthy volunteers taking a range of doses compared to a placebo. Check for side effects and possible dose
Clinical trials stage 3	Group of 1000-3000 patients. Compared against drugs already available. Check the efficacy of the drug for its intended purpose.

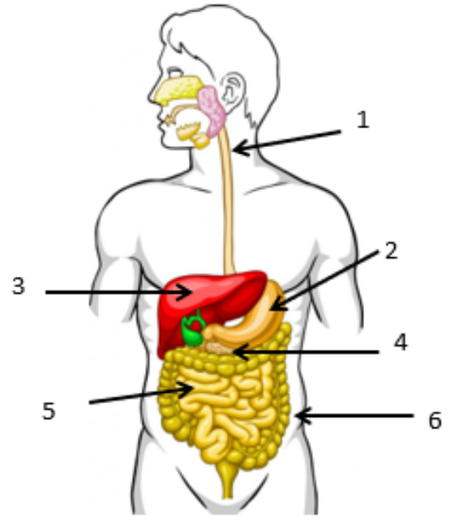
Challenge Questions

1	Why can't measles be treated using antibiotics?
2	Why is it important that a drug development trial is carried out by an independent company?
3	Suggest how the development of antibiotic resistant bacteria can be reduced.
4	Evaluate the use of unlicensed vaccines or drugs to treat COVID-19.

Science: GCSE Organisation

1. Digestive system

	Organ	Function
1	Oesophagus	Muscle contractions push food into the stomach
2	Stomach	Hydrochloric acid and pepsin chemically digest food, stomach muscles churn the food.
3	Liver	Produced bile that is added into the first part of the small intestines called the ileum
4	Pancreas	Produces enzymes that are released into the small intestines to complete digestion.
5	Small Intestines	Chemical digestion continues and small soluble molecules are absorbed into the blood
6	Large intestines	Water is removed from the waste faeces and absorbed back into the blood



2. Key words

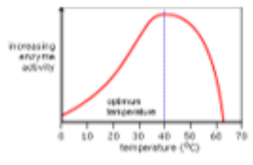
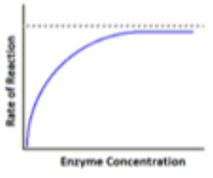
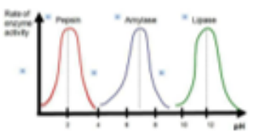
Optimum	The best conditions for the reaction to take place fastest
Active site	The specific point in the structure of the enzyme where the reaction occurs
Denature	When the active site changes shape permanently so the enzyme no longer binds to the substrate
Emulsify	When fat droplets are broken down in to small ones to help mix them with the enzyme and increase the surface area for digestion
Bile	Alkali released from the liver in the duodenum to neutralise neutralise stomach acid and emulsify fats

3. Enzymes

Enzymes are **biological catalysts** that speed up the digestion of large insoluble molecules to small soluble ones that can be absorbed into the blood.

Enzyme	Released from	Function
Amylase	Salivary Glands, pancreas and small Intestines	Breaks down starch into glucose
Protease (Pepsin)	Stomach (pepsin), pancreas and small intestines	Breaks down proteins into amino acids
Lipase	Pancreas and small intestines	Breaks down fats into fatty acids and glycerol

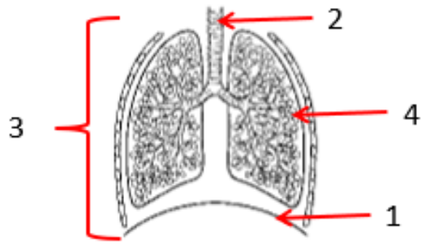
4. Factors affecting the rate of an enzyme reaction

Temperature	pH	Concentration
		

Science: GCSE Organisation

5. Key Words

1	Diaphragm	Flat muscle underneath the lungs that contracts and relaxes to cause breathing
2	Trachea	Tube containing rings of cartilage that allows air to move in and out of the lungs
3	Thorax	Air tight chest cavity containing the respiratory system and the heart.
4	Alveoli	Small blind ending sacs where gases are exchanged between the air and the blood



Inhaling	Exhaling
Diaphragm contracts	Diaphragm relaxes
Volume in the thorax increases	Volume in the thorax decreases
Pressure in the thorax decreases	Pressure in the thorax increases
Air is pulled into the lungs	Air is pushed out of the lungs

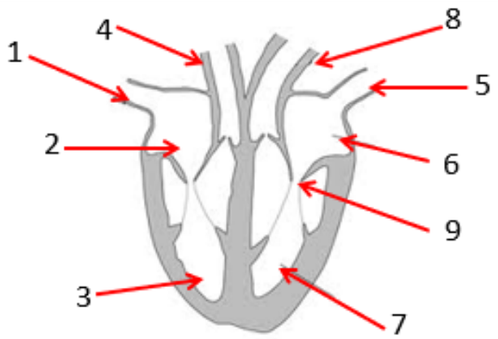
Challenge Questions

1	Why does boiled amylase not work when cooled down to room temperature?
2	How and why does asthma affect breathing?
3	How are the lungs adapted for gas exchange?
4	Why is both diffusion and active transport needed to absorb digested nutrients into the blood?

6. Circulatory system

	Key Word	
1	Vena cava	Vein that brings deoxygenated blood back to the heart from the body
2	Right atrium	Pumps blood in to the ventricle and where the pacemaker cells are located
3	Right ventricle	Pimps blood out of the heat to the lungs
4	Pulmonary artery	Takes deoxygenated blood to the lungs
5	Pulmonary vein	Brings oxygenated blood back to the heart from the lungs
6	Left atrium	Pumps blood to the left atrium
7	Left ventricle	Pumps blood out of the heart to the body. Has a large muscle wall to pump blood at a high pressure
8	Aorta	Artery that carries blood away from the heart to the body
9	Valves	These prevent the backflow of blood through the circulatory system

The blood flows through the heart in the order of 1 to 8



CS - 1.1 SYSTEMS ARCHITECTURE

KEY CONCEPTS

Computer systems take data (input), process it and then output it.

Embedded systems are computers built in to other devices like washing machines. They are dedicated to a single task so they are efficient.

Clock speed: the number of instructions a processor can carry out per/second. Higher clockspeed = faster CPU..

Number of **Cores:** The more cores a CPU has the more instructions it can carry out at once (multitasking). More cores = faster processing.

Cache size: A larger cache gives the CPU faster access to more data

EXAM QUESTIONS

Explain how cache size, cores and clockspeed affect the performance of the CPU.

Define what is meant by an embedded system

What is the purpose of the ALU?

Explain the role of the CPU registers (MAR and MDR)

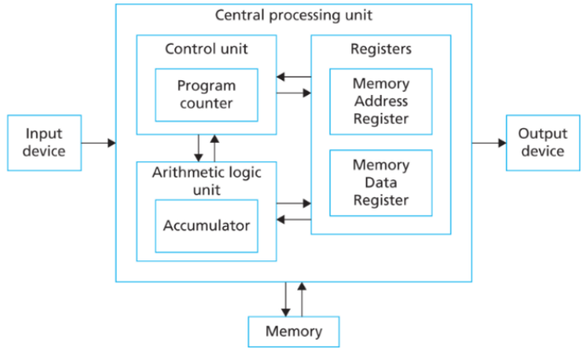
Explain how the fetch decode execute cycle works

Explain four events that occur during the FDE cycle.

FETCH – DECODE – EXECUTE CYCLE

CPU **fetches** instruction from the RAM (copies memory address to MAR, copies instruction to MDR & adds 1 to PC. CU **decodes** the instruction from the MDR Instruction is **executed** by the CU The next instructions is fetched and The cycle repeats.

THE CENTRAL PROCESSING UNIT (CPU)



Control Unit (CU): executes instructions and controls the flow of data in the CPU.

Program counter: holds the memory address for the instruction of each cycle.

Arithmetic Logic Unit (ALU): does all of the calculations and logic operations.

Accumulator: holds the immediate result of any calculations in the ALU.

Cache: very fast memory that stores regularly used data so that the CPU can access it quickly.

MAR (Memory Address Register): holds the address about to be used by the CPU.

MDR (Memory Data Register :) holds the actual data or instruction being processed by the CPU.

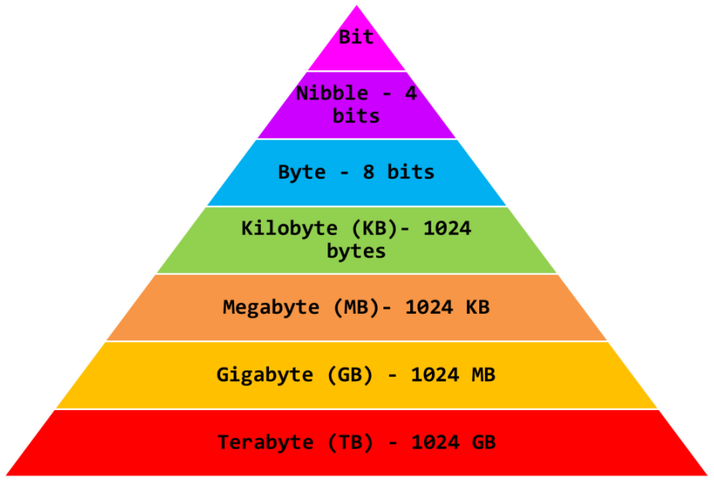
CS - 1.2 MEMORY and 1.3 STORAGE

RANDOM ACCESS MEMORY (RAM)

RAM is the computer's main memory that holds the data, programs and files while they are being used.
RAM is volatile (power off = the data is lost)
The CPU will fetch instructions from the RAM in the fetch – decode – execute cycle.
When the RAM is full the computer uses **VIRTUAL MEMORY.** It uses the secondary storage as temporary RAM so that the computer can continue running (but slowly).

READ ONLY MEMORY (ROM)

The ROM is on a chip build into the motherboard
It contains the BIOS (boot up sequence for the computer)
ROM is non-volatile (data still stored after power is off)



STORAGE CAPACITY

Some storage methods such as a HDD or SSD have a

TYPES OF STORAGE

Secondary Storage: where all data including the programs are stored when they are not being used.

Storage	Key Information
Hard Disk Drive (HDD)	Magnetic, has moving parts, large capacity, lower cost than SSD
Solid State Drive (SSD)	Flash memory, no moving parts, more robust than HDD, faster and more expensive than HDD
Flash memory	Eg: USB memory sticks, memory cards.
Optical Storage	Eg: CDs, DVDs. Cheap, portable and fairly robust.
Magnetic tape	Used for archive storage (back ups). Very large capacity, low cost, slow.

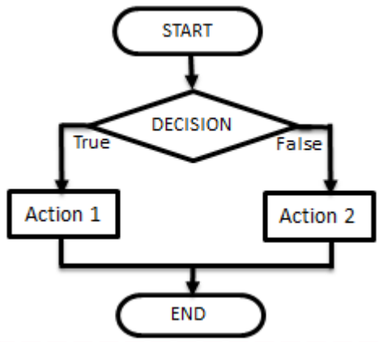
EXAM QUESTIONS

Explain how the RAM works with the CPU in the fetch –decode – execute cycle
Explain the difference between volatile and non-volatile memory giving an example of each
Tom is buying a new laptop, he is not sure whether to get a magnetic HDD or SSD. Discuss the benefits and drawbacks of each.

CS - 2.1 ALGORITHMS

COMPUTATIONAL THINKING

Abstraction	•Focussing on just the important details of a problem
Decomposition	•Breaking a problem down into smaller parts so that it is easier to solve
Algorithmic thinking	•creating a step by step solution to a problem



PSEUDOCODE

```
START
IF the Decision = TRUE
THEN:
      Perform Action 1
ELSE
      Perform Action 2
ENDIF
END
```

SEARCHING ALGORITHMS

To find an item in a list, computers need to use a searching algorithm. A linear search and binary search are both examples of sorting algorithms.

Linear Search: Checks each item in the list one by one until it finds what it is looking for
+ Simple, list doesn't need to be ordered
- Not efficient, takes time with lots of data

Binary Search: Finds the middle item in an ordered list by doing (n+1)/2. IF the middle item is what it is searching for it stops. If not, it compares the item you are searching for to the middle item so that it knows whether to look in the first half or second half of the list. Then it repeats these steps until the item is found
+ More efficient than a linear search
- Only works on an ordered list, complex to program

SORTING ALGORITHMS

Sorting algorithms sort items into an ordered list.

Bubble Sort: Checks the first two items in a list, swaps them if they are in the wrong order and then moves onto the next two items and repeats the process. Once it has passed through the list once it goes through again until none of the items need swapping. + Simple. – Takes a long time

Merge Sort: Finds the middle item (n+1)/2 and splits the list in half. Repeats this step until the list is split into individual items (sub-lists). It them merges (joins) the sublists in pairs. Each time the sublists are paired they are sorted into the correct order. + Efficient – Slow

Insertion Sort: Looks at the second item in a list and compares it to the items that are in front of it, then inserts it into the right place. It then moves to the next item in the list and repeats these steps. + Quick for sorting small lists – slow with long lists

CS - 2.2 PROGRAMMING TECHNIQUES

DATA TYPES

Data Type	Definition
String	Text eg: “Hello”
Integer	Whole number eg: 32
Float/ Real	Decimal number eg: 1.2
Boolean	Two values eg: true or false
Character	A single character eg: b

Casting is when you want to change between data types. Eg – if you want to use

VARIABLES AND CONSTANTS

Variable – A value which may change while the program is running. Variables can be local or global.

Local Variable – a variable which can only be used within the structure they are declared in.

Global Variable – a variable which can be used in any part of the code after they are declared

Constant – A value which cannot be altered as the program is running.

OPERATORS

Operator/ Function	Definition
Exponentiation	Raises a number to a power eg: 2**3 OR 2 ^3 (=2^3)
Quotient/DIV	Gives the whole number after a division
Remainder/MOD	Gives the remainder part of a division
==	Is equal to
! or <>	Is not equal to
<	Is less than
>	Is more than
>=	Is more than or equal to
<=	Is less than or equal to

ARRAYS

One-Dimensional Arrays- this is like a list. In this example an array has been created called students. The list can hold 3 items (as shown).

```
Grades=[[“Bob”, “22%”, “44%”],
[“Dave”, “85%”, “100%”]]
```

This command would print the second item (1) From the array. It would print “Dave”.

Two-Dimensional Arrays – these are lists within lists (like a table)

```
array students [3]
students [0] = “Bob”
students [1] = “Dave”
students [2] = “Bob”
```

```
print(students[1])
```

	0	1	2
0	Bob	22%	44%
1	Dave	85%	100%

```
print(“Bob’s first test score was “ + Grades [0, 1]
```

GCSE Design & Technology
New & Emerging Technologies

1. CAD – Computer Aided Design

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

CAD Software

2. CAM – Computer Aided Manufacturing

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


Laser Cutter


Robots


Barcode Scanner


AGV – Automated Guided Vehicle

3: Production Techniques

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

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

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

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

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

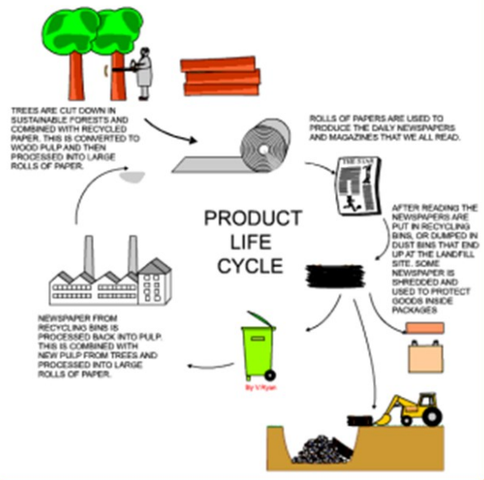
4. Scales of Production

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

5: Informing Design Decisions

5.1 Planned obsolescence - Planned obsolescence is when a product is deliberately designed to have a specific life span. This is usually a shortened life span.
5.2 Design for maintenance - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.
5.3 Disposability – Some products are designed to be disposable.

5.4 Product Lifecycle -



7: KEY WORD FOCUS

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

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

UNIT 1

2.1.1a

New and Emerging

Product Life Cycle

New and Emerging Technologies

S	P	E	C	I	E	S
Sustainability	People	Enterprise	Culture	Industry	Environment	Society

Technology has an impact on:

Automation — Employment

Organisation — Demographic Movement

Market Pull Vs Technology Push

Designers identify the opportunity to develop new products based on technology push or market pull.

Technology push

Technology push is when products are re-designed because of changes in materials or manufacturing methods. This might mean that new materials have become available, with improved properties; or that improvements in manufacturing processes mean a manufacturer can make the product cheaper of more effectively, which reduces manufacturing costs.

Market pull

Market pull is when product ideas are produced in response to market forces. Examples of market influences include;

- A demand from consumers for new or improved products.
- A competing product is launched by another manufacturer.
- A manufacturer wants to increase their share of the market.

Consumer choice

Once a designer has identified an opportunity for a product, the next step is to identify the detail of what consumers want. To do this they need to identify who the different customers are and what they are looking for, e.g. a choice of different styles, performances and process.

For example, car manufacturers design slightly different versions of the same car model to suit individual driver's different tastes. Market research is carried out to identify consumer wants and desires.

Legislation

Products have to meet certain standards before they are allowed to be sold to a consumer. In the UK, standards are regulated by the British Standards Institution (BSI). Products which meet these standards can be marked with the KiteMark.

The marks show government officials that the product conforms to a standard, which enables it to be legally placed on the market within their country.

ISO – International Standards Organisation
BSI – British Standards Institution

Sustainability

Ways to be more sustainable:

Use less material: *can you make things smaller, thinner lighter or with less parts?*

Use renewable material/energy: *materials that can be regrown or recycled easily like wool or steel. Solar or wind power, no batteries.*

Be more eco-friendly: *Reuse old materials, recycle waste, and refuse polluting materials.*

Global production and its effects on culture and people

Designers have to be very aware of what is acceptable and what is not acceptable in society.

Issues with making products: Most people would prefer the products they want to be low cost and good quality.

One way of reducing the manufacturing costs is using computer controlled machines or robots to make the products.

Negative effect – fewer people are employed.

Positive effect – computer controlled systems create jobs for highly skilled workers to develop, program and maintain these systems.

Another way of reducing costs is to make products in countries where labour costs are low. Sometimes the conditions for workers in those countries are far below UK standards.

Negative effect – pollution may also be higher. Environmental cost in transporting good all over the world.

Positive effect – create jobs and opportunities for people.

Consumer Rights

The Consumer Protection Act 1987	The trade Descriptions Act 1968
This protect the public by:	**This protect the public by:**
Prohibiting the manufacture and supply of unsafe goods.	Making it an offence for a trader to make false or misleading statements about goods or services.
Making the manufacturer or seller of a defective product responsible for damage it causes.	**Making it an offence for a trader to:**
Allowing local councils to seize unsafe goods and suspend the sale of suspected unsafe goods.	Apply a false trade description to any goods.
Prohibiting misleading price	Supply or offer to supply any goods to which a false trade description has been applied.
	Make certain kinds of false statement about the provision of any services, facilities or accommodation.

Social, Moral, Environmental and Sustainability issues.

Social
We are all part of one world and we do rely upon each other. Any thing we can do to promote positive work or play is good however as designers we also have a responsibility to make sure designs don't have a negative impact. Products can really influence us as people and as designers we need to be positive role models encouraging 'Social Harmony'.

Moral
As a designer you have a moral responsibility to do the right thing. Moral issues is about being fair and honest. You should be thinking about what is 'right' for the consumer. For example a moral designer should be considering the safety of potential users as a high priority as well as making sure they don't feel uncomfortable or come to any harm. People with strong morals are honest and decent and will put other people before their own personal gain.

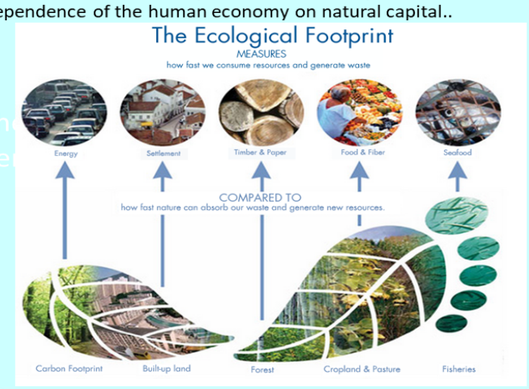
Environmental & Sustainability
When developing designs you need to think about environment and sustainability issues as we only have one planet and need to make sure we look after it.
-The materials will have an impact of some kind
-using materials that can be easily recycled is a good start
- locally sourced uses less fuel
- open cast mines and deforestation have negative impact
Energy consumption is also important. A lot of energy comes from fossil fuels so needs to be reduced. An efficient making process uses less electricity and relies less on fossil fuels.

Fairtrade

Fair trade is an institutional arrangement designed to help producers in developing countries achieve better trading conditions. Members of the fair trade movement advocate the payment of higher prices to exporters, as well as improved social and environmental standards

Ecological Footprint

The **ecological footprint** measures human demand on nature. it is a measure of human's impact on Earth's ecosystem and reveals the dependence of the human economy on natural capital..



Carbon Footprint

Sustainable living is a **lifestyle** that attempts to reduce an individual's or society's use of the Earth's natural resources and personal resources. Practitioners of **sustainable living** often attempt to reduce their carbon footprint by altering methods of transportation, energy consumption, and diet.

GCSE Design & Technology
Sustainability

1. Sustainability

Avoidance of the depletion of natural resources.

Finite Resources e.g. Ore and Oil

Materials which are in limited supply. Use of these should be avoided where possible or only used in small amounts.

Non Finite Resources e.g. Trees and Plants

Materials in abundant supply and are unlikely to ever run out or ones that can be grown again.

The impact of the use of resources can be measured by the following:

- CO_2 emissions
- Transportation method and distance travelled
- Impact on the environment through mining or harvesting
- Availability or scarcity
- Maintenance or repair costs
- Ethical and moral issues

2. Life Cycle

Life cycle assessment (LCA) to assess the impact of a product during the different stages of its life. The 5 main stages are:

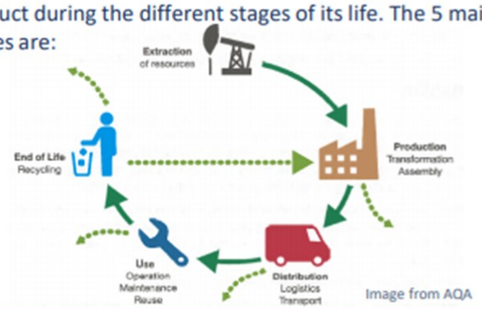


Image from AQA

3. Waste Disposal

Consideration to waste disposal has an impact on the environment and a product life cycle.

Businesses are charged for waste disposal, reducing waste disposal will save money.

The effects of careful consideration of waste disposal within a business are:

- Less raw materials required
- Reusing waste materials/components within a company
- Sale of recyclable waste
- Energy to heat and power a business could be generated

4. Environment

Technologies that have a **positive impact**:

- Renewable materials from managed resources
- Use of renewable energy
- Using recyclable materials
- Consideration to the 6r's
- Designing products with low power consumption
- Designing products with fewer components and reduced weight
- Designing products that are upgradable extending their life
- Creating products that are sourced, produced and sold locally

Technologies that have a **negative impact**:

- Use of finite/non-recycled materials
- Use of components that are hard to repair
- Use of fossil fuels for power
- Products with high power consumption
- Products that have built in **planned obsolescence**
- Components that are shipped globally

5. Key Terms

Continuous Improvement

Kaizen, also known as continuous improvement, is a long-term approach to work that seeks to achieve small, incremental changes in processes in order to improve efficiency and quality. It is best known for being used in **lean manufacturing.**

Efficient Working

Just in time (JIT) and **lean manufacturing** are examples of how businesses reduce costs. Other examples are members of staff doing 'energy walks' to turn off lights etc. to reduce costs and CO_2 emissions.

Pollution

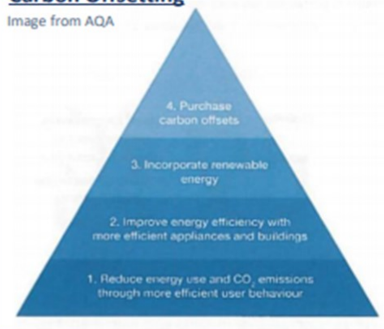
Business's should aim to reduce pollution by conducting an LCA.

Global Warming

The release of CO2, methane (CH4) and nitrous oxide (N2O) into the environment resulting in the rise of average temperatures of the earth's atmosphere and oceans.

Carbon Offsetting

Image from AQA

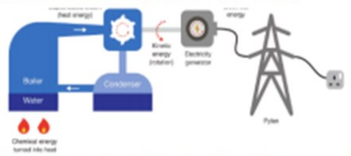


GCSE Design & Technology
Energy Generation & Energy Storage

1. Energy Generation

Power can be generated from renewable and non-renewable sources. Non-renewable power is generated from fossil fuels.

Most electricity is created by rotating a turbine which turns a generator. Fossil fuels are burnt to create heat which superheats the water. The steam rotates the turbine which is linked to the generator to supply the electricity.



1.1 Fossil Fuels – Most electricity in the UK comes from burning Fossil Fuels such as **Coal, Gas and Oil**. Fossil fuels are **finite** resources and **cannot be replaced** as they run out. Burning fossil fuels creates carbon dioxide and is not environmentally friendly and contributes to **global warming.**

1.2 Fracking – Shale gas is trapped within the earths crust. Fracking is the process which removes it so it can then be burnt to create electricity. It involves drilling the earths crust and sending high pressure water, sand and chemical mixtures into the rock to release the gas.

3. Nuclear Power

Nuclear power is highly controversial. The process harnesses a nuclear reaction to create to create heat to power the turbines.

• Clean • Efficient	• High start up costs • Radioactive waste which is very dangerous to all living things. • Nuclear waste stays radioactive for millions of years and is stored underground.

2. Renewable Energy

Energy that comes from the planets non-finite resources is renewable. It includes



2.1 Wind Power	
• Low cost • Produce More power in winter when demand is higher.	• Do not create power when not enough wind or it is too windy. • Harmful to wildlife • Ugly
2.2 Solar Energy	
• Low maintenance costs. • Improvements in technology mean the efficiency is always improving.	• Only produce energy during daytime. • Production is less in winter.
2.3 Tidal Energy	
• Predictable and consistent.	• Machinery has to be located some distance from land making repair and maintenance difficult.
2.4 Hydro Electric Power	
• Very reliable	• High set up costs both financially and environmentally.
2.5 Bio Fuel	
• Carbon Neutral – They absorb the CO_2 whilst growing and produce similar amounts when burnt for energy.	• Vast amounts of land and water needed to produce the crops which contribute to food shortages in developing countries.

4. Energy Storage

Most mechanical power is stored by using tension or compression. Coiled springs used in clocks, watches and wind up toys store physical energy from the winding process which is then released slowly through cogs, gears and other mechanisms.

4.1 Pneumatics – A form of compression is used to store gas or air under pressure. They are commonly used to controlling production lines. They are accurate, efficient and low maintenance.

4.2 Hydraulics – Very similar to Pneumatics but uses a liquid, most commonly Oil. Extremely powerful and using in manufacturing industrial applications.

Both systems will use a compressor which pump the air or liquid into a storage tank to hold it until it is needed.

4.3 Kinetic Energy – any object in motion has kinetic energy. Objects not in motion store potential energy which is converted to kinetic energy when a force is applied to the object such as gravity.

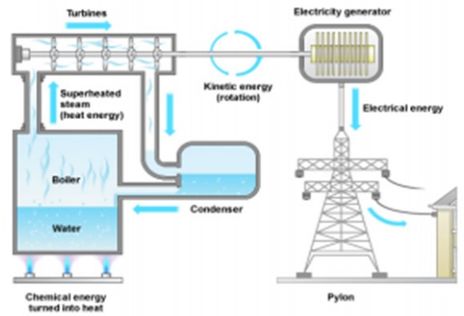
4.4 Batteries – Electrical power can be stored in batteries. Battery technology has vastly improved alongside the power consumption of modern electronic devices helping save valuable finite resources.

Alkaline batteries are more efficient than traditional acid based batteries and hold their charge well.

Rechargeable batteries are capable of being charge d and discharged thousands of times reducing the resources needed. The time it takes for rechargeable batteries to reach full charge has also improved in recent years making their use much more convenient.

4.5 Disposal of Batteries – Batteries must be disposed of correctly as they contain toxic electro chemicals. If placed in the normal bin and they end up in land fill sites, it will degrade over time and release harmful chemicals and metals into the soil and water.

Energy Types
1. Fossil Fuels – Non-renewable energy

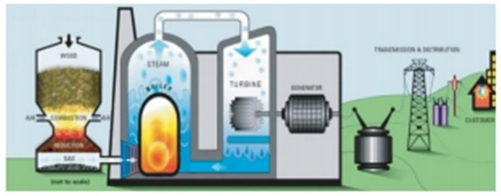


In a thermal power station fuel such as coal, oil or gas is burned in a furnace to produce heat - chemical to heat energy.

- this heat is used to change water into steam in the boiler.
- the steam drives the turbine - heat to kinetic energy
- this drives the generator to produce electricity - kinetic to electrical energy.

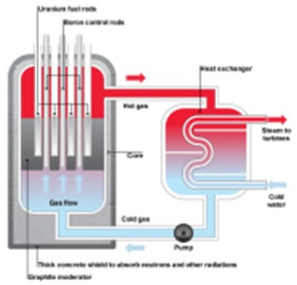
Some experts believe that fossil fuels will run out in our lifetime.

Energy Types 2. Biomass Energy –Renewable Energy



Biomass is an industry term for getting energy by burning wood, and other organic matter. Burning biomass releases carbon emissions, but has been classed as a renewable energy source in the EU and UN legal frameworks, because plant stocks can be replaced with new growth.

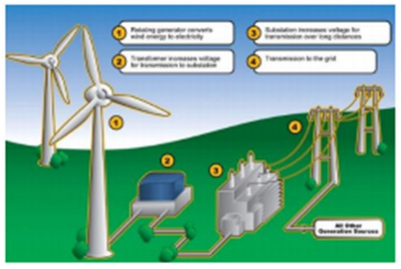
Energy Types
3. Nuclear Energy – Renewable energy



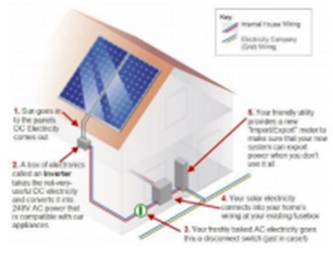
The main nuclear fuels are **uranium** and **plutonium**. In a nuclear power station nuclear fuel undergoes a controlled chain reaction in the reactor to produce heat - nuclear to heat energy.

- heat is used to change water into steam in the boiler.
- the steam drives the turbine (heat to kinetic energy)
- this drives the generator to produce electricity - kinetic to electrical energy.

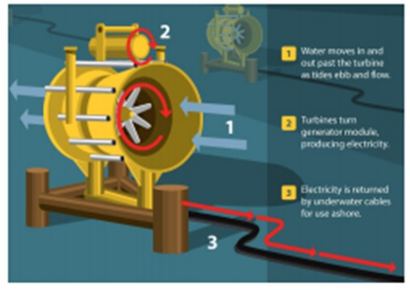
Energy Types
4. Wind Energy – Renewable Energy



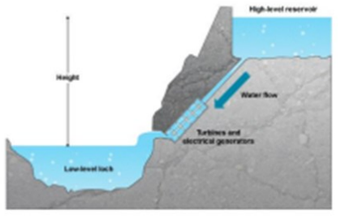
5. Solar Energy – Renewable Energy



6. Tidal Energy – Renewable Energy



7. Hydroelectricity – Renewable Energy



- In a hydroelectric power station water is stored behind a dam in a reservoir. This water has gravitational potential energy.
- The water runs down pipes (potential to kinetic energy) to turn the turbine
- The turbine is connected to a generator to produce electricity (kinetic to electrical energy).

Energy Types
8.Batteries

Alkaline batteries are the most common type of domestic batteries, they are disposable but contain chemicals that are bad for the environment. Fortunately more and more battery recycling banks are appearing now where most of the battery can be reused. **Rechargeable batteries** are better for the environment and more economical in the long run (High initial purchase price). Their lifespan decreases with every charge.

GCSE Design & Technology
Electronic Components

1. Systems

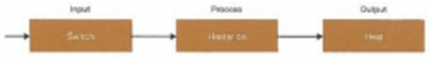
A system is parts or components working together to control tasks or activities.

Systems Diagram

A simple flowchart that lays out input, process, output – an automatic door

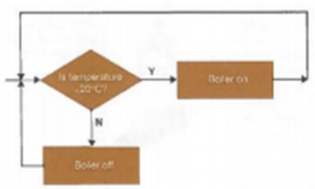
Open loop and closed loop

Has no feedback and is unable to make a decision – a room heater- has to be manually switched off



Closed loop

Able to make a decision using feedback – central heating system – automatically switch off when the desired temperature is reached



Images from AQA

2. Input Components

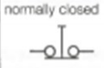
Name and symbol	Appearance	Image	Characteristics	Uses
Toggle switch (latching) 	Available in a variety of shapes, sizes and switching positions depending on the task		Off and on positions, once switched they stay on (latched) until switched again	Lighting, power switch, control panels
Push to make (PTM) switch normally open 	A wide variety of shapes, colours and sizes		The legs of the switch are only connected when the switch is pressed (momentary); it is normally open, no polarity	Door bell, intercoms, keyboards
Push to break (PTB) switch normally closed 	They are identical to PTM switches so you may need to check the connectivity		The legs are only disconnected when the switch is pressed (momentary); it is normally closed, no polarity	Alarm systems, control systems
Light dependent resistor (LDR) 	Small light sensitive panel often in plastic shroud, two wires for mounting to circuit		Resistance increases in the dark and decreases in the light, no polarity	Street lights, solar garden lights, security and child night lights, low-light meter for sporting events
Thermistor 	Small coloured disc, two wires for mounting to circuit		Resistance changes with a change in temperature, no polarity	Thermostats on central heating systems, fridges and freezers, digital thermometers
Pressure switch 	Come in all different shapes, sizes and colours.		Detects pressure from being pressed, can perform on/off tasks or detect gradual pressure being applied	Burglar alarm systems, video game floor mats, sensing fluid pressure in pipes

Image from AQA

3. Output Components

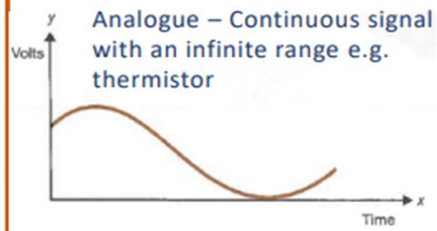
Name and symbol	Appearance	Image	Characteristics	Uses
Light emitting diode (LED) 	Available in a variety of sizes, shapes and colours, most commonly 5mm round		Produces light, connected by an anode (+ve) and cathode (-ve), has polarity. Low voltage, low power consumption, long-lasting, can be hard to change if broken	Low power lighting, torches, TV screens, power indicators
Lamp 	Available in a variety of sizes, shapes, colours and levels of power (wattage) or brightness (lux)		Produces light, can be brighter than LEDs, less economical due to the heat produced. Not long-lasting but easy to change	Household lamps, car headlamps, street lights, floodlights and security lights
Buzzer 	Small compact units in plastic casing, available in a variety of sizes and sounds		Mid- to high-pitched buzz created by fast oscillating electromagnetic parts, has polarity	Alarm systems, door entry systems, children's toys, electronics games
Speaker 	Speaker cone shaped into magnetic coil at base, available in a wide variety of sizes		Full range of sound available, variety of power ratings (wattage), variety of frequency responses (treble to bass)	Headphones, music systems, intercoms, radios

GCSE Design & Technology
Microcontrollers

1. Processes

Components that process electronic signals and enable output devices to perform tasks. This is controlled by an integrated circuit (IC) e.g. A microcontroller

2. Digital and Analogue Signals



Analogue – Continuous signal with an infinite range e.g. thermistor

Digital – Either on or off – 0 is off 1 is on

Image from AQA

3. Counters

Counters – Keep count of how many times something occurs, output information to a **seven segment display.**

4. Programming

Micro controllers also called Peripheral interface controllers (PICs) can be programmed to perform differently by a computer.

Timers

Devices used to perform specific tasks. 2 types monostable and astable.

Monostable – output turned on for a set period of time e.g. Automatic doors

Start:

Decision: Has the motion sensor (PIR) connected to the input been activate

If NO, continue to wait for the PIR to be triggered by movement.

If YES, continue with the program.

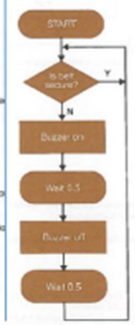
Output: The motor turns on and opens the doors.

Process: Delay for 5 seconds; the motor is on long enough to open the doo and let people through.

Output: The motor turns on again in reverse and the doors automatically clo

The circuit loops back to the top awaiting the next trigger of the PIR.

Astable – fluctuates between on and off – oscillating output e.g. Seatbelt alarm in a car



Start:

Decision: Has the seatbelt been fixed into the seatbelt clip?

If YES, loop back to the start of the program.

If NO, continue with the program sequence.

Output: The buzzer turns on.

Process: Delay for 0.5 seconds; the buzzer stays on during this time.

Output: The buzzer turns off.

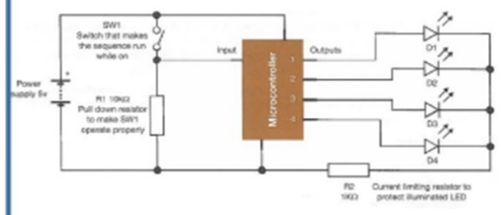
Process: Delay for 0.5 seconds; the buzzer stays off during this time.

The circuit loops back to the top to check if the driver still has seatbelt unfastened.

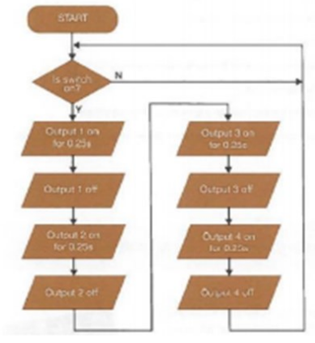
Image from AQA

5. Programming 2

Microcontrollers – How a microcontroller would control a bike light.



Program for the microcontroller to make LED's flash in sequence



Start:

Decision: Has the lighting sequence start switch connected to the input been activated?

If NO, continue to wait for the switch to be triggered by the user.

If YES, continue.

Output and process: The first LED connected to output 1 turns on for 0.25 seconds.
Output: The first LED connected to output 1 turns off.

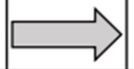
These steps repeat for LEDs 2, 3 and 4.

The circuit loops back to the top to check if the switch has been activated.

GCSE Design & Technology
Mechanical Devises

1: Mechanical Devices - Motion

There are four types of motion:

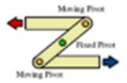
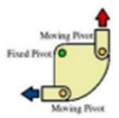
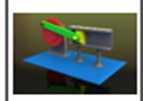
Linear Motion is movement in one direction along a straight line.		
Oscillating Motion This motion is similar to reciprocating motion, but the constant movement is from side to side along a curved path.		
Rotary Motion Examples of circular motion include a ball tied to a rope and being swung round in a circle		
Reciprocating Motion, this is repetitive up-and-down or back-and-forth linear motion		

2: Mechanical Devices – Levers

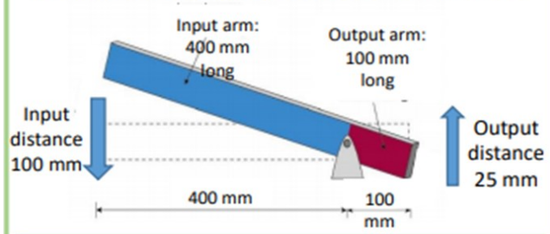
There are three classes of levers.

Class One A class one lever has its input on one side of the fulcrum and its output on the other.		
Class Two A class two lever has its input at one end of the lever, its output in the middle and fulcrum at the other end.		
Class Three A class three lever has its output at one end of the lever, its fulcrum at the other with its input in the middle.		

3: Mechanical Devices – Linkages

Reverse motion linkage	The reverse motion linkage changes the direction of the input motion so that the output travels in the opposite direction. If the input is pulled the output pushes and vice versa. It uses a central bar held in position with a fixed pivot (fulcrum) that forces the change in direction and two moving pivots which are connected to the input and output bars.	
Parallel motion or push/ pull linkage	The push/pull linkage maintains the direction of the input motion so that the output travels in the same direction. If the input is pulled the output is pulled and so on. It uses three linking bars, four moving pivots and two fixed pivots.	
Bell crank linkage	The bell crank linkage changes the direction of the input motion through 90 degrees. It can be used to change horizontal motion into vertical motion or vice versa. It uses a fixed pivot and two moving pivots.	
Crank and slider	The crank and slider linkage changes rotary motion into reciprocating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots to push and pull a slider along a set path.	
Treadle linkage	The treadle linkage changes rotary motion into oscillating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots and a further fixed pivot to create a windscreen wiper motion.	

4: How to work out a levers distance of travel



Output ÷ Input x Input distance = Output distance

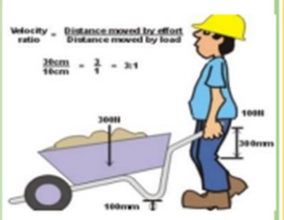
100 ÷ 400 x 100 = 25 mm

5: How to work out the Mechanical Advantage

Or use the following formula:

MA = Load / Effort = 300N / 100N = 3 / 1

This is written as 3:1 or just MA of 3



Verb Endings

1. Find the infinitive
2. Remove AR/ ER / IR
3 Add endings to stem

I speak: hablar -> habl -> hablo

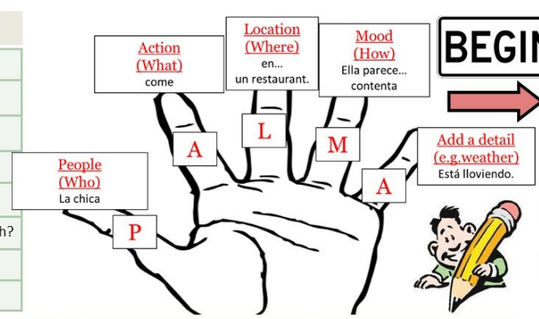
Presente		AR	ER	IR
yo	I	o	o	o
tú	you (s)	as	es	es
el/ella	he /she / it	a	e	e
nosotros	we	amos	emos	imos
vosotros	you (pl)	áis	éis	is
ellos / ellas	they	an	en	en

Pretérito		AR	ER / IR
yo	I	é	í
tú	you (s)	aste	iste
el/ella	he /she / it	ó	ió
nosotros	we	amos	imos
vosotros	you (pl)	asteis	isteis
ellos / ellas	they	aron	ieron

Imperfect		AR	ER / IR
yo	I	aba	ía
tú	you (s)	abas	ías
el/ella	he /she / it	aba	ía
nosotros	we	ábamos	íamos
vosotros	you (pl)	abais	íais
ellos / ellas	they	aban	ían

¿¿¿ PREGUNTAS ???

¿Qué?	What?
¿Cuándo?	When?
¿Cuál(es)?	Which?
¿Quién(es)?	Who?
¿Dónde?	Where?
¿Cuánto(s)?	How many / much?
¿Por qué?	Why?
¿Cómo?	How?



PRESENT		PAST		FUTURE	
normalmente	normally	ayer	yesterday	mañana	tomorrow
en general	in general	anteayer	the day before yesterday	en dos días	in 2 days
siempre	always	el lunes pasado	last Monday	el martes próximo	next Tuesday
todo el tiempo	all the time	el fin de semana pasada	last weekend	la semana que viene	next week
a menudo	often	el mes pasado	last month	el año que viene	next year
a veces	sometimes	el año pasado	last year	en el futuro	in the future
de vez en cuando	from time to time				
nunca	never				

a mi ver	In my opinion
desde mi punto de vista	From my point of view
diría que	I would say
creo que	I believe that
pienso que	I think that
para mí	For me
opino que	I think that

I like	I don't like
me encanta	odio
me gusta	no me gusta
me chifla	no aguanto
me flipa	detest

"because"

P	porque
P	puesto que
Y	ya que
D	dado que
C	como

es / it is — era / it was — será / it will be

Quantifiers

muy	very
bastante	quite
un poco	a bit
mucho	a lot
raramente	rarely
demasiado/a (s)	too much
casi	almost

Connectives

y	and
pero	but
o	or
donde	where
también	also
por ejemplo	for example
(des) afortunadamente	(un) fortunately
por otro lado	on the other hand
especialmente	especially
sin embargo / no obstante	however
al principio / primeramente/ primero	firstly
entonces	then
después	after
finalmente	finally
mientras	while

SER

D escription
O ccupation
C haracteristics
T ime
O rigin
R elationship

yo	soy
tú	eres
el/ella	es
nosotros	somos
vosotros	sois
ellos/ellas	son

ESTAR

P osition
L ocation
A ction
C ondition
E motion

yo	estoy
tú	estás
el /ella	está
nosotros	estamos
vosotros	estáis
ellos/ellas	están

Future

It hasn't happened yet...so keep the full infinitive - AR / ER / IR

yo	é
tú	ás
el /ella	á
nosotros	emos
vosotros	éis
ellos / ellas	án

¿Cuantos años tienes?

TENER + NUMBER + AÑOS

NOT SER — NOT ESTAR

Imperfect Was-ing, were-ing and used to doing

Preterite Used for completed action, with a beginning and an end

Yes, you can!

¡Sí, se puede!

Page 18

Positivo

- bondadoso/a • caring
- educado/a • polite
- gracioso/a • funny
- listo/a • clever
- extrovertido/a • outgoing

Negativo

- aburrido/a • boring
- vago/a • lazy
- travieso/a • mischievous
- quisquilloso/a • fussy
- egoísta • selfish

Page 44

KS4: AO1 – CONTEXTUAL UNDERSTANDING: developing ideas.

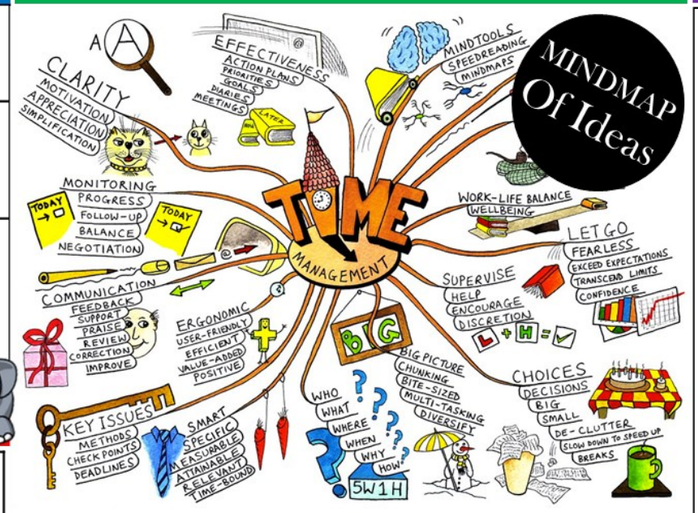
Key Vocabulary…

MIND MAPPING	A graphical way to represent ideas around your theme. Use of keywords and branches to show breadth of initial ideas.
VISUAL MOODBOARD	A collection of imagery and collaged ideas to present a visual understanding of your theme. Keep to a style of scheme of colour.
ARTIST RESEARCH	Show your understanding of contemporary and historical artists and artistic movements by analysing their work. To draw in their style and discuss your intention.

Always remember…

DON'T LIMIT YOURSELF	Even if it doesn't link to your starting point, it may relate to your theme. Add annotations and sketches to show/explain your thought process.
PRIMARY SOURCES	When researching a theme, collect images, photos, samples, magazine cuttings etc. Make sure all images are relevant.
PRESENTATION	Pull your boards together by being consistent. Stick to a particular style and/or colour scheme. Use DAFONT for titles if unsure.

Picture This…



Deeper Learning…

ANALYSING ARTWORK: -

CONTENT:

- What is the work about?
- Is the work realistic/abstract?
- Has it been exaggerated?
- Are there recurring features?
- What is the theme of the work?
- What message is communicated?

FORM:

- What colour does the artist use?
- What shapes does the artist use?
- What mark-making techniques?
- How big is the work – why?
- Does the artist have a style?

PROCESS:

- How has the work been made?
- What media/material has the artist used?

MOOD:

- How does the work make you feel?
- Does the colour, texture, form or composition effect your mood?
- Does the work reminisce about a dream in any way?

The Big Question…

NEXT STEPS:

- What is your intention?
- How will you use this style?
- What features will you try to replicate?
- How are you going to use this knowledge to further develop your work?
- How are you going to develop your own
- imagery in response to the artist and/or movement?

Activity: Take (10-15) of your own images linked to your theme (primary research) from observation. You will then draw from these images and develop further by exploring different media in the style of your chosen artist and/or movement.

KS4: AO2 – REFINE: Refine work by experimenting with ideas.

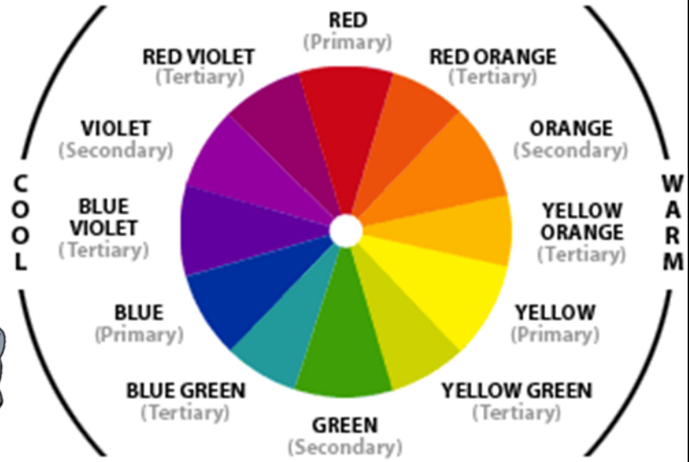
Key Vocabulary…

MEDIA	The substance an artist uses to create art e.g. collage, coloured pencils, paint etc.
MATERIALS	The same idea as media but can also refer to what the work is created on e.g. canvas, paper or clay.
TECHNQUES	The method used to complete the artwork, can be generic such as painting or more focussed such as blending.
PROCESSES	The method used to create artwork that usually follows a range of steps rather than just one skill.

Always remember…

COLOURED PENCILS	• Apply using a soft circular motion • Start with the lightest colours and build up • Avoid applying a thick line of tone
WATERCOLOUR	• Mix your own variations of paint instead of straight from palette • Avoid too much water as paper will bobble
ACRYLIC PAINT	• Mix your own paint instead of out of tub • Add colour to white to lighten rather than white to colour.
COLLAGE	• Rip or cut (not both) • Overlap to avoid gaps • Use a variety of tones
OIL PASTELS	• Start with lightest first • Press on heavy for strong coverage • Blend by overlapping

Picture This…



Complementary

Deeper Learning…

COLOUR THEORY

PRIMARY = RED, YELLOW, BLUE

SECONDARY = ORANGE, GREEN, PURPLE

TERIARY = SECONDARY + PRIMARY
SHADE = ADD BLACK

TINT = ADD WHITE

HARMONIOUS = COLOURS NEXT TO EACH OTHER ON COLOUR WHEEL

COMPLEMENTARY = OPPOSITE ON COLOUR WHEEL

MONOCHROMATIC = ONE COLOUR AND VALUES (LIGHT TO DARK)

HUE = PIGMENT OF ONE COLOUR

WARM = RED, ORNAGE, YELLOW

COOL = BLUE GREEN, PURPLE

The Big Question…

NEXT STEPS:

Have you chosen an image by refining and selecting through your images/drawings?

Have you developed this image further by using a variety of media, materials, techniques and processes?

Have you pushed this further by applying another method?

Activity: Take your favourite drawings and photocopy original before altering. Link to artist style and use a variety of techniques and processes to push further. Change scale and material to add depth to your artwork.

KS4: AO3 – RECORD: observations and insights into intention.

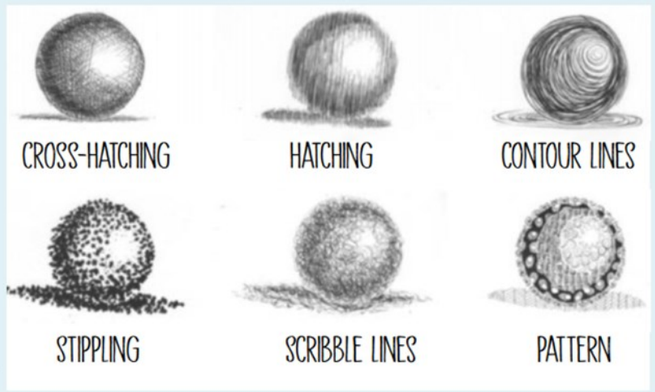
Key Vocabulary…

OBSERVATIONAL DRAWING	Drawing from looking at an image or object.
PRIMARY OBSERVATION	Drawing from an object that is directly in front of you.
SECONDARY OBSERVATION	Drawing from an image.
PHOTOGRAPHS	Using a camera to record images – this is classed as primary observation.
SKETCHES	Basic sketches and doodles can act as a starting point to aid in developing an idea.

Always remember…

CROSS-HATCHING	Cross-hatching uses fine parallel lines drawn closely together to create the illusion of shade or texture in a drawing. It is the drawing of two layers of hatching at right-angles to create a mesh-like pattern.
HATCHING	For pencil or pen-and-ink drawing. Hatching is one of the quickest ways to fill in the dark areas. By drawing a lot of fine lines that are parallel, the area as a whole is perceived as being darker.
STIPPLING	The art or process of drawing, painting, or engraving using numerous small dots or specks.

Picture This…



STAGES OF DRAWING

BASIC SHAPES > ACCURATE SHAPES > DETAIL > TONE

Deeper Learning…

ANNOTATION: -

STEP 1: DESCRIBE

- What is this an image of?
- What have you done?
- What was the purpose of the piece?

STEP 2: EXPLAIN

- How was the work made?
- How did you produce the effect?
- How did you decide on composition?

STEP 3: REFLECT

- Why did you use this specific method?
- Why are some areas better than others?
- What might you do differently next time?
- Why might you do it differently?
- How will your develop in response?

The Big Question…

NEXT STEPS: -

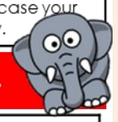
- **Produce a range of tones by varying the pressure and layering**
- **Consider using softer pencils for darker shades**
- **Apply tone using a soft circular motion to create a smooth coverage. Filling all the white gaps and avoid shading in different directions**
- **Add detail/interest by applying tone using mark-making techniques**
- **Mark-making can be produced by making your own tools/paintbrushes**

Activity: Try to annotate or evaluate whenever you have an idea or a change in direction. Write about a technique that was successful or if something didn't go as planned.

KS4: AO4 – PERSONAL: creating a meaningful response.

Key Vocabulary…

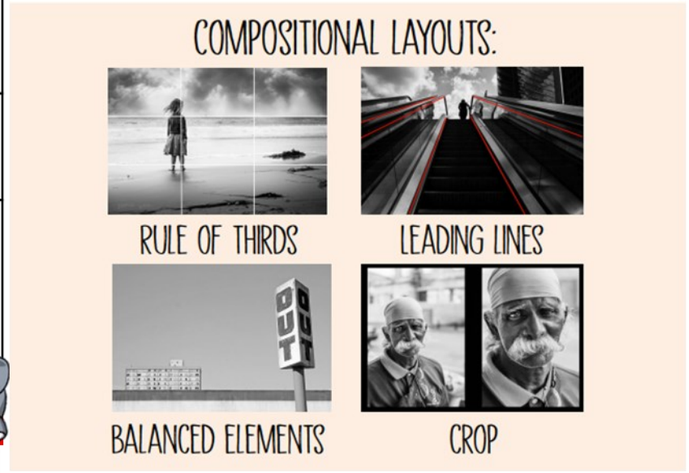
ROUGH IDEA	Basic sketches of a final idea. Label to ensure clarity.
VISUAL OR MAQUETTE	An image or model created from selected materials (usually smaller in scale than intended.
FINAL PIECE	An image or sculpture that is the end product of your project/journey. Visual representation of pulling all prep work together to showcase your ideas and journey.



Always remember…

RULE OF THIRDS	The rule of thirds is a guideline which applies to the process of composing visual images. The horizon sits at the horizontal line dividing the lower third of the photo from the upper two-thirds.
LEADING LINES	Leading lines refers to a composition technique whereby the viewer's eye is attracted to lines that lead directly to the principle subject in the image.
BALANCED ELEMENTS	When different parts of a photo command your attention equally, perfect balance is achieved.
CROP	Cropping is the removal of unwanted outer areas from a photograph or illustrated image.

Picture This…



Deeper Learning…

FORMAL ELEMENTS OF ART: -

COLOUR: Primary colours cannot be mixed by using any other colours but in theory, all other colours are made from them.

Red + Yellow = Orange
Blue + Yellow = Green
Red + Blue = Purple

Orange, Green and Purple are secondary colours. All other colours (primary + secondary = tertiary).

Colour schemes could be adhered to fit with theme.

SHAPE: An area closed by line. Geometric or basic.

FORM: Form is a 3D shape which can be sculpted using clay, wire or Modroc.

In 2D art, tone and perspective can be used to create an illusion of 3-dimensions using light and dark to create shadows.

TEXTURE: Surface quality. The way it feels physically or the way it is made to feel.

TONE: Light to dark to create depth. This could be a shade or how dark or light a colour appears. Tones are created by the way the light falls onto a 3D object.

PATTERN: Created by repeating lines, shapes, tones or colour. The design used to create a pattern is often referred to as a motif. Motifs can be simple shapes or complex arrangements.

Patterns can be man-made, like a fabric or wallpaper design, or natural, such as the markings on animal fur.

LINE: Line can be used to portray different qualities such as: contours, feelings or expressions and movements.

Activity: Create a draft copy of your final design ideas. Make sure to label and photocopy sections if using a combination of a number of pieces.

KNOWLEDGE ORGANISER AUTUMN TERM 1 yr10

Fruit & Vegetables

Choosing fruit and vegetables

- Crisp and firm
- Blemish and bruise free
- Excellent colour
- Use as soon as possible
- Store in a cool, dark place

Processed Fruit and Vegetables

Processed fruit and veg are brilliant for convenience and for when they are out of season

- Pre-prepared—peeled, chopped
- Tinned
- Frozen
- Dried
- Juiced

Preparing fruit and vegetables

- Wash before use to remove dirt or insects
- Try not to peel, or peel thinly to preserve the nutritional content
- Do not soak in water
- Do not prepare ahead, prepare as close to use as possible

Cooking vegetables

Vegetables can be cooked in various ways however the drier methods and the ones with little contact with water are best for preserving the nutritional content.

We cook vegetables for the following reasons:

- To improve colour and taste
- To ensure they are edible (potatoes)

Potatoes

- Potatoes are a very versatile and therefore popular. They have many uses.
- Roasting—Maris Pipers
- Mashing– Desiree
- Frying—Maris Piper
- Boiling– Maris Piper
- Salad– Jersey royals

Variety of Fruit	Examples
Citrus	Lemon, Lime
Nut	Brazil nut, cashews
Tree	Apple, Pear
Berry	Raspberry, strawberry
Tropical	Mango, watermelon
Stone	Apricot, cherries

Herbs and spices

Herbs and spices are used to add flavour and interest to dishes. Commonly used in multicultural dishes.

Herbs—are the leaves, stems and roots of plants

Spices—are the dried flowers, seeds and leaves of aromatic plants

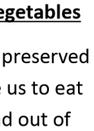
HERBS	SPICES
Coriander	Cardamom
Mint	Cinnamon
Basil	Coriander seed
Tarragon	Cumin
Rosemary	Chilli powder
Thyme	Nutmeg

Variety of Vegetable	Examples
Bulb	Onion, Garlic
Stem	Asparagus, Celery
Root	Beetroot, Carrot
Tuber	Potato, Sweet Potato
Seed	Peas, Sweetcorn
Fungi	Mushrooms
Flower	Cauliflower, Sprouts
Vegetable Fruit	Peppers, Tomatoes
Leaf	Spinach, Cabbage

Preserving fruit and vegetables

Fruit & Veg have been preserved for centuries to enable us to eat them all year round and out of season. Methods include:

- Jamming
- Pickling
- Freezing
- Drying
- Juicing



Nutrition	Function	Source
Carbohydrate	Energy	All fruit & Veg
Vitamin A	Healthy eyes	Carrots, Spinach
B Vitamins	Energy release	Green Veg
Vitamin C	Fighting infection	Citrus fruit
Vitamin E	Healthy skin	Green veg
Vitamin K	Wound healing	Green veg
Calcium	Healthy bones	Spinach
Iron	Healthy red blood cells	Green veg
Fibre	Healthy digestive system	All fruit & Veg

5-a-day

- We should eat 5 or more different fruits and vegetables each day
- Fresh, frozen, juiced and tinned all count
- Choose tinned fruits in juice or water not syrup
- Only 1 glass of juice counts as a portion
- Portion examples:
  - 2 satsumas
  - Handful of grapes
  - 1/2 tin beans
  - 1 apple
  - 7 strawberries
  - 3 tablespoons of peas

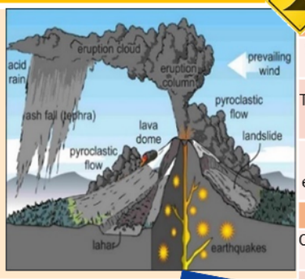
Geography- Year 10 Knowledge Organiser – Tectonic Hazards

The structure of the Earth

The Crust	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.
The Mantle	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.
The Inner and outer Core	Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.

Volcanic Hazards

Ash cloud	Small pieces of pulverised rock and glass which are thrown into the atmosphere.
Gas	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.
Lahar	A volcanic mudflow which usually runs down a valley side on the volcano.
Pyroclastic flow	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.
Volcanic bomb	A thick (viscous) lava fragment that is ejected from the volcano.



Managing Volcanic Eruptions

Warning signs	Monitoring techniques
Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
When a volcano is close to erupting it starts to release gases.	Gas samples may be taken and chemical sensors used to measure sulphur levels.

Preparation	
Creating an exclusion zone around the volcano.	Being ready and able to evacuate residents.
Having an emergency supply of basic provisions, such as food	Trained emergency services and a good communication system.

Convection Currents

The crust is divided into tectonic plates which are moving due to convection currents in the mantle.

1. Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2. When lower parts of the mantle molten rock (Magma) heat up they become **less dense** and **slowly rise**.
3. As they move towards the top they cool down, become **more dense** and **slowly sink**.
4. These **circular movements** of semi-molten rock are **convection currents**
5. Convection currents create **drag** on the base of the tectonic plates and this causes them to move.

LIC -CS: Haiti Earthquake 2010

Causes
On a conservative plate margin, involving the Caribbean & North American plates.
The magnitude 7.0 earthquake was only 15 miles from the capital Port au Prince.
With a very shallow focus of 13km deep.

Effects
230,000 people died and 3 million affected. Many emotionally affected.
250,000 homes collapsed or were damaged. Millions homeless.
Rubble blocked roads and shut down ports.

Management
Individuals tried to recover people.
Many countries responded with appeals or rescue teams.
Heavily relied on international aid, e.g. $330 million from the EU.
98% of rubble remained after 6 months.

Earthquake Management

PREDICTING

Methods include:
- Satellite surveying (tracks changes in the earth's surface)
- Laser reflector (surveys movement across fault lines)
- Radon gas sensor (radon gas is released when plates move so this finds that)
- Seismometer
- Water table level (water levels fluctuate before an earthquake).
- Scientists also use seismic records to predict when the next event will occur.

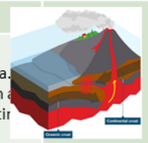
PROTECTION

You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:
- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

Types of Plate Margins

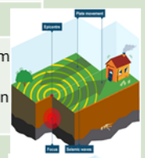
Destructive Plate Margin

When the denser plate subducts beneath the other, friction causes it to melt and become molten magma. The magma forces its ways up to the surface to form a volcano. This margin is also responsible for devastating earthquakes.



Constructive Plate Margin

Here two plates are moving apart causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the Mid Atlantic Ridge.



Conservative Plate Margin

A conservative plate boundary occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.

Tectonic Hazards

AQA

The Challenges of Natural Hazards

What is a Natural Hazard

A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.

Geological Hazard	Meteorological Hazard
These are hazards caused by land and tectonic processes.	These are hazards caused by weather and climate.

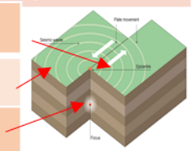
Causes of Earthquakes

Earthquakes are caused when two plates become **locked** causing **friction** to build up. From this **stress**, the **pressure** will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of **seismic waves**, to travel from the **focus** towards the **epicentre**. As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the EPICENTRE.

SEISMIC WAVES (energy waves) travel out from the focus.

The point at which pressure is released is called the FOCUS.



Project

Research a recent Volcanic eruption and produce a fact file about it. Make sure you include information on location, date, time, length of eruption & type of volcano. **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Effects
Detail all the effects of the eruption. Make sure you include both short/long & primary/secondary impacts, whether effects would have been as bad if country was a HIC/LIC and did any effects impact other countries?

Management
What methods of prediction and warnings were in place? How effective were they and could these be improved? Was there any management needed outside of the country the eruption took place in?

Geography 10 Knowledge Organiser – Climatic Hazards

Global pattern of air circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

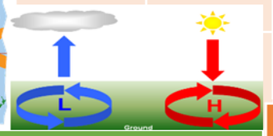
Hadley cell	Largest cell which extends from the Equator to between 30° to 40° north & south.
Ferrell cell	Middle cell where air flows poleward between 60° & 70° latitude.
Polar cell	Smallest & weakness cell that occurs from the poles to the Ferrell cell.

Distribution of Tropical Storms.

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.

High and Low Pressure

Low Pressure	High Pressure
Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.



Formation of Tropical Storms

1	The sun's rays heats large areas of ocean in the summer and autumn. This causes warm, moist air to rise over the particular spots
2	Once the temperature is 27°, the rising warm moist air leads to a low pressure. This eventually turns into a thunderstorm. This causes air to be sucked in from the trade winds.
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to spin.
4	When the storm begins to spin faster than 74mph, a tropical storm (such as a hurricane) is officially born.
5	With the tropical storm growing in power, more cool air sinks in the centre of the storm, creating calm, clear condition called the eye of the storm.
6	When the tropical storm hits land, it loses its energy source (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

Management of Tropical Storms

Protection
Preparing for a tropical storm may involve construction projects that will improve protection.

Aid
Aid involves assisting after the storm, commonly in LIDs.

Development
The scale of the impacts depends on the whether the country has the resources cope with the storm.

Planning
Involves getting people and the emergency services ready to deal with the impacts.

Prediction
Constant monitoring can help to give advanced warning of a tropical storm

Education
Teaching people about what to do in a tropical storm.

Climatic Hazards

AQA

The Challenges of Natural Hazards

Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings** and **communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.

Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- **Shortage of clean water** and **lack of proper sanitation** makes it easier for diseases to spread.
- **Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**.

Case Study Project

Research a recent Tropical Storm and produce a case study about it. Make sure you include information on location, date, path, strength, formation. DO NOT DO Typhoon Haiyan. **You can do this digitally or on paper but submit this as a printed piece of work. Also include:**.

Effects
- Almost 6,500 deaths.
- 130,000 homes destroyed.
- Water and sewage systems destroyed had caused diseases.
- Emotional grief for dead.

Management
- The UN raised £190m in aid.
- USA & UK sent helicopter carrier ships deliver aid remote areas.
- Education on typhoon preparedness.

Case Study: UK Heat Wave 2003

Causes
The heat wave was caused by an anticyclone (areas of high pressure) that stayed in the area for most of August. This blocked any low pressure systems that normally brings cooler and rainier conditions.

Effect
- People suffered from heat strokes and dehydration.
- 2000 people died from causes linked to heatwave.
- Rail network disrupted and crop yields were low.

Management
- The NHS and media gave guidance to the public.
- Limitations placed on water use (hose pipe ban).
- Speed limits imposed on trains and government created 'heatwave plan'.

What is Climate Change?

Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.

Recent Evidence for climate change.

Global temperature	Average global temperatures have increased by more than 0.6°C since 1950.
Ice sheets & glaciers	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by 10% in 30 years.
Sea Level Change	Average global sea level has risen by 10-20cms in the past 100 years. This is due to the additional water from ice and thermal expansion.

Enhanced Greenhouse Effect

Recently there has been an increase in **humans burning fossil fuels** for energy. These fuels (gas, coal and oil) emit **greenhouse gases**. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing **less to be reflected**. As a result, the Earth is becoming warmer.

Evidence of natural change

Orbital Changes	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
Sun Spots	Dark spots on the Sun are called Sun spots. They increase the amount of energy Earth receives from the Sun.
Volcanic Eruptions	Volcanoes release large amounts of dust containing gases. These can block sunlight and results in cooler temperatures.

Managing Climate Change

Carbon Capture
This involves new technology designed to reduce climate change.

Planting Trees
Planting trees increase the amount of carbon is absorbed from atmosphere.

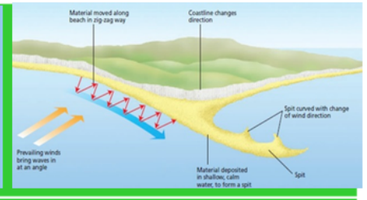
International Agreements
Countries aim to cut emissions by signing international deals and by setting targets.

Renewable Energy
Replacing fossil fuels based energy with clean/natural sources of energy.

Geography 10 Knowledge Organiser – Coasts

Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.



1) Swash moves up the beach at the angle of the prevailing wind.
2) Backwash moves down the beach at 90° to coastline, due to gravity.
3) Zigzag movement (Longshore Drift) transports material along beach.
4) Deposition causes beach to extend, until reaching a river estuary.
5) Change in prevailing wind direction forms a hook.
6) Sheltered area behind spit encourages deposition, salt marsh forms.

How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

1	Waves start out at sea.
2	As waves approaches the shore, friction slows the base.
3	This causes the orbit to become elliptical.
4	Until the top of the wave breaks over.

Types of Erosion

The break down and transport of rocks – smooth, round and sorted.

Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

Types of Weathering

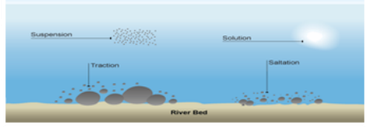
Weathering is the breakdown of rocks where they are.

Carbonation	Breakdown of rock by changing its chemical composition.
Mechanical	Breakdown of rock without changing its chemical composition.

Types of Transportation

A natural process by which eroded material is carried/transported.

Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.



What is Deposition?

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition.

Mass Movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

1	Rain saturates the permeable rock above the impermeable rock making it heavy.
2	Waves or a river will erode the base of the slope making it unstable.
3	Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
4	The debris at the base of the cliff is then removed and transported by waves or river.

AQA

Physical Landscapes in the UK

Formation of Bays and Headlands

1) Waves attack the coastline.
2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Project

Research a section of UK coastline that is under threat . Examine how the coast is being threatened, the underlying geology and what short and long term impacts will affect it. **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Background
How has this area of coast been formed? What is threatened and how will it impact the local community? What measures have already been put in place? Are they effective?

Management
What solutions are being used to help solve these problems? What solutions could they use? Is the cost of these solutions worth the benefit? Why?

Mechanical Weathering Example: Freeze-thaw weathering

Stage One
Water seeps into cracks and fractures in the rock.

Stage Two
When the water freezes, it expands about 9%. This wedges apart the rock.

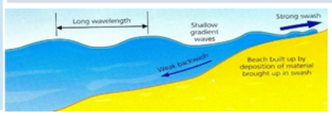
Stage Three
With repeated freeze-thaw cycles, the rock breaks off.

Size of waves

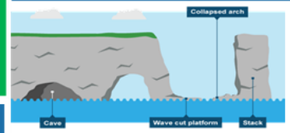
- Fetch how far the wave has travelled
- Strength of the wind.
- How long the wind has been blowing for.

Types of Waves

Constructive Waves	Destructive Waves
This wave has a **swash that is stronger** than the backwash. This therefore builds up the coast.	This wave has a **backwash that is stronger** than the swash. This therefore erodes the coast.



Formation of Coastal Stack



Example: Old Harry Rocks, Dorset

1) Hydraulic action widens cracks in the cliff face over time.
2) Abrasion forms a wave cut notch between HT and LT.
3) Further abrasion widens the wave cut notch to from a cave.
4) Caves from both sides of the headland break through to form an arch.
5) Weather above/erosion below –arch collapses leaving stack.
6) Further weathering and erosion eaves a stump.

Geography 10 Knowledge Organiser – Rivers & Coasts

Coastal Defences

Hard Engineering Defences

Groynes	Wood barriers prevent longshore drift, so the beach can build up.	✓ ✗	Beach still accessible. No deposition further down coast = erodes faster.
Sea Walls	Concrete walls break up the energy of the wave . Has a lip to stop waves going over.	✓ ✓ ✗	Long life span Protects from flooding Curved shape encourages erosion of beach deposits.
Gabions or Rip Rap	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	✓ ✓ ✗	Cheap Local material can be used to look less strange. Will need replacing.

Soft Engineering Defences

Beach Nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	✓ ✓ ✗ ✗	Cheap Beach for tourists. Storms = need replacing. Offshore dredging damages seabed.
Managed Retreat	Low value areas of the coast are left to flood & erode.	✓ ✓ ✗	Reduce flood risk Creates wildlife habitats. Compensation for land.

Project

Research a UK River. You need to include locational detail, geomorphic processes and how the river is managed at specific points to benefit people **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Background
The features of the Upper, Middle and Lower courses of the river. History of flooding along the river and problems this has caused.

Management
What solutions are being used to help solve these problems? What solutions could they use? Is the cost of these solutions worth the benefit? Why?

Water Cycle Key Terms

Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevent water reaching the ground.
Surface Runoff	Water flowing over surface of the land into rivers
Infiltration	Water absorbed into the soil from the ground.
Transpiration	Water lost through leaves of plants.

Physical and Human Causes of Flooding.

Physical: **Prolong & heavy rainfall**
Long periods of rain causes soil to become saturated leading runoff.

Physical: **Geology**
Impermeable rocks causes surface runoff to increase river discharge.

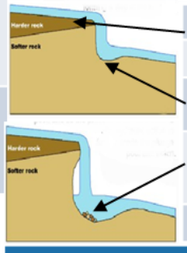
Physical: **Relief**
Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.

Human: **Land Use**
Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

Upper Course of a River

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Formation of a Waterfall



1) River flows over alternative types of rocks.

2) River erodes soft rock faster creating a step.

3) Further hydraulic action and abrasion form a plunge pool beneath.

4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.

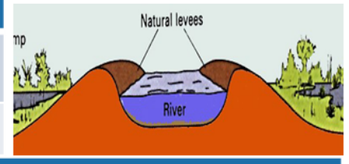
5) Waterfall retreats leaving steep sided gorge.

Lower Course of a River

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

Formation of Floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.



✓ Nutrient rich soil makes it ideal for farming.
✓ Flat land for building houses.

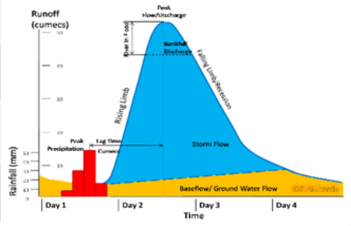
River Management Schemes

Soft Engineering	Hard Engineering
Afforestation – plant trees to soak up rainwater, reduces flood risk. **Demountable Flood Barriers** put in place when warning raised. **Managed Flooding** – naturally let areas flood, protect settlements.	**Straightening Channel** – increases velocity to remove flood water. **Artificial Levees** – heightens river so flood water is contained. **Deepening or widening river** to increase capacity for a flood.

Hydrographs and River Discharge

River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.

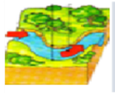


Middle Course of a River

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

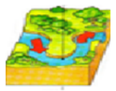
Formation of Ox-bow Lakes

Step 1



Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.

Step 2

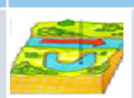


Further hydraulic action and abrasion of outer banks, neck gets smaller.

Step 3

Erosion breaks through neck, so river takes the fastest route, redirecting flow

Step 4

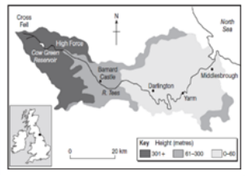


Evaporation and deposition cuts off main channel leaving an oxbow lake.

Case Study: The River Tees

Location and Background
Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.

Geomorphic Processes
Upper – Features include V-Shaped valley, rapids and waterfalls. High Force waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed.
Middle – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.



Management
-Towns such as Yarm and Middleborough are economically and socially important due to houses and jobs that are located there.
-Dams and reservoirs in the upper course, controls river's flow during high & low rainfall.
- Better flood warning systems, more flood zoning and river dredging reduces flooding.

Geography Yr10 KO – Urban issue & Challenges

Urban Issues & Challenges

What is Urbanisation?

This is an increase in the amount of people living in urban areas such as towns or cities. In 2007, the UN announced that for the first time, more than 50 % of the world's population live in urban areas.

Where is Urbanisation happening?

Urbanisation is happening all over the word but in LICs and NEEs rates are much faster than HICs. This is mostly because of the rapid economic growth they are experiencing.

Causes of Urbanisation

Rural - urban migration (1) — **The movement of people from rural to urban areas.**

Push	Pull
• Natural disasters • War and Conflict • Mechanisation • Drought • Lack of employment	• More Jobs • Better education & healthcare • Increased quality of life. • Following family members.

Natural Increase (2) — **When the birth rate exceeds the death rate.**

Increase in birth rate (BR)	Lower death rate (DR)
• High percentage of population are child-bearing age which leads to high fertility rate. • Lack of contraception or education about family planning.	• Higher life expectancy due to better living conditions and diet. • Improved medical facilities helps lower infant mortality rate.

Project

Research a Megacity. It can be anywhere in the world, HIC/LIC/NEE. You must look at how it has grown to be this size and what growth is predicted for the future and **You can do this digitally or on paper but you must submit this as a printed piece of work. Also include:**

Problems
Detail problems that exist within the city. Make sure you include both short/long impacts, one specific to this city, ones common with megacities

Management
What solutions are being used to help solve these problems? What solutions could they use?

Sustainable Urban Living

Sustainable urban living means being able to live in cities in ways that do not pollute the environment and using resources in ways that ensure future generations also can use then.

Water Conservation

This is about reducing the amount of water used.
- Collecting rainwater for gardens and flushing toilets.
- Installing water meters and toilets that flush less water.
- Educating people on using less water.

Energy Conservation

Using less fossil fuels can reduce the rate of climate change.
- Promoting renewable energy sources.
- Making homes more energy efficient.
- Encouraging people to use energy.

Creating Green Space

Creating green spaces in urban areas can improve places for people who want to live there.
- Provide natural cooler areas for people to relax in.
- Encourages people to exercise.
- Reduces the risk of flooding from surface runoff.

Waste Recycling

More recycling means fewer resources are used. Less waste reduces the amount that eventually goes to landfill.
- Collection of household waste.
- More local recycling facilities.
- Greater awareness of the benefits in recycling.

Sustainable Urban Living Example: Freiburg

Background & Location	Sustainable Strategies
Freiburg is in west Germany. The city has a population of about 220,000. In 1970 it set the goal of focusing on social, economic and environmental sustainability.	• The city's waste water allows for rainwater to be retained. • The use of sustainable energy such as solar and wind is becoming more important. • 40% of the city is forested with many open spaces for recreation, clean air and reducing flood risk.

Traffic Management

Urban areas are busy places with many people travelling by different modes of transport. This has caused urban areas to experience different traffic congestion that can lead to various problems.

Environmental problems
- Traffic increases air pollution which releases greenhouse gases that is leading to climate change.

Economic problems
- Congestion can make people late for work and business deliveries take longer. This can cause companies to loose money.

Social Problems
- There is a greater risk of accidents and congestion is a cause of frustration. Traffic can also lead to health issues for pedestrians.

Congestion Solutions

- Widen roads to allow more traffic to flow easily.
- Build ring roads and bypasses to keep through traffic out of city centres.
- Introduce park and ride schemes to reduce car use.
- Encourage car-sharing schemes in work places.
- Have public transport, cycle lanes & cycle hire schemes.
- Having congestion charges discourages drivers from entering the busy city centres.

Traffic Management Example: Bristol

In 2012 Bristol was the most congested city in the UK. Now the city aims to develop it's integrated transport system to encourage more people to use the public transport. The city has also invested in cycle routes and hiring schemes.

Integrated Transport System

This is the linking of different forms of public and private transport within a city and the surrounding area.

Greenbelt Area

This is a zone of land surrounding a city where new building is strictly controlled to try to prevent cities growing too much and too fast.

Brownfield Site

Brownfield sites is an area of land or premises that has been previously used, but has subsequently become vacant, derelict or contaminated.

Urban Regeneration

The investment in the revival of old, urban areas by either improving what is there or clearing it away and rebuilding.

Key Vocabulary…

Kaiser	The German word for Emperor and the Head of State of Germany between 1871 and 1918.
Dictatorship	A system of government in which one person has absolute power to make all decisions.
Left-Wing	Political ideas which are focussed around lots of government intervention, especially in helping poorer people.
Right-Wing	Political ideas which are focussed less government intervention, and the right to freely trade to make money.
Reichstag	The elected parliament of Germany, containing representatives from across the country.
Chancellor	The leader of the German Government responsible for day-to-day running of the country.
Hyperinflation	Prices of goods rise so fast that money becomes worthless.
Democracy	The idea that a nation should choose its own leaders.

Timeline

German Unification	1871	Germany becomes one nations instead of many smaller states under the leadership of Prussia.
Wilhelm II becomes Kaiser	1888	The 29-year-old grandson of Queen Victoria, Wilhelm becomes the leader of Germany.
First Navy Law	1898	The Kaiser begins to spend huge amounts of money to build a large German Navy.
World War One	1914	Germany is in a state of total war against Britain, France and Russia.
Spartacist Uprising	1919	Extreme left-wing socialists attempt to overthrow the government.
The Treaty of Versailles	1919	The defeated Germany is forced to accept harsh terms for peace after losing WWI.
The Kapp Putsch	1920	A group of Freikarps led by Wolfgang Kapp attempt to overthrow the government.
France and Belgium invade the Ruhr	1923	France and Belgium try to make Germany pay reparations and this leads to hyperinflation.
The Munich Putsch	1923	Unhappy with the German Government, Adolf Hitler tries to overthrow it and fails.
Dawes Plan	1924	USA lends money to Germany.
Locarno Pact	1925	Germany makes a series of deals with the other Great Powers.
Germany joins the League of Nations	1926	Germany is finally allowed to join the League and become respected as a nation.

Important People

Kaiser Wilhelm II	Ruled Germany from 1888-1918 when he abdicated.
Friedrich Ebert	Leader of the German Socialist Party (SPD), the largest party in the German Reichstag.
Gustav Stresemann	Served as German Foreign Minister from 1924-9. Solved lots of problems including hyperinflation.
Adolf Hitler	Fought in WWI for Germany and then took control of the German Workers' Party and tried to take over Munich in 1923.

What changed over the period?

Germany began the period as monarchy, with the Kaiser in overall control he could chose not to listen to the Reichstag, who were the elected representatives of the people. The First World War exhausted German industry and the German people and the Kaiser's reign did not survive. He abdicated meaning that he gave up his power. Germany then experimented with true democracy but there were huge social and economic problems to overcome.

Always Remember…

- Germany was industrialising fast before WWI, this meant that she was very quickly building factories, producing goods and as a result many people moved from the countryside to the cities to find jobs.
- The First World War caused huge social and economic problems.
- There was a huge amount of political violence in the early 1920s, such as the Sparacist Uprising, the Kapp Putsch and the Munich Putsch.

Deeper Learning…

State what the Weimar Constitution was and its main rules.
Describe the Golden Age of the late 1920s.
Explain why hyperinflation happened in 1923 and how it was solved.
Analyse the threats to Weimar democracy in the early 1920s, which was most significant and why?
Project: Create a fact-file on Gustav Stresemann, his contribution to German society and his achievements.

Activity – 'The main effect WWI had on Germany was the economic effect on the German people.' How far do you agree with this statement?

Key Vocabulary…

Depression	A period of economic problems where there is a drop in industrial production and businesses struggle.
Dictatorship	A system of government in which one person has absolute power to make all decisions.
Left-Wing	Political ideas which are focussed around lots of government intervention, especially in helping poorer people.
Right-Wing	Political ideas which are focussed less government intervention, and the right to freely trade to make money.
Reichstag	The elected parliament of Germany, containing representatives from across the country.
Chancellor	The leader of the German Government responsible for day-to-day running of the country.
Proportional Representation	A system of elections which results in weak governments in which many parties must work together.
Unemployment	The amount of people in an area who do not have a job.

Timeline

The Wall Street Crash	1929	A financial collapse in the USA which caused a depression in most of the world.
Huge increases in support for the Nazis	1929-32	Membership of the Nazi party increased by millions in this period.
Four Chancellors in 12 months	1932	The government was paralysed as four chancellors came and went.
Hitler appointed Chancellor	1933	In January, President Hindenberg appointed Hitler as Chancellor.
The Reichstag Fire	1933	In February, the Reichstag building burned down and a communist was blamed.
Hitler eliminates his political opposition	1933-34	Hitler uses his power to destroy the German communist party as well as other opposite groups.
Death of President Hindenberg	1934	Paul von Hindenberg died, allowing Hitler to declare himself dictator of Germany.
Night of the Long Knives	1934	Hitler sends the SS to kill or imprison the leaders of the SA.

Important People

Adolf Hitler	An extreme German nationalist who led the Nazi party and was dictator of Germany from 1934 until 1945.
Ernst Rohm	Leader of the SA or Sturmabteilung, a private army who were part of the Nazi party.
Marinus van der Lubbe	A Dutch communist who was blamed for the Reichstag fire, allowing Hitler to hunt down many German communists.
Paul von Hindenberg	A famous German general who became President of Germany until his death in 1934.

What changed over the period?

By the late 1920s Germany was recovering from WWI and employment, living standards and cultural achievements were on the rise. The Wall Street Crash in the USA in 1929 caused global financial problems and Germany was one of the hardest hit, due to her reliance on American loans. With huge unemployment and a government in crisis, the German people started to support more extreme political parties in order to try to fix the problems, such as the communists and the Nazi parties.

Always Remember…

- Germany was improving financially by the late 1920s.
- The Wall Street Crash was in 1929, and was unrelated to hyperinflation in 1923.
- Gustav Stresemann died in 1929.
- Hitler used his army of thugs, the SA as well as his private bodyguard, the SS to destroy opposition groups like the KPD.
- Many people, such as farmers and businessmen voted for the Nazis because they were scared of communism.

Deeper Learning…

State what Article 48 of the Weimar Constitution was.
Describe the political promises the Nazis made to Germany voters in the late 1920s.
Explain how Hitler used the Reichstag fire to eliminate his political opposition.
'The Wall Street Crash was responsible for Germany becoming a dictatorship.' -Analyse.
Project: Create a fact-file on the Enabling Act, what was it, why did it happen and why was it important?

Activity – 'The main reason for the increase in support for the Nazi Party was the bullying tactics of the SA.' How far do you agree with this statement?

Key Vocabulary…

Economics	The study of the production of wealth and the exchange of goods of services.
Autarky	Hitler's economic plan for self-sufficiency, where Germany would produce everything it needed.
Rationing	The control of how much food and resources are allowed per person – normally during war time.
Hitler Youth	An organisation for teenage boys in Germany where they would learn the kind of skills soldiers need.
League of German Maidens	An organisation for teenage girls in Germany where they would learn housewife and motherhood skills.
Holocaust	The systematic destruction of the European Jews by the Nazis during the 1930s and 1940s.
Final Solution	Another term for the Holocaust as the Nazis considered the Holocaust to be the 'solution' to the 'Jewish problem'.
Anti-Semitism	Prejudice and discrimination against Jewish people.

Timeline

Night of the Long Knives	1934	Hitler uses the SS to kill or imprison the leaders of the SA, consolidating his hold on Germany.
Berlin Olympics	1936	Nazi Germany hosts the Berlin Olympics, the world sees the Nazis as restoring German pride.
Membership of BDM becomes compulsory	1936	All Germany girls must now join the League of German maidens to learn to be wives and mothers.
Kristallnacht	1938	November – Jewish homes and business are burned and over 300 Jews are killed.
Start of WWII	1939	Germany invades Poland which causes France and Britain to declare war on Germany.
Wannsee Conference	1942	Extermination of the Jews is planned by a group of top Nazis.
Hitler commits suicide.	1945	Knowing the Red Army is approaching, Hitler kills himself.
Surrender of Germany in WWII	1945	Germany surrenders to the Allies.

Important People

Adolf Hitler	Dictator of Germany from 1934 until his suicide in 1945.
Hermann Goering	Nazi Minister of Economics from 1936 onwards. Responsible for the Four Year Plan.
Albert Speer	Nazi minister of armaments and responsible for organising Germany for total war.
Joseph Goebbels	Nazi Minister of Propaganda and believed that propaganda was essential for a well-organised society.
Heinrich Himmler	Head of the SS and the person responsible for organising the 'Final Solution', the Nazi plan to eliminate the Jews.

What changed over the period?

Hitler became Chancellor in 1933 and was able to declare himself 'Der Fuhrer', supreme leader of Germany by August 1934. The Weimar Constitution and German democracy was no more. Hitler immediately started to reorganise Germany for war. He prepared young boys to be soldiers and young girls to be mothers to yet more soldiers. His economic plans were designed to make Germany self-sufficient so that the supply problems of WWI would not cause the same problems again. In addition to all of this, Hitler proceeded on his racial 'purification' of Germany by first discriminating against and then exterminating the Jews. However, Germany was defeated in WWII ending these plans.

Always Remember…

- Nazi policies were always working towards the conquest of new lands. Hitler said the Germans required more leibensraum, or living space.
- Nazi ideologies were always going to clash with Christianity, the Nazis did a deal of non-interference with the Catholic Church and attempted to control the protestant churches.
- The Nazis had traditional ideals about the role of women in society and thought they should not work, but should only be concerned with excelling at the roles of wife and mother.

Deeper Learning…

State the names and functions of the key Nazi security organisations.
Describe the youth organisations in Nazi Germany, both official and unofficial.
Explain the ways in which the Nazis discriminated against the Jews.
Analyse the role of propaganda in Nazi Germany.
Project: Create a fact-file on the Nazi economic plans – what was autarky and how did they try to achieve this?

Activity – 'The extermination of the Jews was not always the plan of the Nazis, it evolved over time.' How far do you agree with this statement?

Subject RE Year 10 Topic Christian Beliefs

Key Vocabulary…

Monotheistic	The belief in one God who is transcendent
Transcendent	The belief that God is above and beyond human understanding
Omnipotent	The belief that God is all powerful
Omniscient	The belief that God is all seeing & all knowing
Omnibenevolent	The belief that God is all loving
Trinity	The belief in **one** God in three parts: the Father who is transcendent, the Son who is immanent & personal and the Holy Spirit who is immanent and personal.
Immanent	The belief that God is with humans.
Incarnation	The belief that God becomes flesh, becomes human in the person of Jesus.
Messiah	A title for Jesus – the chosen one.
Resurrection	The belief that Jesus rose from the dead on Easter Sunday.
Crucifixion	The belief Jesus died on a cross and suffered as he was human, he was the incarnation. Christians believe he died to bring salvation to humans.
Salvation	Being saved from sin through belief in Jesus' teachings, death and resurrection and by doing good deeds.
Judgement	People will be judged on how they have lived to decide what happens to them in the afterlife.

Picture This…

	**Trinity**	The belief in **one** God in three persons: the Father (God) who is transcendent, the Son (Jesus) who is immanent & personal and the Holy Spirit who is immanent and personal.
	**Creation**	Some Christians are creationists and the believe the account of creation in Genesis is literally true: God created the world in 6 days and rested on the seventh. Other Christians believe the Genesis story has a truthful message that God created the universe and all life, but the story is not literally true and it needs to be interpreted. Christians believe the Trinity was involved in Creation: God the father created the world, the word (Jesus) was with God in the beginning and the Holy Spirit works in the world and in creation.
	**Incarnation** **Crucifixion** **Resurrection**	Christians believe in the incarnation of Jesus as they believe in his virgin birth, a voice at his baptism said "This is my son with who I am well pleased" and he was resurrected after death. The crucifixion influences Christians as they believe Jesus suffered on the cross as a human, and when they suffer Jesus is with them, he is immanent. Resurrection influences them as it gives them hope for the afterlife, good over evil and reward in heaven.

Always Remember…

Christians believe in one God who is understood in three parts or persons: God the Father, Jesus the son and the Holy Spirit. This is called the Trinity.

Deeper Learning…

Create a connection map to show the links between Christian beliefs and Christian practices in how a Christian worships God and the festivals they celebrate.

The role of Jesus in salvation

Sacred writings

Activity – Plan your evaluation answer to 12 mark questions.

1. "The stories of the incarnation prove Jesus was the Son of God." 2. "There is no such place as hell." 3. "The best way to gain salvation is to obey God's law."

Subject RE Year 10 Topic Christian Practices

Key Vocabulary…

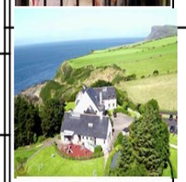
Worship	Worship is the act of religious praise to give **thanks** to God and ask for **forgiveness**. It shows their **love** of God.
Public & private	Worship can be in public in a church with other Christians and it can also be in private on their own.
Liturgical	Worship which follows a set pattern each time, for example, prayers, Holy Communion, reading the Bible. Roman Catholic and Church of England worship in a liturgical way.
Non-liturgical	Worship which does not follow a set pattern each time, for example, not celebrating the Holy Communion at every service but spending more time reading the Bible. Methodist and Baptist churches worship in a non-liturgical way.
Spontaneous	Worship which follows no structure at all but is guided by the Holy Spirit: Quaker Christians sit in silence until someone feels moved to speak by the Holy Spirit.
Sacrament	A outward ceremony/sign of an inward, deep spiritual meaning. Holy Communion and baptism are sacraments. The bread & wine at Holy Communion mean the body & blood of Jesus' sacrifice on the cross and the water of baptism symbolises the washing away of sin and welcoming a person into Christianity.
Transubstantiation	The belief Roman Catholic Christians have that the bread & wine at Holy Communion actually miraculously turns into the body & blood of Jesus' sacrifice.
Pilgrimage	A religious and spiritual journey, for example, to Lourdes (France) and Iona (Scotland)
Mission	Mission is the calling to spread the faith. The church has a mission to tell people about the Son of God (Jesus) who came into he world to bring salvation. Jesus gave the disciples the Great Commission when he asked them to go out into the world to spread his teachings.
Evangelism	When a Christian spreads the faith by telling other about Jesus' teachings.
Persecution	When areligious person is bullied and received bad treatment because of their religion, for example, not being able to build a church, being put in prison or even killed.
Atonement	Paying the price for sin
Reconciliation	Fixing a broken relationship, for example, when Jesus died on the cross he fixed the broken relationship between God and humans caused by sin. He atoned for human sin and gave salvation.

Picture This…

Salvation
Atonement
Reconciliation
Fixing a broken relationship, for example, when Jesus died on the cross he fixed the broken relationship between God and humans caused by sin. He atoned for human sin and gave salvation.

Christian Aid
Christian Aid is a Christian charity which provides development aid and emergency aid to those in need. They donate money and pray for those who are in need and living in poverty.

Persecution
When areligious person is bullied and received bad treatment because of their religion, for example, not being able to build a church, being put in prison or even killed.



Corrymeela Community
In Northern Ireland – a centre to work for reconciliation .

Church growth
The church is growing rapidly in South America, Africa and Asia, but not in Europe, USA and Middle East

Street Pastors
Street Pastors are trained Christians who help the most vulnerable on the streets. They put agape (unconditional love) into practice.

Always Remember…

Christians believe in one God who is understood in three parts or persons: God the Father, Jesus the son and the Holy Spirit. This is called the Trinity. The Trinity is active in a Christian's life.

Deeper Learning…

Create a connection map to show the role of the church in the local community and the world wide community.

Sacred writings

Activity – Plan your evaluation answer to 12 mark questions.

1. "The most important duty of a Christian is to worship God." 2. The best way to understand God is to go on a pilgrimage." 3. "Evangelism is wrong." 4. " Baptism is the most important sacrament."

Subject RE Year 10 Topic Islam beliefs

Key Vocabulary…

Tawhid	Oneness & supremacy of Allah
Risalah	Belief in prophet hood
Akhirah	Belief in life after death
Day of Judgement	Belief that people will be judged on how they have lived their life as a good Muslim.
Sunnah	Following the teachings & actions of Muhammad
Night of Power	The first night of the revelation of the Quran
Night Journey	The night Muhammad went on a miraculous journey to heaven (Jannah) to talk to the prophets
Hijrah	The journey Muhammad made from Mecca to Medina to escape persecution
Ummah	The Muslim community
Six articles of faith	Sunni Muslim key beliefs: Supremacy of Allah, Tawhid, Day of Judgement, authority of the Quran, authority of prophets and angels
Five roots of usul ad-Din	Shi'a Muslims beliefs: Resurrection, imamate, prophets, Tawhid and Judgement Day

Angels

Muslims have many beliefs about angels. Firstly, Muslims believe angels are spiritual beings of light and have no free will so follow Allah's will and give messages from Allah to humans. Jibril, (Gabriel) for example, is a special angel (archangel) who gave the words of the Quran to Prophet Muhamad as this is what God wanted. Secondly, Muslims believe that angels are involved in the lives of humans from conception to death. Some angels are **guardian angels** who take care of each person through their lives. Other angels are responsible for writing down in the **Book of Deeds** everything a person does. This book will be used on the **Day of Judgement** to decide if a person goes to Paradise of Hell. The sacred writing about angels in the **Quran** is: "Each person has angels before him and behind, watching over him by God's command."(Qur'an). This sacred writing shows that Muslims believe angels have an important role in the lives of humans and connecting humans to Allah and the belief in angels is one of the **Six Articles of Faith**.

Muhammad

Muhammad received the first revelation of the Quran from angel Jibril on the Night of Power

Muhammad in Mecca: Three years after the first revelation Muhammad began preaching the words he had received from Angel Jibril: there is only one God and complete surrender to God is the only way to live life. He challenged the people of Mecca to give up cheating, drinking alcohol, gambling and idol worship. This was not the message the leaders of Mecca wanted to hear so he was persecuted. He left Mecca to avoid persecution in 622CE and went to the city of Medina. This is known as the Hijrah (departure) and is the beginning of the Ummah (worldwide Muslim community).

The Night Journey

Before the Hijrah Muhammad had a miraculous experience. Angel Jibril took Muhammad on a journey to Jerusalem. This event is known as the **Night Journey.** Muhammad was carried on a horse-like creature with wings to Jerusalem and then he ascended to heaven and spoke to other prophets like Jesus. He was told that Muslims should pray 5 times every day. When he returned he circled the Ka'aba 7 times.

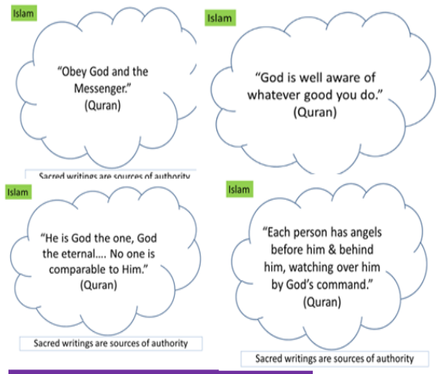
It is important for Muslims to follow the example of Muhammad because firstly, Muhammad is a role model and is an example of a perfect human being. He is a living example of Allah's message. Secondly, Muhammad is the last prophet who Allah gave his final message/Qur'an to – the seal of the prophets. Muhammad's teachings and actions called Sunnah, influences how a person lives their life. The Sunnah teaches Muslims how to carry out Allah's will in their daily lives, for example, how to pray five times every day. The sacred writing which shows Muhammad's importance is: *" He (Muhammad) is God's messenger and the seal of the prophets."* This shows that Muhammad is the last prophet, no other prophet is to follow and that Muhammad is seen a the perfect prophet. He is the most important prophet of them all and seal of the prophet means he is the superior prophet.

Always Remember…

Tawhid

Muslims believe in the Tawhid: the oneness & supremacy of Allah. All the prophets taught people to believe in the Tawhid. The Quran says: "He is God, the one, God the eternal …No-one is comparable to Him."

Sacred writings



Deeper Learning…

Create a connection map to show the links between Muslim beliefs and Muslim practices: show how the beliefs in the six articles of faith (Sunni) and the five roots of Usul ad-Din (Shi'a) link to the Five Pillars of Islam, the celebration of festivals and the Ten Obligatory Acts.

Activity – Plan your evaluation answer to 12 mark questions.

1. "The Quran contains all the guidance that Muslims need to live a perfect Muslim life." 2. "For Muslims, the prophets make better role models than the angels." 3. Predestination means Muslims have no free will." (12)

Subject RE Year 10 Topic Islam Practices

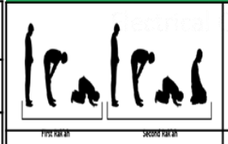
Key Vocabulary…

Shahadah	Declaration of faith in Islam
Salah	Five daily prayers
Rak'ah	A set pattern of prayer movements and recitations when praying.
Jummah	Special Friday prayers. Men are expected to attend the mosque.
Sawm	Fasting during the month of Ramadan. Ramadan is the month when angel Jibril started to recite the Quran to Muhammad.
Laylat-al-Qadr	The Night of Power when Muhammad received the Quran.
Zakah	Muslims give 2.5% of their savings to charity every year. This is almsgiving.
Hajj	A spiritual journey to Mecca. Muslims make this pilgrimage once in their lives. The holy shrine of Islam, the Ka'aba, is in Mecca.
Jihad	The struggle against evil and to live a life to submit to God to please Allah.
Id-ul-Fitr	A festival which celebrates the end of Ramadan.
Id-ul Adha	A festival which celebrates Prophet Ibrahim's obedience to God as he was willing to sacrifice his son, and this festival marks the end of Hajj.
Ashura	A festival which is important to Shi'a Muslims as they remember the death of Husayn in the battle of Karbala.

The Five Pillars of Islam

The Five Pillars of Islam are five duties Muslims perform to submit to the will of Allah, to be good Muslims and to live a perfect Muslim life.

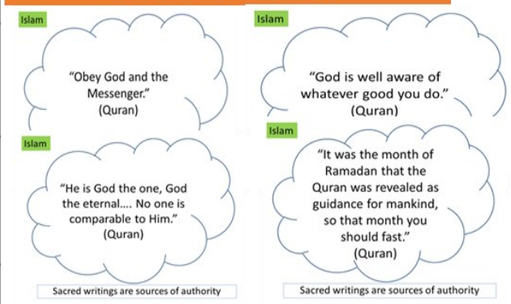
Picture This…

	**Rak'ahs** — A set pattern of prayer movements and recitations when praying. Muslims face the city of Mecca in pray.
	**Wudu** — Washing before prayers to show respect to Allah.
	**Ka'aba** — The holiest shrine in Islam. Prophet Ibrahim re-built it as the first Ka'aba, built by prophet Adam, was destroyed. On the Hajj Muslims circle it 7 times to remember that Prophet Muhammad did when he returned from the Night Journey.
	**Ihram** — On the Hajj pilgrims enter a state of Ihram by washing, praying and wearing a white sheet.
	**Circle the Ka'aba** — Muslims circle the Ka'aba to show Allah is at the centre of their lives.
	**Standing at Arafat** — Muslims spend al day praying in the hot sun to remind them what Judgement Day might be like and asking for forgiveness.
	**Throwing pebbles at Mina** — At Mina they throw stones at three stone walls to remember Ibrahim and how he rejected sin, temptation and evil.
	**Sacrifice an animal** — As part of the festival of Id-ul-Adha Muslims sacrifice an animal and the meat is given to family and the poor.

Always Remember…

Allah is at the centre of a Muslim's life which is reflected in the way they live their lives and the practices they perform. The Five Pillars of Islam, for example, celebrating Id-ul Fitr & Id-Ul-Adha and the greater jihad to be a good Muslim shows their belief in the Tawhid.

Sacred writings



Deeper Learning…

Create a connection map to show the links between Muslim beliefs and Muslim practices: show how the beliefs in the six articles of faith (Sunni) and the five roots of Usul ad-Din (Shi'a) link to the Five Pillars of Islam, the celebration of festivals and the Ten Obligatory Acts.

Activity – Plan your evaluation answer to 12 mark questions.

1. "The Shahadah is the most important pillar of Islam." 2. "Id-ul-Fitr & Id-ul-Adha should be public holidays in Britain." 3."The lesser jihad is more important than the greater jihad."

Year 10 HT 1 – Area of Study 4 Knowledge Organiser

Key Terminology

- **Gradual Transformation**: When a melody or rhythmic pattern gradually change shape.
- **Metamorphosis:** A short motif is changed gradually; one note at a time is changed so that the music completely changes over a period of time.
- **Additive Melody:** A short motif is gradually changed by adding a note at a time or changing a note for a rest
- **Subtractive Melody:** A short motif is gradually changed by taking away/subtracting a note at a time or changing a note for a rest
- **Phase Shifting:** Two or more parts begin with the same motif, these gradually move out of and then back into phase.
- **Polyphonic Texture:** This literally means 'different sounds or voices'. Polyphonic music has parts that weave in and out of each other. Polyphonic music is also sometimes called contrapuntal music.
- **Diatonic Harmony:** Diatonic harmony is a fancy way of saying chords or notes that relate to a certain key – i.e. they should work well together.
- **Phasing:** Phasing is a compositional technique in which the same part (a repetitive phrase) is played on two musical instruments, in steady but not identical tempi.
- **Ostinato:** A short repeated pattern.
- **Pulse:** The beat of the music. Every piece of music has a heartbeat. It doesn't need to be played by drums - you can 'feel' the beat.
- **Rhythm:** Notes have different lengths, some long, some short. When we combine long and short sounds, it creates a pattern, which is a rhythm.
- **Pitch:** Pitch is a variation of high and low sounds. Pitch increases and decreases by steps of a scale. Scales are Major and Minor.
- **Tempo:** Tempo means the speed of the music. Music can change tempo within a piece. We describe tempo using Italian words.
- **Dynamics:** Dynamics means the volume of the music. Music can change dynamics within a piece. We describe dynamics using Italian words.
- **Structure:** Music is divided into sections. The order of these sections creates a structure. Song structure includes Chorus, Verse, Instrumental etc.
- **Texture:** A single melody creates a thin sound. Adding more parts/layers creates a bigger sound. These layers can interact with each other.
- **Timbre:** Each instrument has a unique sound and sounds different to others. This individual sound quality is called Timbre.

Year 10 HT 2 – Area of Study 3 Knowledge Organiser

Key content/ ideas/ concepts

Origins – African slaves brought their musical traditions with them when they were transported to work in the North American colonies. These **Work songs** were sung rhythmically in time with the task being done. Their songs were passed on orally (word of mouth) and were never usually written down. They used **call and response** where phrases from a lead singer were followed by the others. Early styles of Blues was known as **country blues** and was usually a solo singer accompanied on guitar or piano sometimes with added harmonica or drums.

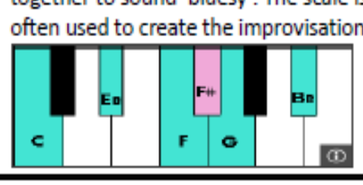
12 Bar Blues – The 12 bar blues is the name of the structure used in blues music. It is split in to 3 sections, which have 4 bars each.

Chords – A chord is 3 notes played together at the same time. A chord is also called a **triad.** Blues music only uses 3 chords which are played at the start of every bar.

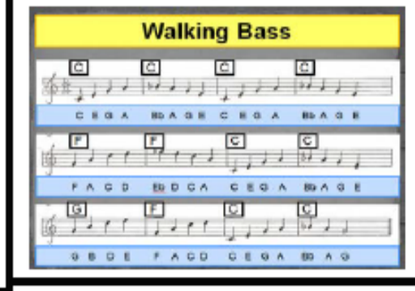
C/// C/// C/// C///
F/// F/// C/// C///
G/// F/// C/// C///

Improvisation – Improvisation is where music is performed 'on the spot'. Music that is improvised isn't traditionally written down, and the performers will use their musical knowledge to perform something from scratch. In Blues music, the improvisation is usually the notes from the Blues scale.

Blues Scale – The blues scale is a certain selection of notes that have been put together to sound 'bluesy'. The scale is often used to create the improvisation.



Walking Bass – The walking bass is the main part of any Blues song. This is usually played by the bass guitar. The tempo of the bass line should be steady, which is why it is called the "walking" bass.



Song Structure– Modern Blues songs can sometimes follow modern pop song structure (Verse-Chorus). Older Blues songs usually consist of 3 lines. Lines 1 & 2 are the same, and line 3 is usually different. (This also ties in with the 12 chords).

Lyrics – The lyrics of Blues songs were often about depression, lack of money/employability, loneliness and them missing their family. The lyrics of line 1 & 2 are usually he same, with line 3 being different.

Musical Elements – Musical elements are often used separately and together to help create the mood and expression the emotion on a song.

Composers–
Robert Johnson
Muddy Waters
Etta James

Keywords/ Glossary

12 Bar Blues	The structure used in Blues music. There are 3 lines of 4 bars.
Blues Scale	A selection of notes that are put together to create a 'bluesy' scale. The blues scale is used for the notes during improvised sections of music.
Chords	The chords are played at the beginning of each of the 12 bars. The chords used in Blues are C, F & G. Rule for a chord: play a note – miss a note – play a note – miss a note – play a note.
Improvisation	Improvisation is where music is played and made up 'on the spot'. Music that is improvised is not usually written down, and not pre-planned.
Walking Bass	The name for the bassline heard in Blues music. It is usually played at a "walking" tempo.
Call and Response	A performed plays/sings a 'call' and the other performers will 'respond'.

Wider reading

http://www.bbc.co.uk/schools/gcsebitesize/music/popular_music/blues2.shtml

https://www.misswardmusic.com/blues.html

https://www.educationquizzes.com/ks3/music/jazz-improvisation-01/

GCSE Physical Education – Components of Fitness

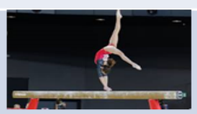
Health – A state of complete mental, physical and social well-being (not merely the absence of disease or infirmity).
Fitness - The capacity to carry out life's activities without getting too tired.
Well-being – a feeling or mental state of being contented, happy, prosperous and healthy.
Sedentary – a lifestyle that is inactive and involves much sitting down

Relationship between these:

- Regular **exercise** increases general **health, fitness** and **well-being**.
- High levels of **fitness** can in turn have a positive impact on **well-being** and **sedentary** lifestyles.

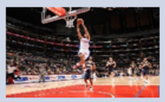
Health Related Components of Fitness

How to remember this?
B – Bob
M - Munches
M - More
F - Fried
C - Chicken

Component	Definition	Sporting Example
Muscular Strength	The ability of a muscle to exert force for a short period of time.	
Muscular Endurance	The ability to use voluntary muscles, over long periods of time without getting tired.	
Flexibility	The range of movement at a joint.	
Cardiovascular Endurance (stamina) **VO2 Max** O2 intake per minute	The ability of the heart and circulatory system to continuously exercise without tiring (for a long period of time).	

Skill Related Components of Fitness

How to remember this?
C
R
A
B
S
P

Component	Definition	Sporting Example
Coordination	The ability to move different limbs at different times or to do more than one task at a time effectively.	
Reaction Time	The ability to react quickly in sport situations to out wit your opponent or outsprint another athlete	
Agility	The ability to change direction under control, whilst maintaining speed, balance and power.	
Balance	The ability to keep your body mass or centre of mass over a base of support.	
Speed	The ability to move the body quickly.	
Power	The ability to combine speed and strength.	 

GCSE Physical Education – Components of Fitness	
Term	Definition/notes/concept

Keywords:

GCSE Physical Education – Fitness Testing

Muscular Strength

Test: Hand Grip Dynamometer Test
Protocol: Grip the dynamometer in one hand. Start with your hand up and bring down to side while pulling in handle. No swinging your hand.

Advantages	Disadvantages
•Simple and easy to complete	• Only one size of dynamometer which may affect reading. • Focuses solely on forearm strength.

Muscular Endurance

Test: sit up test (metronome)
Protocol: Complete full sit ups in time to to the beat on the recording

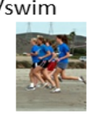
Test: Maximal press up test
Protocol: complete as many press-ups as possible resting in the "up" position

Advantages	Disadvantages
• Simple test to complete • Minimal equipment needed.	• Difficult to assess whether each repetition is performed correctly. Difficult to accurately measure large groups.

Flexibility
Test: Sit and Reach Test
Protocol: Sit with legs straight out in front and soles of feet against box/table. Reach forward without bending knees. No jerking movements.

Advantages	Disadvantages
•Quick and easy to perform. •Data table readily available for comparison	• Can cause injury if not fully warmed up appropriately. • Only measures flexibility of lower back and hamstrings.

Cardiovascular Fitness (Aerobic Endurance)
Test: 12 min Cooper Run
Protocol: Continuously run/swim for 12 minutes.
Distance recorded.

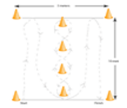


Advantages	Disadvantages
•Minimal equipment needed •Test can be self administered.	• Inaccuracy of heart rate measurements • Motivation dependant

Test: Multi-Stage Fitness Test
Protocol: Shuttle run continuously for 20 metres. Record the level and point that you cannot continue at that pace for.

Advantages	Disadvantages
• Simple test to complete	• Motivation dependant

Agility



Test: Illinois Agility Test
Protocol: Start lying down at the start line. Complete course as quick as possible (10m x 5m – 4 central cones)

Advantages	Disadvantages
•Simple and easy to complete	• Motivation dependant / Timing errors.

Speed

Test: 30m Sprint Test
Protocol: Start from stationery position. Complete distance in the quickest possible time. Time is stopped when chest crosses the line.

Advantages	Disadvantages
• Quick test to complete. • Minimal equipment needed and can be performed anywhere with a flat 50m run.	• Running surfaces/weather conditions can affect the results. • Inaccuracies with stopwatch usage.

Power

Test: Vertical jump Test
Protocol: Stand next to wall and mark an initial reach while feet are flat on the ground. Standing jump to reach as high as possible. Measure distance from first mark to second.

Advantages	Disadvantages
• Quick and easy to perform. • Easy to complete with large groups.	• Technique plays are large role in successful completion.

Reliability /Validity

Validity relates to whether the test actually measures what it sets out to measure.
Reliability is a question of whether the test is accurate. It is important to ensure that the procedure is correctly maintained for ALL individuals.

<u>Results can be improved:</u>
- By using experienced testers & calibrating equipment
- Ensuring performers have the same level of motivation to complete each test
- Repeatedly test to avoid human error (x3)

GCSE Physical Education – Fitness Testing	
Term	Definition/notes/concept

Keywords:

GCSE Physical Education – Types of Training

Continuous training - Involves a steady but regular pace at a moderate intensity (aerobic) which should last for at least 20 minutes. i.e. running, walking, swimming, rowing or cycling.
Used by a **marathon runner**.

Advantages	Disadvantages
•Ideal for beginners •Highly effective for long distance athletes	• Can be extremely boring as repetitive

Interval training - Involves periods of work followed by periods of rest. *i.e. Sprint for 20 metre + walk back to start.*
Used by a **200m sprinter**

Advantages	Disadvantages
• Quick and easy to set up. • Can mix aerobic and anaerobic exercise which replicates team games.	• It can be hard to keep going when you start to fatigue (high motivation and self discipline needed) • Over training can occur if sufficient rest is not allowed between sessions (48 hours)

Fartlek training – Referred to as **'speed play'**
This is a form interval training but without rest. Involves a variety of changing intensities over different distances and terrains.
i.e. 1 lap at 50% max, 1 lap walking, 1 lap at 80% (aerobic and anaerobic used)
Used by **games players – Hockey players**

Advantages	Disadvantages
• More enjoyable than interval and continuous training • Good for sports which require changes in speed • Easily adapted to suit the individuals level of fitness and sport.	• Performer must be well motivated particularly when intensity is high • Difficult to assess whether performer is performing at the correct intensity

Plyometrics training
Involves high-impact exercises that develop **power**. *i.e. bounding/hopping, squat jumps.* Used by **long jumpers**, **100 m sprinters** or **basketball players**.

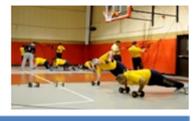
Advantages
• Easy to set up requiring little or no equipment • Hugely effective in developing power

Disadvantages
• Can result in injury if not fully warmed up. • Can place a great stress on joints and muscles.

Weight/Resistance training – A form of training that uses progressive resistance against a muscle group. Used by **cyclists**.
Muscular strength: High weight x low repetitions
Muscular endurance: Low weight x high repetitions

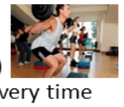
Advantages	Disadvantages
•Variety of equipment to prevent boredom •Strengthens the whole body or the muscle groups targeted. •Can be adapted easily to suit different sports	• Requires expensive equipment • If exercises are not completed with the correct technique it can cause injury to the performer

Circuit training - A series of exercises completed one after another. Each exercise is called a station. Each station should work a different area of the body to avoid fatigue.
i.e. press ups, sit ups, squats, shuttle runs.



Advantages	Disadvantages
• Quick and easy to set up • Easy to complete with large groups • Can be adjusted to be made specific for certain sports. *i.e. netball specific circuit*	• Technique can be affected by fatigue and can increase risk of injury • Must have motivation and drive to complete the set amount of repetitions and sets.

HIIT Training
These are High Intensity Interval Training activities where speed and recovery are used throughout the session. Exertion levels are high (7/10) for between 30 secs and 3 mins. Work output is much shorter than recovery time Examples might be Body pump, High Impact Aerobics, Spinning.



Advantages	Disadvantages
•Variety avoids boredom •Instructor will challenge & motivate •Great way to meet new people	• Gym membership can be expensive. • Group classes are not tailored to individual needs.

GCSE Physical Education – Methods of Training	
Term	Definition/notes/concept

Keywords:

GCSE Physical Education – Principles of Training

Principles of training - **Guidelines** that ensure **training is effective** and results in **positive adaptations**. These principles are used when planning an Exercise Programmes

PAR-Q – Physical Activity Readiness Questionnaire
Conducted before fitness testing or an activity programme to examine the performer's readiness for training or any health conditions/lifestyle choices that may affect the successful completion.

FITT Principle

Frequency	How often training takes place.	*Increase training from once a week to two*
Intensity	How hard the exercise is.	*Increase resistance from 10kg to 15kg or increase incline on the treadmill.*
Time	The length of the session.	*Increase training session from 45 minutes to 55 minutes.*
Type	The method of training used.	*Change to from interval training to Fartlek training.*

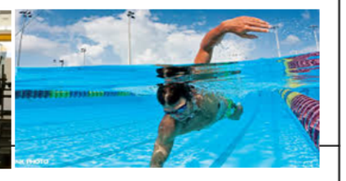
Progression
Using overload in a progressive way over the course of a programme. Once adaptations have happened overload needs to be applied to make gains again, e.g. lifting more in week 12 than in week 2 of the programme.

Overload
Working the body harder than normal/gradually increasing the amount of exercise you do. *i.e. bench press 50kg x 10 repetitions and increase to 55kg x5 repetitions.*

Reversibility
If training is not regular, adaptations will be reversed. This can happen when:
- Suffering from illness and cannot train
- Injury
- After an off-season.

Specificity
Training showed be **matched** to the requirements of the sport or position the performer is involved in.
Training must be specifically designed to develop the right:
- Muscles
- Type of fitness
- Skills

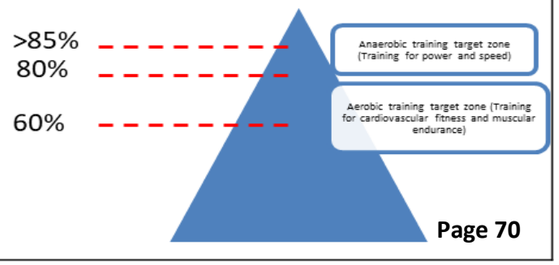
Individual needs
All athletes programmes would differ depending on:
- Performer's goals/targets
- Strength and weaknesses
- Age/gender
- Current health/fitness levels



Overtraining
Occurs when you **train too hard** and do not allow the body enough **rest/recovery time**. Signs/symptoms include: extended muscle soreness, frequent illness & increase injuries.

Calculating Training Zones/Thresholds of Training

Maximum Heart Rate (MHR) = 220 – age	**Aerobic target zone: 60–80% of MHR (60% = x 0.6 / 80% = x 0.8)**	**Anaerobic target zone: > 85% MHR (85% = x 0.85)**



GCSE Physical Education – Principles of Training	
Term	Definition/notes/concept

Keywords:

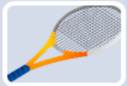
GCSE Physical Education – Warm up and cool down, injury and prevention

Injury prevention – to prevent injury performers and coaches should recognise and identify risks and reduce them.


Using the right principles of training to over overuse injuries

Understand and following the rules of the sport during play


Using appropriate protective clothing


Checking the equipment to make sure it is in good condition and age appropriate


Following a full warm up and cool down


Checking the facilities


Ensuring competition is balanced

Warm up

Pulse raiser	An activity that increases heart rate and temperature.
Stretches	An activity that increases the elasticity of muscles, tendons and ligaments.
Mobility	An activity that takes the joint through the full range of motion.
Dynamic movements	An activity that involves changes in speed and direction.
Skill rehearsal	An activity that mirrors game demands.

Cool Down

Low intensity exercise	An activity that gradually decreases temperature and heart and breathing rates.
Stretches	Static stretches that decrease muscle temperature.

Injuries

Soft tissue injuries

Strain – Twist or tear to a muscle or tendon.
Sprain - Twist or overstretch to a ligament.
Treatment for strain and sprain = **RICE** (Rest, Ice, Compression, Elevation) for 24 - 48 hours.


R – **rest** the injured part.


I - Apply **ice** to reduce the swelling for a maximum of 10 minutes.


C – **Compress** the injured area using a bandage.


E – **Elevate** the injured part to decrease the blood supply.

Head Injury

Concussion – An injury to the brain caused by a knock to the head. Common in contact sports. If an athlete is concussed, they may:

- Become unconscious.
- Feel sick, dizzy or drowsy.
- Get confused, stare & suffer memory loss.

Spinal Injury

A serious and painful injury to the spine. This could be paralysing or fatal. This may occur during a rugby scrum or falling off a horse.

Fracture – a broken bone.
Open/compound/complex fracture – bone through the skin
Closed/simple fracture – bone remains in the skin.
Greenstick fracture – bone bends (younger children)
Stress fracture - repeated or prolonged forces against the bone

Dislocations - a sudden impact to a joint can cause the bones that meet to become disconnected or moved out of place.

Blisters

These are caused through friction and rubbing e.g. on footwear. Fluid is released under the skin to form a protective layer. The swelling becomes painful.

GCSE Physical Education – Performance-enhancing dugs, injury and prevention	
Term	Definition/notes/concept

Keywords:

GCSE Physical Education – Sports Psychology

Classification of skill
Skills are specific tasks that can be learnt and practiced. *i.e. Golf swing / Lay up / Tennis volley*

Continuum = sliding scale of extremes at each end

Environmental Continuum – Open/Closed skills


OPEN CLOSED

Difficulty Continuum - Complex/Simple skills


COMPLEX BASIC/SIMPLE

Skilful Movement
- **Efficiency** e.g. no wasted energy – good timing
- **Pre-determined** e.g. planned like a routine
- **Co-ordinated** e.g. run and kick/hit
- **Fluent** e.g. one skill transfers into another
- **Aesthetic** e.g. technique looks good

Mental Preparation
- **Imagery** e.g. pictures in the mind
- **Mental Rehearsal** e.g. internal view / external view
- **Selective Attention** e.g. filtering relevant information
- **Positive Thinking** (self talk) e.g. rehearsing success
- **Concentration –**

Mental Preparation for Performance
Mental rehearsal/Imagery involves the athlete imagining themselves in an environment performing a specific activity using all of their senses.
This can be used to:
- Familiarise the athlete with a competition site or a complex play pattern or routine.
- Motivate the athlete by recalling images of their goals or of success in a past competition.
- Perfect skills or skill sequences the athlete is learning or refining.
- Reduce negative thoughts by focusing on positive outcomes


Feedback
Vital part of information processing which provides confidence, motivation and improves performance.
Intrinsic feedback: This comes from within the performer. Kinaesthetic senses provide feelings from muscles/joints about the action.
Extrinsic feedback: This comes from results and match analysis.

1.Knowledge of results – the outcome
2.Knowledge of performance – techniques used
Knowledge of Results: Information provided to the athlete detailing stats and data from the event/training
Knowledge of Performance Information provided to the athlete after the performance in terms of technique and tactical decision making.

Guidance (Positive & Negatives)
Visual guidance: Learners are shown the whole action by the coach. *i.e. demonstration/use of video playback.*

Verbal guidance: Learners listen to information given to a performer often using associated terminology. *i.e. instructions told to a team.*

Manual guidance: Coaches will physically move a performer and support them in performing a skill. *i.e. Trampolining somersault support.*

Mechanical guidance: Learners use equipment to help support the practicing of a skill. *i.e. floats during swimming stroke development.*

SMART Targets
Goal setting motivates performers
- Short Term goals:
- Long Term goals:
- Outcome goals: result based
- Performance goals: technique based

Specific	Measureable	Achievable	Recorded	Timed
Targets must be concise and clear. ***"To take a 0.5 second off my time personal best time"***	Must be measured and compared. Easy to monitor. ***"I will time my runs every training session for the next five weeks of training"***	Target must be challenging but yet reachable. Motivating. ***"My coach and I devised the training programme around improving leg power for my start"***	Needs to be recorded to track progress. ***"We keep a diary of times and distances for every training session to inform the planning for the next one and plot progress against our aim"***	Set for a particular time to be completed. ***"We agreed to do the training programme four times per week for the next five weeks"***

Devising Log Knowledge Organiser

Section 1 – Response to stimulus (20 marks)

- Start by describing the stimulus you were given/ chosen.
- What was your first response to the stimulus?
- What were the different ideas, themes and settings you considered and how and why you reached your final decision. What did you discuss as a group?
- What YOU discovered from your research. Where did you collect your research from?
- What YOUR own dramatic aims and intentions are – what do you want to achieve with your character?
- What are the overall aims and objectives of the piece – what message would you like to convey?
- What style did you choose to present your drama in and why?

Section 2 – Development and Collaboration (20 marks)

- How did you develop and refine your ideas and those of the others in your group?
- How did you develop your piece in rehearsals?
- How did you structure your rehearsals? Did you have natural leaders? Did you have different responsibilities?
- How did you develop and refine your own theatrical skills during the devising process?
- What problems did you encounter during rehearsals and how did you overcome them?
- What drama conventions (techniques) did you decide to use and why?
- What structure did you decide for your drama and why?
- How did you give and receive feedback throughout?
- How did you respond to feedback throughout the process?
- How you used your refined theatrical skills in the final performance.

Section 3 – Analysis and Evaluation (20 marks)

- How far did you develop your theatrical skills?
- What benefits did you bring to the group and in what way did you help to shape the final piece?
- What was the overall impact you personally had on the devising, rehearsals and performance of your drama?
- Which areas of devising did not go as well as you would have hoped or could have been developed further?
- What did you hope to achieve from your performance? Were you successful? How do you think you achieved this? If you weren't successful why not? What would you change?
- Choose an aspect of your contribution to the final piece to write about in more detail – what you did, what was successful about it and what could have been improved?
- What feedback did you get from the audience about your work? Did they understand your work? Would you change anything they suggested?

Checking your devising log

Have you written three sections with the appropriate headings?
Are the sections roughly the same length?
Have you stayed within the final word count length? (2500 words)
Have you provided evidence of research?
Have you stated your dramatic aims and intentions?
Have you shown how you developed and refined ideas?
Have you explained how you helped the group?
Have you shown how you responded to feedback?
Have you demonstrated that you developed your theatrical skills?
Have you explained how you positively shaped the final piece?
Have you used correct theatrical terminology to explain your thoughts?
Have you given specific examples to back up your points?
Have you analysed and evaluated your work?

Challenge

In order to succeed at a high level, you need to provide precise details and an impressive amount of creativity. Check your work to make sure your creative journey is clear and that you have backed it up with specific details.

GCSE DRAMA- TERM ONE- KNOWLEDGE ORGANISER

KEY VOCABULARY

Intentions – This is your aim or plan.

Stimulus – A resource used to start a creative process.

Constructive – Something that is useful and intended to improve.

Analyse – Looking at something in detail.

Blocking – When you dismiss the ideas of others preventing the work from progressing.

Theatrical skill – The level at which you develop and perform your character.

Range of skill – Using a number of different techniques and skills appropriate to your ideas.

Contribution – The impact you have during the devising and rehearsal process making sure it is positive.

Inventiveness – Including original ideas and structure in your drama.

Artistic intention – What you, as an actor want to achieve with your work, what you want the audience to understand.

PROGRESS CHECK

Have you **highly developed** your use of theatrical skill?

Are you demonstrating an **extensive** range of skills?

Have you shown **outstanding** contribution to the overall effectiveness of your piece?

Is your work **highly inventive** throughout?

Are you **highly successful** in realising your individual artistic intentions?

The success of your group depends on each individual

Always Remember

Keep reflecting on how you are working as a group and make sure everyone contributes

Stay positive! This is a vital part of being a successful group

Don't block the process by being unwilling to listen or try out the ideas of others. Be a leader not a boss!

Don't forget to keep notes throughout the process, any diagrams or comments as you will need these for your devising log

Research as much as you can on your chosen theme. This will help with the devising process

Never think your work is done! The more you rehearse the better the outcome

Only include techniques that are going to improve your work and help the audience understand your intentions

Hot seating is a fantastic way of developing your character. Sit in role and get the members of your group to ask you questions and you have to answer them as your character

DEVISING TECHNIQUES

Still Images *Exposition* *Sound scape* *Split Screens*

Spoken Thoughts *Essence Machines* *Choral Speaking* *Cross Cutting*

Narration *System of movements* *Proxemics* *Flashbacks*

Mime *Physical Theatre* *Chair Duets* *Slow Motion Movement* *Mask Work*

TYPES OF STIMULUS	CONSIDERATIONS	AUDIENCE & PURPOSE	PERFORMANCE SPACE
Themes	Target audience	To educate	End on
Props	Structure of work	To inform	In the round
Time and place	Style and genre	To entertain	Thrust
Issues	Creative intentions	To celebrate	Traverse
Historical events	Timing	To challenge viewpoints, to provoke, to raise awareness	Promenade
Existing repertoire	Performance space		Proscenium Arch

Contribution	Responding	Reliability	Supporting
Be imaginative	Let everyone speak	Be punctual and prepared	Trust and support each other
Check your ideas meet the requirements	Discuss every idea suggested	Be committed & consistent	Be respectful & listen
		Be positive	

GCSE Knowledge Organiser – Drama Techniques

Explorative Techniques – These are used during the rehearsal process and the devising of the drama to build on ideas and develop deeper characterisation.

Naturalistic Techniques – These are included when you want the audience to believe what you are presenting them with, when you want them to make connections with the action on stage or feel a particular way towards a character.

Abstract Techniques – These are structured into the work when you want to make a statement. Either a strong start to the piece or convey a strong message to the audience or to show the range of skills and disciplines, you as an actor, can display.

Always Remember

You need to have a firm decision before you start the devising process of what the purpose of your drama is. This will always influence how you structure it and what techniques you use.

Experiment with techniques, don't just always use the same ones. The technique you pick might not necessarily be the right one at that point so always have as many ideas as you can.

Always make sure you have included the key features of each technique you use. This will ensure you have the most effective piece and shows your discipline as an actor.

Listen to the ideas and suggestions of others, they may be really great! Using techniques is all about trial and error and learning from experience.

The more techniques you use, the more you will remember. The more you remember the more you will use, which will lead to a better piece of drama!

Key Techniques and Glossary

Explorative Techniques	Naturalistic Techniques	Abstract Techniques

Conscience Alley - Students form two lines that face each other. A character walks down the middle and the sides shout opposing opinions, ideas, thoughts etc

Hot Seating – A character is questioned on their motivation, decisions, behaviour or background. The method is used to develop a role

Role on the wall – This is a written document that explores the facts and feelings of a character throughout the piece

Forum Theatre – The observers are encouraged to stop the action when they feel necessary and suggest different actions. The actors can also ask for help

Role Play - The imitating of characters, behaviour, locations and situations that are different from yourself

Still Image - This is a static picture that is used to represent people, objects, situations but also abstract concepts like emotions or atmospheres

Spoken Thoughts - When the action freezes and a character speaks his/her **thoughts** aloud in order to add tension, provide information, or for some other purpose.

Narration - The act or process of telling a story or describing what happens. This is usually directed at the audience and can fill gaps between events/scenes.

Slow Motion - To move your body at a slow rate and maintain this slow pace for a period of time.

Marking the Moment - A **dramatic** technique used to highlight a key **moment** in a scene or role play. This can be done in a number of different ways: for example through slow-motion, a freeze-frame, narration, thought-tracking or music.

Choral Speaking - A group of actors narrating a poem or dramatic piece. This is often using various voice combinations and contrasts to bring out the ***meaning***.

Sound Scape - A combination of sounds and/or words that try to create a location or environment by being performed with a variety of skills EG volume, repetition, pace.

Essence Machine - Using simple repetitive sounds and movements that builds a picture of a location, event or situation. Each member of the group repeats one sound and one action three times.

Physical Theatre - Where you use your own body or group of bodies to physically create a prop. Focusing on using physical movement to tell a story.

System of Movement - Each member of the group has a series of actions conveying a character or location. Each action is held for four seconds before the actor moves to another position on the stage. This is usually done in silence in time with music.

Cross Cutting/ Split Screen - Two or more scenes are present on the stage at the same time and are intercut to develop a story or characters. Whichever action is moving the others remain still.

Flashback/ Flash forward - Is a short scene in the story, earlier or later than the main idea, that interrupts the normal chronological order of the story.

Mime - A technique where action, character and emotion are suggested, without words using only expression, gesture and movement.

Exposition - Is performed in role as the character and is designed to give important information to the audience quickly. Usually a character's name, age and information on the plot, other characters, past events or a back story.

Direct Address - Where the actor in or out of character speaks directly to the audience to create irony, inform them of off stage action or involve them in the drama.

Chair Duets – A choreographed number of movements put together to explore a theme, story or relationship. It must involve the chairs or be in close proximity throughout.

Knowledge Organiser – Scripted Drama

KEY VOCABULARY

Pitch – How high or low your voice is.

Pace – The speed at which you speak or move.

Tone – How you want to sound, usually an emotion or feeling.

Emphasis – Drawing attention to a word, phrase or movement by adjusting it.

Interpretation – Your end product based on how you understood the meaning.

Intention – This is what you aim to achieve.

Established – Something well thought out, planned and consistent.

Demeanor – The way your character behaves to convey feeling or emotion.

Refine – To improve something with minor changes.

Dramatic aim – Choices you make to communicate meaning or ideas.

Impact – A strong effect or influence.

CHECK YOUR PROGRESS

I have demonstrated an **extensive range** of skills.

My skills are deployed **precisely** and in a **highly effective** way.

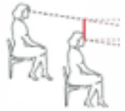
My personal interpretation is **entirely appropriate** to the play as a whole.

My personal interpretation is **highly sensitive** to the context.

I have **entirely achieved** my artistic intentions.

Always Remember

The sightline is the view of the **audience**



You are always assessed as an individual

You get separate marks for each performance in your exam

You must learn all of your lines you cannot adlib.

To get a better understanding try to read the whole play not just the sections you perform

Use your creativity but remember to remain appropriate to the context

Split your character's aims up into the extract, smaller sections and even each line to achieve the best impact

Try improvising around your script to explore your character and the context of the scene

Experiment with a range of performance skills to create the most effective and appropriate character

Demonstrate internal and external energy throughout no matter how many times you have done it before

The examiner is a stranger and you will only get to perform once!

YOUR OBJECTIVES

- Remember all your lines.
- Remember all your movements.
- Understand the play from which the excerpts come.
- Project and vary your voice.
- Stay in character even when you are not speaking.
- Listen and react to others.
- Be confident about what comes next.
- Maintain your focus and energy throughout your performance.
- Establish your character by the way you speak and move.
- Create the world of the play through your use of the performance space.
- Achieve your artistic intentions for the role.

SKILLS TO CONSIDER

Pitch ***Pace*** ***Emphasis*** ***Tone*** ***Volume*** ***Pause***

Accent ***Facial Expressions*** ***Posture*** ***Gait***

Mannerisms ***Eye Contact/ Withdrawal*** ***Movement***

Proxemics ***Actions/ Gestures*** ***Direct Address***

Status ***Setting the Scene*** ***Open/ Closed Expression***

KEY QUESTIONS

Where do your extracts fit in the play as a whole?

What is the purpose of your character?

How will you create the setting?

Are your props and costume essential and appropriate?

What effect are you creating for your audience?

How far removed is your character from yourself?

Have you experimented with your vocal, facial and physical expression?

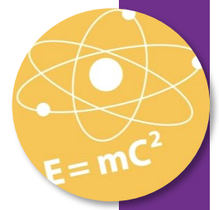
Are your character's reactions accurate?

Are you making the most of your staging?

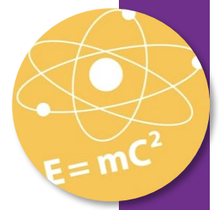
Are you supporting your fellow performers?

Have you thought about drama techniques?

Notes



Notes



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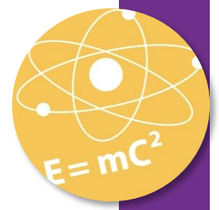

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