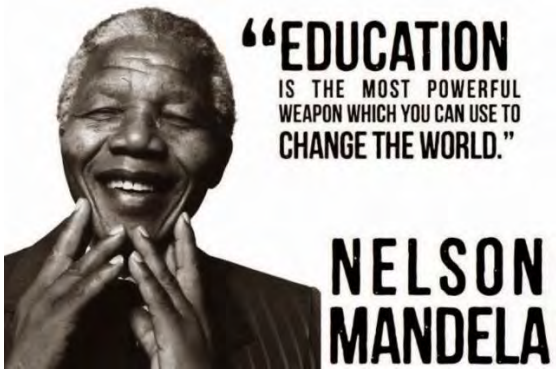
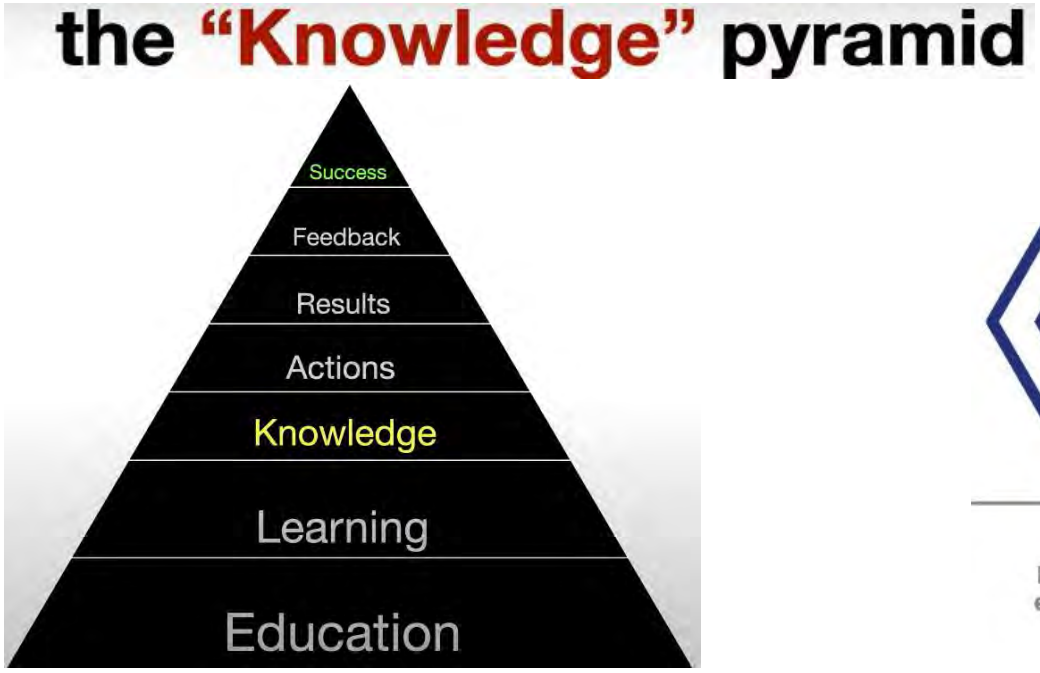
Westhoughton High School

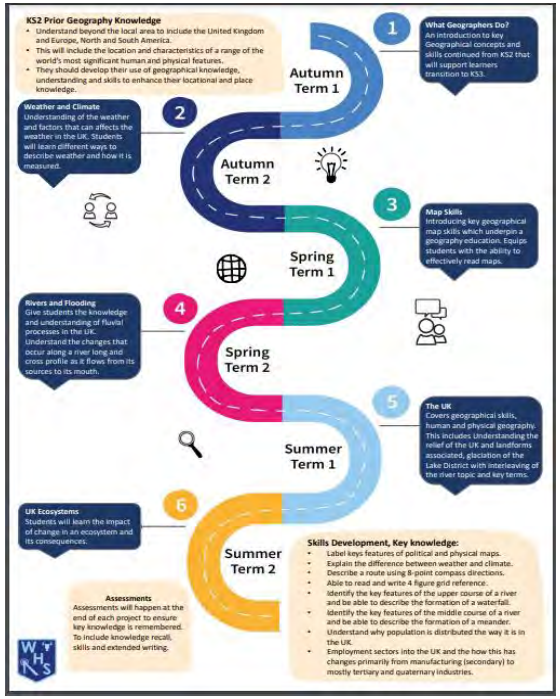
Year 9 – Autumn Term -





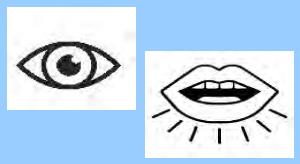
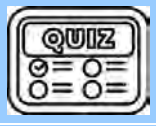
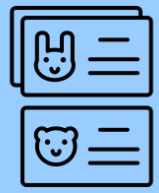
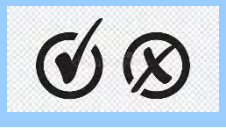
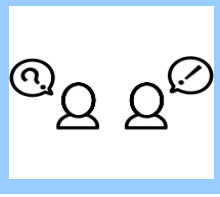
Introduction

The curriculum in each of your subjects at WHS has been carefully planned to help you learn new things, building upon what you know and preparing you for learning in the future. This is mapped out as a learning journey which each teacher will share with you, so you understand how your learning fits together as a whole. Each subject's roadmap is here https://www.westhoughton-high.org/subjects/.

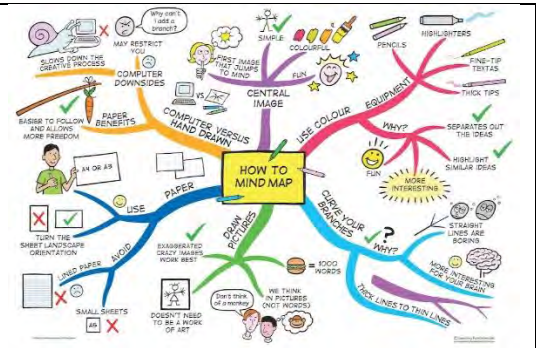
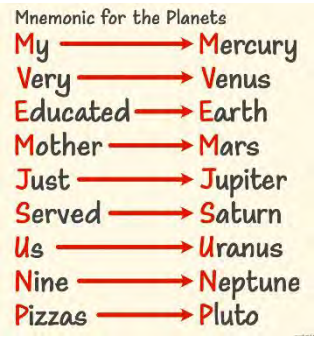


This booklet contains knowledge organisers for all the topics you will study in each subject this term. These give an overview of the essential knowledge that you MUST remember to be as successful as possible in Year 9 and as you move through each year of school. Your teachers will expect you to use them during lessons to find out about what you are going to be learning in a new topic, to retrieve information during a connect activity – connecting your brain to what you are going to learn that lesson and to test yourself or others to recall knowledge. You will also use them to complete home learning activities, to regularly revise from so that you begin to remember more knowledge over time, to discuss what you have been learning with family and friends and to catch up on any learning you might have missed due to absence. You must bring your booklet to school every day and keep it safe at the end of each term as you will continue to use it to support ongoing revision.

Learning Techniques to use with KOs – using them regularly is vital to make knowledge stick in your long-term memory (remember you need to revisit information at least 10 times before it is embedded in your memory).
Try using these ideas, choose different techniques to learn small sections of knowledge each day.

	Look, Say, Cover, Write, Check	Key Word Definitions	Flash Cards	Self-Quizzing	Mind Maps	Paired Retrieval
STEP 1	Look at and read aloud a specific area of your KO. 	Write down the key words and definitions in two columns. 	Use your KO to condense and write down key facts or information onto flash cards. 	Use your KO to create a mini quiz. Write down your questions relating to the information. 	Create a mind map with the information on your KO. 	Ask a partner, friend or family to use the KO or your flash cards. 
STEP 2	Cover or flip the KO over and write down everything you remember. 	Repeat the above but don't look at your KO 	Add pictures that might help you remember. Then self-quiz using the flash-cards. 	Answer the questions, remember to use full sentences. 	Check your KO to make sure there are no mistakes on your mind map. 	Make sure they test you on different sections of the KO and also on previous topics. 
TEP 3	Check what you have written down. Correct any mistakes and add anything you missed in purple pen. 	Use a purple pen to check and correct your work 	Ask a friend or family member to quiz you on your knowledge. 	Ask a friend or family member to quiz you using the questions. 	Try to make more connections, link the information together where you can. 	Repeat this regularly so that you are frequently looking at KOs past and present. 

How to make learning stick…

Mind Mapping	Flash Cards	Look, Say, Cover, Write, Check	Key Word Mnemonics	Revision Clocks
				
Mind mapping is a great way of representing key information from a topic in a visual way. Use colour and images to represent the knowledge you need to learn. Keep writing to a minimum; use only keywords/phrases. Watch the clip for more tips and advice.	Make flash cards using your KO. Write a question on one side and the answer on the other or record key- words and definitions. Test yourself frequently. For more advice scan the code.	This technique is one that has been well used from primary school upwards. It is useful for rehearsing keywords, definitions and spellings. Look at the information, read it aloud, cover it up, write it down and then check it is correct.	A mnemonic is a sentence you make up where each word begins with the same letter as the word you want to remember. It is a useful technique for remembering a group of facts/words in a certain order.	Draw a basic clock and break your KO down into 12 chunks. Make notes on each chunk in the 12 clock sections, use colour and images to make it memorable. Revise each section for 5 minutes, turn over and test how much you can recall. Watch the clip for more tips and advice.

‘Talk with type’: Knowledge Organiser

Throughout this project you will learn about: letterforms, the design process, painting and surface pattern; art direction and photography.

How to : reflect on the work of selected artists’ then create your own positive messages responses using similar processes

Rationale: We want you to become familiar with the work of ‘letterform artists’ in a variety of media. This will help you to understand the power of Words in design and our environment.

A typeface is the design of lettering that can include variations in size, weight, slope, width.
Each of these variations of the typeface is a font. There are thousands of different typefaces in existence, with new ones being developed constantly.

READ THESE :

https://www.blocal-travel.com/street-art/manchester-street-art-guide/

https://www.instagram.com/streetartcities/?hl=en

WATCH THESE:

https://www.youtube.com/watch?v=-GObJBkS5cw

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

https://www.youtube.com/watch?v=qH_NII8FF68

TRY THIS.. PRACTICE YOUR LETTERING:

https://www.youtube.com/watch?v=S-HP_dcVskk

https://www.youtube.com/watch?v=VFK7Bt7kfSY&t=4s

https://www.youtube.com/watch?v=r2cSl5BF4zc

Key Words and Definitions	
Typeface	The design of lettering
Font	The variations of a typeface
Street art	Artwork that is created in a public space
Graffiti	Writing or drawings scribbled, scratched, or sprayed illicitly on a wall or other surface in a public place.
Graphic design	The art or skill of combining text and pictures in advertisements, magazines, or books.
Serif	A slight projection finishing off a stroke of a letter in certain typefaces.
Sans serif	Without serifs.
Typography	The art of arranging type
Inclusive	Embrace all people irrespective of race, gender, disability, medical or other need. It is about giving equal access and opportunities and getting rid of discrimination and intolerance (removal of barriers). It affects all aspects of public life, including inclusive design.

Computing –Privacy and Surveillance

How could data be lost? What could criminals use the data for?

Hacking Accidental deletion Overwriting of files Power cuts Spilled liquids Hard drive worn out Natural disaster e.g. weather Fire	Blackmail Steal identities Make online purchases

Category	Explanation
Legal	Technology provides opportunities to criminals. To help protect people, their data, and their work, several laws have been introduced in the UK.
Environmental	The effect that technology has on the world around us
Cultural	How have society and the ways that we interact been impacted?
Ethical	Considerations about right and wrong, morality and power
Privacy	Once data is put on a computer, it can be easily copied or shared. In some cases, people have a right to choice in this matter.

Computers and the Law

Data Protection Act (DPA) 2018

Computer Misuse Act 1990

Copyright, Designs and Patents Act 1988

Freedom of Information Act 2000

Data Protection Act

Purpose: To control the way that data is handled and to give legal rights to people who have information stored about them.

Who is it for?: We are all "data subjects". That just means that we have data stored about us and have the right to have the data looked after properly and have the right to see that data. This is called the 'right of subject access'.

Who makes sure that companies stick to DPA? **Data Controller (DC) and Information Commissioner's Office (ICO)**

The DC is the person who is responsible for ensuring that the organisation stays within the principles of the Data Protection Act.

The ICO makes sure that the companies keep to the rules, and fines those that don't, sometimes heavily.

The principles of the Data Protection Act 2018

1. Personal data must be fairly and lawfully processed
2. Personal data must be obtained for specified, explicit and legitimate purposes
3. Personal data muse be adequate, relevant and not excessive
4. Personal data must be accurate and up-to-date
5. Personal data must not be kept longer than necessary
6. Personal data must be handled in a way that ensures security

Computing –Privacy and Surveillance

Stakeholder

Stakeholders are groups or individuals who will be affected by or can change the way the technology is used.

Right to be forgotten

The right to be forgotten (part of GDPR) means that an individual can request that an organisation erases all their personal data. This right only applies in certain circumstances, e.g. the personal data is no longer necessary for the purpose for which an organisation originally collected or processed it.

Copyright, Designs and Patents Act 1988

The Copyright, Designs and Patents Act 1988 exists to protect people's creations. When a person creates something, they own it. E.g.

A picture, photograph, recording of music, television programme, film, text (book, article or report), algorithm (but only once the source code has been created)

When is it legal to copy, publish, distribute, or sell copyrighted material?

- When you are the copyright holder
- When you have the copyright holder's permission
- When the copyright holder has chosen to give up their copyright

Open Source V's Proprietary Software

Proprietary software cannot be copied/altered (without permission of the copyright owner)

Open source software can be modified (provided it remains open source)

Proprietary software is distributed only as a completed program; the source code is not available

Open source software is distributed with its source code

Creative Commons (CC)

A creative commons licence is one of several public copyright licenses that enable the free distribution of an otherwise copyrighted work.

The work must not be used for commercial purposes and should not be changed

Use appropriately licensed material.

Legal use of other people's work

Credit the creators of the material.

Credit the source/website of the material.

Freedom of Information Act 2000

The Freedom of Information Act was introduced to give **any** member of the public the right to access any information recorded by public sector organisations. These organisations include: Schools, councils, government departments, health trusts and hospitals, libraries and museums.
Requests must be made in writing, either by letter or by email. The organisation then has 20 working days to provide the information.

When doesn't the organisation have to respond?

It would cost too much or take too much staff time to deal with the request
The request is vexatious (designed to create annoyance)
The request repeats a previous request from the same person
In addition, requests cannot be responded to if they contravene data protection or GDPR

Why is the Freedom of Information Act important? It promotes social justice. 'Social justice' refers to creating an equal society where everyone is treated fairly and has equal opportunities. Public organisations act on everyone's behalf and spend money that belongs to everyone; therefore, everyone has a right to know how that organisation operates, and what they spend public funds on.

Computing –Privacy and Surveillance

Computer Misuse Act 1990

The Computer Misuse Act (1990) and its amendments were created so that unauthorised access to computers and crimes committed using a computer could be prosecuted. The act is

PRINCIPLES	LEGAL ACTIONS
Unauthorised access to digital/computer material. This means a person asking a computer to perform any function with the intent of accessing anything on the computer for which they do not have permission, and for which they know they do not have permission.	Punishable by up to two years in prison and a £5,000 fine.
Unauthorised access to digital/computer material with intent to commit or facilitate the commission of further offences. This means a person gaining access to a computer without permission in order to commit another crime or to enable someone else to commit a crime.	Punishable by up to five years in prison and an unlimited fine determined by the damage caused and the severity of the crime.
Unauthorised acts with intent to impair, or with recklessness as to impairing, the operation of a computer. This means a person intentionally impairing the operation of any computer or program, or intentionally preventing access to any data or program on any computer. This includes creating or supplying materials that could be used to carry out this offence.	Punishable by a prison sentence of up to ten years and an unlimited fine, but if the act puts life at risk or endangers national security, the sentence may be extended to life imprisonment.

Cultural impact of technology

'Culture' means 'relating to the ideas, customs, and social behaviour of a society', i.e. 'how we do things around here'. 'Impact' means 'to have an effect on something'.

- Impact on daily lives
- Digital Divide
- Globalisation

E-Waste

Use of non-recyclable materials, Depletion of rare chemical elements, Harmful effect of pollution caused by disposal and recycling to environment and health of recyclers through exposure to toxins.

Downtime

'Downtime' describes situations where an organisation loses some or all of its IT systems for a period of time. This could be for any number of accidental or deliberate reasons, including:

- Planned maintenance and system upgrades
- Power or ISP failure
- Cyberattacks
- Human error
- Natural disasters

Artificial Intelligence (AI)

Artificial intelligence is technology that enables a computer to think or act in a more 'human' way.

Algorithm

An algorithm is a set of instructions that describes how to get something done.

The Digital Divide

The digital divide is the division that exists between people who have access to and can use technology, and people who don't have access or cannot use it:

People who live in rural areas-Slower internet speeds, delayed access to repairs

People who live in developing countries

People in low-income households

People with poor computer skills

Elderly people

Some people who have disabilities

The Investigatory Powers Act 2016

This act sets out rules on the use of investigatory powers by the police and security and intelligence agencies. Phone companies and internet service providers are required to keep copies of users' emails and browsing histories for 12 months. It also gives the police and security services the authority to access computers and phones to search for data.

Computing—How Computers Work Name_____

Device	What is it?	Input, Output or Storage ?	What it is used for ?
	Monitor	Output	Displaying images and text.
	Mouse	Input	Navigating and selecting items on a screen.
	Optical Storage: Blu-ray, CD or DVD	Storage	Storing files e.g. documents, movies and audio.
	USB Flash Memory Stick	Storage	Backing up or transferring data from one computer to another.
	Keyboard	Input	Typing.
	Printer	Output	Printing.
	Hard Disk Drive	Storage	Storing applications and files.
	Speakers	Output	Audio.
	Scanner	Input	Scanning to store digitally/electronically.
	Sim Card	Storage	Storing mobile phone contacts.
	Webcam	Input	Using video calling over the Internet.
	Headphones	Output	Listening to audio

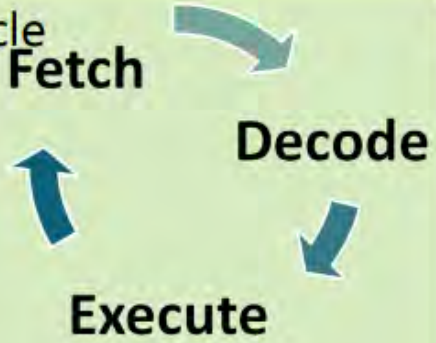
Key Terms

Hardware	Objects that you can touch, like a keyboard, mouse, monitor etc.
Application Software	You cannot 'touch' software. Software refers to the programs that run on a computer. Examples of software: Windows, MS Word, MS Excel, Publisher etc.
Input Devices	An **input device** is computer hardware, which is used to enter data for processing. Examples of **input devices** include keyboard, mouse, image scanner, digital cameras and joysticks.
Output Devices	An **output device** is any hardware **device** used to send data from a computer to another **device** or user. Typical examples of **output devices** are monitors, projectors, headphones, speakers and printers.
Storage Devices	A piece of computer equipment on which information can be stored.

Key terms

CPU	The central processing unit, is a large chip inside the computer. It is known as the brains of the computer.
RAM (Random Access Memory)	RAM is both readable and writable. You can add, change and delete data stored in RAM. It is volatile. When the computer is switched off, all the data stored in RAM is lost. It is fast to read/write.
ROM (Read only Memory)	ROM is read-only. ROM is non-volatile memory, which means it does not need power to keep the data inside it.
Hard Drive	The hard drive (sometimes called the hard disk) is the main storage device in your computer. If you have files and folders on your computer, they are stored on the hard drive. The operating system is also stored on the hard drive.
BIOS (basic input output system)	Contains all the basic code for controlling your computer hardware (such as keyboards, mice, monitors and hard drives).

The Fetch-Decode-Execute Cycle



FETCH

Instructions are loaded into memory (RAM) before the processor starts running the program. Each instruction is the fetched from memory (in order) and put into the appropriate registers. The control unit can then access the instruction for the next stages.

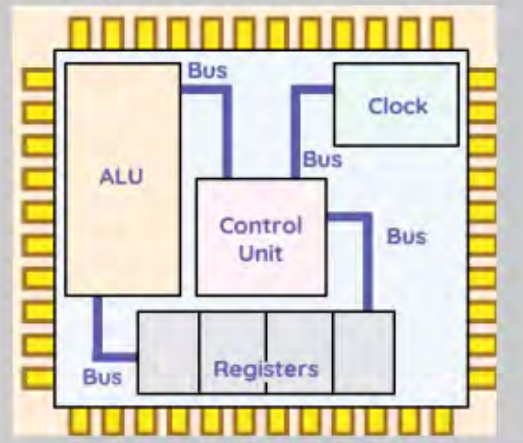
DECODE

The binary representation of an instruction needs to be decoded before it can be run. This is the process the control unit uses to work out what the other components need to do. Each processor will have slightly different encodings for instructions.

EXECUTE

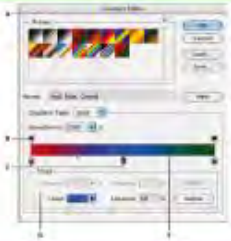
Once the instruction is understood, the instruction will be executed. The control unit will tell the other components what they need to do in order for the instruction to work.

The CPU Key Terms



The Control Unit	The control unit runs the show. It understands the instructions and tells the other components what each instruction needs from them. It manages the instructions and controls the other components.
Arithmetic logic unit (ALU)	The ALU is the calculator of the CPU. It handles mathematical and logical operations that are required as part of an instruction. It manages calculations and logic.
Clock	The CPU contains an internal clock that is used to regulate the number of cycles carried out per second and synchronise the other components. It manages the cycles per second.
Registers	These are very small, very fast memory locations located inside the CPU. There are a few key registers. **(MAR)** Memory address register stores memory addresses used when searching for data in RAM. **(MDR) Memory data register** Stores the data when fetched from memory. **Current instruction register (CIR)** Holds the binary representation of the instruction to be executed. **Program counter (PC)** This register counts up as each instruction is executed, keeping track of how many instructions are in a program. **Accumulator (Acc)** Stores important data being used in calculations.

Computing—Graphics: Photopea Name_____

Tool	What it is used for ?
Image Editing/Graphics Software	Software programs that allow you to manipulate digital images.
Brush 	A brush tool is one of the **basic tools found in graphic design and editing applications**. It is a part of the painting tool set which may also include pencil tools, pen tools, fill colour and many others. It allows the user to paint on a picture or photograph with the selected colour.
Spot Healing Brush	The spot healing brush can be used to clone areas from an image and blend the pixels from the sampled area seamlessly with the target area. The basic principle is that the texture from the sample area is blended with the colour and luminosity surrounding wherever you paint.
Clone	The clone tool is used in digital image editing to replace information for one part of a picture with information from another part. In other image editing software, its equivalent is sometimes called a rubber stamp tool or a clone brush.
Text	This *tool* allows *text* to be typed onto the current layer using the Primary colour. The *Text* Controls in the *Tool* Bar can be used to change the font.
Gradient 	The Gradient tool **creates a gradual blend between multiple colours**. You can choose from pre-set gradient fills or create your own. Note: You cannot use the Gradient tool with bitmap or indexed-colour images. To fill part of the image, select the desired area.
Adjust white balance levels	White balance is **the adjustment of a digital photograph to make its colours appear more realistic** 
Face Remixing	**Mix faces together in different combinations**.
Adjustment Layers	An adjustment layer **applies colour and tonal adjustments to your image without permanently changing pixel values**.
File Formats for digital Graphics	PSD, TIFF, PNG, JPEG, GIF
Best file type for printing	TIFF
Best file type for online use	PNG/JPEG

- To look at
- To examine in detail to explain and interpret

1. Investigate
2. Explore
3. Extract

ANALYSE

- In Year 9 you will be Analysing a Designer and a Design Period.
- You will analyse both Zaha Hadid and Art Deco
- Your analysis will help you when you Design.

Zaha Hadid

Iraqi-British architect and designer, recognised as a major figure in architecture

In search of an alternative to traditional architectural drawing, and influenced by Suprematism (Geometric shapes, deconstructivism-broken up shapes).

Hadid adopted painting as a design tool and abstraction (to pull away and detach) as an investigation.

She was described by some as the "Queen of Curves", who "liberated architectural geometry, giving it a whole new expressive identity".

Her major works include the London Aquatics Centre for the 2012 Olympics, Vitra fire station, Evelyn Grace Academy and the Guangzhou Opera House,

Hadid was the first woman to receive the Pritzker Architecture Prize in 244. She received the UK's most prestigious architectural award, the Stirling Prize, in 2010 and 2011. In 2012, she was made a Dame for services to architecture, and in February 2016.

Design in the style of Zaha Hadid

Daring sharp angles
Zig Zag

Swooping curves
Flowing waves

Shapes linked location
Waves like the water

1st; Doodle thoughts
Initial ideas are quickly sketched

2nd Card Model design ideas
Make parts to scale

3rd Develop into a final idea
- S.C.A.M.P.E.R:
(Substitute, Change, Alter, Move, Place, Reduce)
- Prototypes

4th Make
Cut, Shape and finish into a working product

To put together

Practical activity

1. Construct
2. Join

MAKE

In Year 9 we will be **making** your own design idea.

You will use tools to **make** the parts.

It will be **made** from either Plywood or Jelutong.

Key Concepts	
Quality	The grade of excellence • How good something is / looks • How well it is made
Identical	• You will cut 2 identical parts • The 2 parts could have equal measurements to allow the for-slot construction to be accurate
Engineering Tolerance	• Measure and cut within an acceptable range, to allow parts to fit together without gaps.
Precision	• Across all aspects of making, I have no errors.

Select Material
Ply or Jelutong

- Ply is manufactured board, it has layers of 3mm, flat surface, easy to cut but can splinter
- Jelutong is a hardwood. These properties such as the low density, straight grain and fine texture mean it is easy to work.

Select and Use the correct equipment

1. Measuring: Pre-Made Templates; to draw around the outside shape, Steel Ruler; working in millimetres to measure the correct length cuts
2. Marking Out: Marking gauge; to score across the wood surface, Scribe to scratch the surface , Centre punch; to mark drill hole.
3. Wasting (Removal of materials);

- Cutting: Fret Saw, Coping Saw, Tenon Saw, Pad Saw, Junior Hack saw
- Drilling: Hand drill, Pillar Drill
- Shaping; Rasp, Files (various profiles)

Joining parts together to create a self-supporting product

Slot Construction

Notch Construction / Tab and Slot

Dowel Joint

Surface Decoration

Pyrography

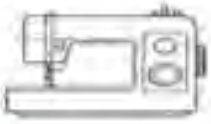
Applying heat to create the textured pattern

Dremel

Removing materials to create the textured pattern

- To look at
- To examine in detail to explain and interpret

1. Investigate
2. Research
3. Explore



TEXTILES ANALYSE

- In Year 9 you will be Analysing the ART DECO Design Period.
- Your analysis will help you when you Design.

Art Deco

What is Art Deco?
The predominant decorative art style of the 1920s and 1930s, characterized by precise and precise geometric shapes and strong colour. Used mainly in household objects and in architecture.

Design History
It emerged in France in the 1920s and took its name from the Exposition Internationale des Arts Décoratifs et Industriels Modernes, held in Paris in 1925. It was most popular between the years 1925 - 1939

Inspiration
It was an eclectic style that drew on tradition and the mechanised modern world. It celebrated both hand crafted and machine products, exclusive art and mass-produced products in affordable materials.

Background Information
Art Deco is said to be influenced by the world at the time, skyscrapers began to spread across Americas skylines, cruise-liners and planes were becoming more accessible to the average person and Tutankhamun's tomb had just been discovered. All these influences filtered into the elegant design of Art Deco products. The rise of mass production in this era made it possible for all to style their home and selves in this fashion.

Key Designers: Eileen Gray

Key Features or Patterns: geometry features heavily, influenced by transport and skyscraper shapes. Chrome, satin, animal products (e.g. furs, tortoise shell), high gloss woods.

Colours: Silver, black and chrome, gold, bronze, mother of pearl.

Line Styles: geometric, circles, arcs and curves, mathematically drawn. Straight lines. Streamlined shapes

Design in the ART DECO style

Geometric shapes: Art Deco designs often feature Geometric shapes, such as circles, squares and triangles.

To put together

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- Jelutong is a hardwood. These properties such as the low density, straight grain and fine texture mean it is easy to work.

Select and Use the correct equipment

1. Measuring: Pre-Made Templates; to draw around the outside shape, Steel Ruler; working in millimeters to measure the correct length cuts
2. Marking Out: Marking gauge; to score across the wood surface, Scribe to scratch the surface , Centre punch; to mark drill hole.
3. Wasting (Removal of materials);

- Cutting: Fret Saw, Coping Saw, Tenon Saw, Pad Saw, Junior Hack saw
- Drilling: Hand drill, Pillar Drill
- Shaping; Rasp, Files (various profiles)

Joining parts together to create a self-supporting product

Slot Construction

Notch Construction / Tab and Slot

Dowel Joint

Surface Decoration

Pyrography
Applying heat to create the textured pattern

Dremel
Removing materials to create the textured pattern

Year 9 Drama Knowledge Organiser – 1984

1984

This is a dystopian novel and cautionary tale by English writer George Orwell. The story takes place in an imagined future. Great Britain, now known as Airstrip One, has become a totalitarian superstate which is led by Big Brother, a dictatorial leader supported by an intense cult. The Party engages in surveillance and persecutes individuality and

Performance Techniques	
Repetition	The action of repeating something that has already been said or done
Creation of atmosphere	Using performance skills to create a particular feel or mood in a scene
Physical Theatre	Physical movement is the primary method of storytelling
Proxemics	The amount of space that people feel it necessary to set between themselves and others
Dialogue	A conversation between two or more people as a feature of a play

Tasks for this topic:

- Explore the links from the novel to our society
- Use dialogue to create stylised performance work to represent control
- Examine how character interact depending on relationships and mood
- Use movement to create a story
- Use your performance skills to create an atmosphere to your work

YEAR 9 AUTUMN TERM KNOWLEDGE ORGANISER:
DYSTOPIAN NIGHTMARES
THE HUNGER GAMES BY SUZANNE COLLINS

Plot Overview: In a dystopian future, the totalitarian nation of Panem is divided into 12 districts and the Capitol. Each year two young representatives from each district are selected by lottery to participate in The Hunger Games: a televised fight to the death.

Chapter	Plot Summary
Chapter 1	• Introduction to Katniss Everdeen (the protagonist). • District 12 on the day of the reaping. • Katniss and Gale go poaching outside of the boundaries. • Prim's name (Katniss' younger sister) is drawn in the reaping for the Hunger Games.
Chapters 2-3	• Katniss takes Prim's place as tribute. • Peeta Mellark is drawn as the male tribute. • Katniss recalls Peeta being kind to her when she was starving after her father's death. • They say goodbye to their families. Katniss receives a gold pin of a bird.
Chapters 4-6	• Haymitch introduces himself as Katniss and Peeta's mentor. • Cinna, their stylist, dresses them as flames for the opening ceremony – a huge success with the public.
Chapters 7-9	• Training: Peeta is an excellent wrestler; Katniss is a skilled archer. • Katniss scores highly in training and attracts sponsors.
Chapters 10-12	• TV interviews: Peeta reveals his love for Katniss (a tactic to make them desirable to the public). • The Hunger Games begin. • Peeta joins career tributes and they hunt as a tribe; Katniss is alone.
Chapters 13-15	• Katniss rests up a tree after escaping a large fire. • The career pack attempt to kill her. • Katniss saws down a tracker jacker nest, killing one and causing the others to flee. • Katniss is stung – she hallucinates and passes out. • Alliance: Rue (District 11) helps Katniss with her stings.
Chapters 16-18	• Katniss and Rue raid the career pack's supplies – the Mockingjay call is their signal. • Rue is killed by a boy from District 1. • Katniss mourns Rue's death. • The rules are changed – recruits from the same district can now both win.
Chapters 19-21	• Alliance: Katniss finds an injured Peeta (his leg is infected). He needs medicine. • An announcer informs the tributes that something they need is at a 'feast'. • Katniss risks her life to get the medicine for Peeta.
Chapters 22-24	• Peeta is rejuvenated after receiving the medicine. • More tributes die (Thresh from District 11 is killed and Foxface from District 5 eats poisonous berries). • Katniss and Peeta take the berries to give to the last member of the careers pack: Cato. • Cato runs past them – he is being chased by something.
Chapters 25-27	• They realise that Cato is being chased by muttations – wolf-like creatures. • Final fight: Katniss shoots Cato with an arrow as he attacks Peeta. He is mutilated by the muttations. • The announcer informs the rules have been reversed: only one tribute can win. • Katniss and Peeta attempt to kill themselves with the poisonous berries. • Katniss and Peeta are crowned the winners but the Capitol is furious at their rebellious actions.

Key Characters

Katniss Everdeen
Protagonist / narrator / District 12 tribute (volunteer) / 16 years old / mature / responsible for her family / skilled hunter and archer / strong / courageous / resilient / independent

Peeta Mellark
District 12 tribute / Katniss' love interest / strong / loyal / willing to sacrifice himself / kind / charitable / selfless / artistic

Haymitch Abernathy
Only surviving tribute from District 12 / Katniss and Peeta's mentor / alcoholic / previous winner of the Hunger Games / cunning / helpful / manipulative / calculated

Prim
Katniss' younger sister / 12 years old / originally chosen as tribute / sweet / soft-spoken / loves her family / animal – lover / nurturing / requires protection / well-liked

Gale Hawthorne
District 12 resident / Katniss' hunting partner / responsible for his family / hates the Capitol

Cinna
Katniss' stylist for the Hunger Games / modest / kind / understanding / critical of the residents in the Capitol / calm

Rue
District 11 tribute / young / small / similar to Prim / skilled tree climber / Katniss' ally

Effie Trinket
Escort of the tributes from District 12 / vain / materialistic / fashionista / caring

Caesar Flickerman
Host of the Hunger Games / flamboyant / vain / materialistic / entertaining

Mrs Everdeen
Katniss and Prim's mother / mourns her husband / weak / emotional

Cato
District 2 tribute / antagonist / career pack / leader / strong / privileged

President Snow
President of the Capitol and the 12 districts / cruel / manipulative / ruthless

Key Symbols

Mockingjay 	Bread / 'Panem' 	Fire 
Katniss 	Primrose 	Rue 

YEAR 9 AUTUMN TERM KNOWLEDGE ORGANISER:
DYSTOPIAN NIGHTMARES
THE HUNGER GAMES BY SUZANNE COLLINS

Big Ideas

Dehumanisation
The process of depriving a person or group of positive human qualities.

Exploitation
The action of treating someone unfairly in order to benefit from their work.

Hierarchy
A system or structure in which individuals are organised into different levels based on their status, authority or importance.

Oppression
Prolonged cruel or unjust treatment or exercise of authority.

Social Division
Divisions in society associated with social groupings, often causing conflict, inequality and disadvantage.

Context – *The Hunger Games* was written by Suzanne Collins and was published in 2008.

Suzanne Collins: author / her father was in the American Air Force and was a Vietnam veteran / influences: reality TV, TV coverage of the Iraq War, Greek myth: Theseus and the Minotaur, dystopian fiction

Capitalism: The Capitol and the Districts of Panem represent the rich-poor hierarchical divide within capitalist society. The Capitol is characterised by its surplus food, overindulgence, frivolous fashion and consumerism. This is juxtaposed with the rest of the districts – they experience extreme poverty and starvation while providing the manual labour to benefit The Capitol. The Capitol exploit the poor within the Districts through the Hunger Games: a reminder to the Districts who is in control.

The Panopticon: A critical theory, developed by Michel Foucault, stating that the threat of surveillance, as well as all forms of surveillance (CCTV, guards, authority figures) mean that society self-regulates, follows rules and is controlled. In *The Hunger Games*, this is shown through the televised Hunger Games, the Peacekeepers and monitoring devices, such as the jabber jays.

Displacement: A critical theory that examines the identity crisis caused by the forced movement of individuals or groups from their homes due to conflict, persecution or natural disasters. In *The Hunger Games*, this is presented through the forced movement of Katniss and the other tributes to the Capitol, then to the Hunger Games arena.

Nihilism: A critical theory, often associated with Friedrich Nietzsche, that rejects all religious and moral principle. It states that the world has no meaning or structure other than what we give it. In *The Hunger Games*, the reader is presented in a nihilistic world in which evil actions (including murder) can be excused based on necessity and survival.

Modern Mass Media and Technology: A criticism of the way the media and technology is used to indoctrinate, control, limit knowledge and surveille society. In *The Hunger Games*, reality TV promotes and engages its audience with the Hunger Games. Similar to contemporary reality TV shows, it exploits its contestants by forcing them to present themselves as attractive, consumerist objects.

YEAR 9 AUTUMN TERM KNOWLEDGE ORGANISER: DYSTOPIAN NIGHTMARES
TECHNICAL ACCURACY & KEY DEVICES

'FOUR FOR MORE'-THE 4-PART SUCCESS STORY

Part	Key Features
SETTING 	• Introduce your story by focusing on the setting • Describe the weather / environment / surroundings / objects / décor • DEVICES: Personification / pathetic fallacy / symbolism / prepositions / foreshadowing
CHARACTER 	• Describe your character(s) within your setting • One or two characters – keep it minimal • Craft their actions / behaviour to reflect their personality and emotions • DEVICES: Sensory language / similes / metaphors / minimal dialogue
FLASHBACK 	• Include a flashback to teach the reader something about your character and / or their world • Begin this section with a trigger • This memory should contrast your character's current situation • DEVICES: Sensory language / juxtaposition / light imagery / similes / metaphors / symbolism
RETURN TO THE SCENE 	• Begin this section with a trigger that forces your character back to their current world • Offer a glimpse of change / a subtle change to end your story • Return to something that you described in your opening paragraph to create a cyclical structure • DEVICES: Sensory language / personification / pathetic fallacy / symbolism / cyclical structure

Device / Feature

Cyclical structure
The end of the text repeats an idea / image /character from the beginning


Pathetic fallacy
Giving human emotions to something non-human (usually nature)


Foreshadow
Hints / clues of future events


Personification
Giving living qualities to something non-human


Imagery
Metaphors, similes, symbols


Sensory language
Five senses


Juxtaposition
Contrasting ideas / images


Simile
Comparing something to something else: 'as', 'like'


Metaphor
Describing something by stating it is something else


Symbolism
Objects, colours, sounds, places


Tenses

PAST
Something that has already happened
Had / went / said / walked

PRESENT
Something that is currently happening
Have / go / say / walk

FUTURE
Something that will happen
Will have / will go / will say / will walk

Common Homophones

Word Classes

Adjective
Describes a noun or pronoun.
Blue / young / powerful


Adverb
How, when or where something happens.
Furiously / yesterday / here


Preposition
Where something is; the time, direction or cause of something.
On / under / above


Pronoun
Words that replace nouns or noun phrases.
She / he / they


Noun
Person, place, thing, idea or state of being.
Manchester / cat / love


Verb
An action or state of being.
Jump / write / be


To put together

Practical activity

1. Assemble
2. Mix
3. Stir

FOOD & NUTRITION

MAKE

In Year 9 we will be **making** dishes you can cook at home.

You will use equipment to **make.**

It will be **made** following a recipe.

Knife Skills and Techniques

Bridge Method: Make a bridge with your fingers and thumb, place the knife underneath and cut downwards, repeat to cut ingredients to size.

Claw Method: Make a claw with your hand by curling your fingers and then place the knife near your claw sliding it away from the knife as you slice each piece

Hygiene rules in the food room

Wash your hands with anti-bacterial soap

Wear a clean apron

Tie hair up

Make sure your nails are clean and short—no nail varnish

Cover cuts and sores with a blue plaster

Clean work surfaces with sanitiser

Use clean dishcloths and tea towels

Make sure all equipment has been cleaned thoroughly in hot soapy water

Egg Experiments

Sensory Properties off eggs:

1. Garnish- eggs can be cooked and used as a garnish to products (e.g. sliced hard boiled egg)

2. Glazing- beaten whole egg or yolk can be used to create a shiny glaze on pastry. Egg white and sugar creates a crystallised glaze

Nutritional Properties of eggs:

Eggs are a valuable source of high biological value protein, B group vitamins, calcium and phosphorous.

Coagulation

During the cooking process, coagulation happens as the proteins SET.

Raw and partially cooked eggs can contain Salmonella bacteria. Therefore it is advised that eggs should be fully cooked if they are to be eaten by babies, the elderly, pregnant women or frail people.

Pasta making

How is flour turned into pasta?

To review

To look back at

1. Discuss
2. Compare
3. Judge

ANALYSE & EVALUATE

In Year 8 we will be **evaluating** your cooking skills

You will **evaluate** the nutritional information linked to your dishes

Sensory characteristics

- Ingredients are selected for their nutrition, functional and sensory characteristics, as well as provenance and seasonality

Using our senses
A range of senses are used when eating food:
- sight;
- smell;
- hearing;
- taste;
- touch.

A combination of these senses helps to evaluate a food.

Other factors
Other factors also experience the way we feel about food. These include:
- food previously eaten;
- hunger and satiety;
- mood;
- where you eat, e.g. home, canteen, picnic;
- beliefs and values, e.g. religion, culture and tradition;
- social aspects e.g. special occasions, events.

Sight
The size, shape, colour, temperature and surface texture all play an important part in helping to determine your first reaction to a food. Often if a food does not look appetising, then you will not eat it.

Taste
The tongue can detect five basic tastes:
- bitter;
- salt;
- sour;
- sweet;
- umami.

Taste receptors
Our tongues are covered with taste buds, which are designed to sense chemicals in the mouth.

Smell (odour)
The nose detects volatile aromas released from food. An odour may be described by association with a particular food, e.g. herby, cheesy, fishy. The intensity can also be recorded.

Touch
Texture can be assessed through touch. When food is placed in the mouth, the surface of the tongue and other sensitive skin reacts to the feel of the surface of the food. The sensation is also known as mouth-feel.

Taste receptors
Sensitivity to all tastes is distributed across the whole tongue (and indeed other regions of the mouth where there are taste buds), but some areas are more responsive to certain tastes than others.

Smell and taste
Smell (odour) and taste work together to produce flavour. This is the reason why people with a blocked nose find it difficult to determine the flavours of foods.

Hearing/sound
The sounds of food being prepared, cooked, served and eaten all help to influence our preferences. The sound of eating food can alter our perception of how fresh a food is (e.g. crunchy carrots).

Umami
Umami is a savoury taste, often known as the fifth taste. It is a subtle taste and blends well with other tastes. Umami has its own distinct savoury taste, often associated with ripe tomatoes and cheese.

The olfactory system
The olfactory system is the sensory system used for olfaction, or the sense of smell.

Heat exchange/transfer
Cooking requires heat energy to be transferred from the heat source, e.g. the cooker hob, to the food. This is called heat transfer or heat exchange. There are three ways that heat is transferred to the food. They are:
- conduction – direct contact with food on a surface, e.g. stir-frying;
- convection - currents of hot air or hot liquid transfer the heat energy to the food, e.g. baking;
- radiation - energy in the form of rays, e.g. grilling.

Many methods of cooking use a combination of these. The amount of heat and cooking time will vary according to the type of food being cooked and the method being used.

Selecting ingredients
Ingredients are chosen for a number of reasons, such as:
- to add flavour, colour or texture;
- to provide a particular function, e.g. to thicken;
- to provide nutrients or change the nutritional profile of a dish, e.g. to increase fibre;
- to extend the shelf life, e.g. vinegar for pickling or chemical preservatives;
- cost and availability, e.g. fruit in season;
- to satisfy a need to buy food with a certain provenance, e.g. Red Tractor.

Comment t'appelles-tu? – What is your name?
Je m'appelle... – My name is...
Mon meilleur ami/ma meilleure amie s'appelle... – My best friend is called...
Quel âge as-tu? – How old are you?
J'ai treize / quatorze ans – I'm 13 / 14 years old
Quelles langues parles-tu? – What languages do you speak?
Je parle anglaise / français – I speak English / French
De quelle nationalité es-tu? – What nationality are you?
Je suis anglais / anglaise / français / française – I am English / French
Tu passes des heures à faire quoi? – What do you spend hours doing?
Je passe des heures à... – I spend hours...

Tu t'entends bien avec ta famille? – Do you get on well with your family?
Je m'amuse avec mon frère – I have fun with my brother
Je m'entends bien avec mes parents – I get on well with my parents
Avec mes copains/copines, on se confie des secrets – With my friends (m/f), we share secrets
Avec mon copain/ma copine, on se dit tout – With my friend (m/f), we tell each other everything
On s'ennuie emsemble – We get bored together
On s'excuse – We apologise

Year 9 Topic 1: Mon identité – My identity

Qu'est-ce que tu portes normalement? – What do you wear normally?
Normalement je porte... – Normally I wear...
Mon copain/ma copine porte... – My friend (m/f) wears...
Qu'est-ce que tu as porté le weekend dernier? – What did you wear last weekend?
Le weekend dernier j'ai porté... – Last weekend I wore...
Mon père a porté... – My dad wore...
Qu'est-ce que tu vas porter le weekend prochain?
– What are you going to wear next weekend?
Ce weekend je vais porter... – This weekend I'm going to wear...
Ce weekend on va porter... – This weekend we're going to wear...
des baskets – trainers
des chaussures – shoes
une chemise – a shirt
un chapeau – a hat
une jupe – a skirt
un pantalon – trousers
un pull – a jumper
une veste – a jacket
un haut – a top
une robe – a dress
J'ai un style plutôt classique – I have a rather classic style
J'ai un style plutôt sportif – I have a rather sporty style
C'est chic – it's chic/smart
C'est à la mode – it's fashionable
C'est démodé – it's old-fashioned

Quelle musique écoutes-tu? – What music do you listen to?
J'écoute de la musique classique – I listen to classical music
J'écoute de la musique pop – I listen to pop music
Avant, j'aimais écouter du jazz – Before , I used to like listening to jazz
Quand j'étais petit(e), je détestais écouter du jazz
– When I was little, I used to hate listening to jazz
Qui est ton chanteur/chanteuse préféré(e)?
– Who is your favourite singer?
Mon chanteur préféré/ma chanteuse préférée, c'est...
– My favourite singer (m/f) is...
Mon groupe préféré, c'est... - My favourite group is...
J'adore la musique de (Stormzy) – I love Stormzy's music
Je déteste la musique de Justin Bieber – I hate Justin Bieber's music
J'adore la chanson – I love the song
Pourquoi écoutes-tu de la musique? – Why do you listen to music?
Ça me donne envie de danser – it makes me want to dance
Ça me donne envie de pleurer – it makes me want to cry
Ça me donne envie de chanter – it makes me want to sing
Ça me donne envie de dormir – it makes me want to sleep
Ça me rend joyeux / joyeuse – it makes me happy
Ça me rend triste – it makes me sad

Quelles sont tes qualités?
– What are your qualities?
Je suis... – I am...
Je ne suis pas (du tout)... – I am not (at all)...
Je ne suis jamais... – I am never...
Avant / Quand j'étais petit(e), j'étais...
– Before / When I was little, I used to be
Mon meilleur ami / ma meilleure amie est...
– My best friend is...
adorable – adorable
amusant / amusante – fun / funny
casse-pieds – a pain in the neck
drôle – funny
égoïste – selfish
fidèle – loyal / faithful
fier / fière (de) – proud (of)
gentil / gentille – nice/kind
intelligent / intelligente – intelligent
paresseux/paresseuse – lazy
patient / patiente – patient
pénible – a pain in the neck / annoying
sympa – nice

Year 9 Topic 1: Transferable language

Porter – to wear

Present tense

Je porte – I wear
Tu portes – You wear (singular / informal)
Il porte – He wears
Elle porte – She wears
On porte – We wear
Nous portons – We wear
Vous portez – You wear (plural / polite)
Ils portent – They wear (m / m+f)
Elles portent – They wear (f)

Perfect tense

J'ai porté – I wore
Tu as porté – You wore (singular / informal)
Il a porté – He wore
Elle a porté – She wore
On a porté – We wore
Nous avons porté – We wore
Vous avez porté – You wore (plural / polite)
Ils ont porté – They wore (m / m+f)
Elles ont porté – They wore (f)

Immediate future tense

Je vais porter – I'm going to wear
Tu vas porter – You are going to wear (singular / informal)
Il va porter – He's going to wear
Elle va porter – She's going to wear
On va porter – We're going to wear
Nous allons porter – We're going to wear
Vous allez porter – You are going to wear (plural / polite)
Ils vont porter – They are going to wear (m / m+f)
Elles vont porter – They are going to wear (f)

s'amuser – to have fun
s'entendre – to get on
se confier des secrets – to share secrets
se dire tout – to tell each other everything
s'ennuyer – to get bored
s'excuser – to apologise to each other

Jean est plus *amusant* que Pierre – Jean is more *fun* than Pierre
Marie est moins *amusante* que Danielle – Marie is less *fun* that Danielle

Le chanson est le plus amusant – The song is the most fun
La musique pop est la plus amusante – Pop music is the most fun

Le meilleur / la meilleure – the best
Le pire / la pire – the worst

Se disputer – to argue

Je me dispute – I argue
Tu te disputes – You argue (sing. / informal)
Il se dispute – He argues
Elle se dispute – She argues
On se dispute – We argue
Nous nous disputons – We argue
Vous vous disputez – You argue (plural / polite)
Ils se disputent – They argue (m / m+f)
Elles se disputent – They argue (f)

Etre – to be

Je suis – I am
Tu es – You are (singular / informal)
Il est – He is
Elle est – She is
On est – We are
Nous sommes – We are
Vous etes – You are (plural / polite)
Ils sont – They are (m / m+f)
Elles sont – They are (f)

S'entendre bien – to get on well

Je m'entends bien – I get on well
Tu t'entends bien – You get on well (sing. / informal)
Il s'entend bien – He gets on well
Elle s'entend bien – She gets on well
On s'entend bien – We get on well
Nous nous entendons bien – We get on well
Vous vous entendez bien – You get on well (plural / polite)
Ils s'entendent bien – they get on well (m / m+f)
Elles s'entendent bien – they get on well (f)

blanc / blanche – white
bleu (foncé/clair/marine) – (dark/light/navy) blue
gris / grise – grey
jaune – yellow
marron (chocolat) – (chocolate) brown
noir / noire – black
orange – orange
rouge – red
rose – pink
vert (kaki) – (khaki) green
violet / violette – purple

Year 9 Topic 1: El colegio – School

¿Te gusta el inglés? - Do you like English?
Me gusta el inglés – I like Engliish
¿Te gustan las ciencias – Do you like sciences?
Me gustan las ciencias – I like science

¿Qué estudias? - What do you study?
Estudio inglés – I study English
Estudio ciencias – I study sciences

(el) dibujo – art
(el) inglés – English
(el) español – Spanish
(el) teatro – drama
(la) música – music
(la) religión - RE
(la) historia – history
(la) tecnología – DT
(las) ciencias – sciences
(las) matemáticas – maths

El profesor/La profesora es... - The teacher is...
Los profesores / Las profesoras son... - The teachers are...

¿Qué hora es? – What time is it?
Es la una – It is one o'clock
Son las dos – It is two o'clock
y cinco – 5 past
Y diez – 10 past
Y cuarto – quarter past
Y veinte – 20 past
Y veinticinco – 25 past
Y media – half past
Menos cuarto – quarter to

¿A qué hora? – At what time?
A la una – At one o'clock
A las dos – At two o'clock

¿Qué haces durante el recreo? –
What do you do during break?
Durante el recreo... - During break
Durante la hora de comer – During lunch

Como... - I eat...
un bocadillo – a sandwich
fruta – fruit
unas patatas fritas – some crisps
pan con tomate – tomato bread
pescado – fish
tortilla – omelette
paella – paella
chocolate – chocolate
arroz - rice

Bebo... - I drink
agua – a bottle of water
leche – milk
un café – coffee
un té – tea

Leo – I read
Escribo – I write
(No) hago mis deberes –
I (don't) do my homework

¿Qué hay en tu insti(tuto)? –
What is there is in your school?
En mi instituto hay... – In my school there is...
un gimnasio – a gym
un patio – a yard
una clase de informática – an IT room
una piscina – a swimming pool
una biblioteca – a library
unas clases – some classrooms
No hay (gimnasio) – there isn't (a gym)

¿Qué quieres? - What do you want?
Quiero... - I want...
Quisiera... - I would like...
¿Algo más? - Anything else
No, nada más - No, nothing more
¿Y de beber? - And to drink?
¿Cuánto es? - How much is it?
Es un euro - It's one euro
Son dos euros - It's two euros
Son tres euros setenta –
It's three euros seventy

Year 9 Topic 1: Transferable Knowledge

Me gusta(n) – I like
Me gusta (n) mucho – I really like
Me encanta(n) – I love
Prefiero – I prefer
No me gusta(n) – I don't like
No me gusta (n) nada – I really don't like
Odio – I hate
Me gustaba(n) – I used to like
No me gustaba(n) – I didn't used to like
Antes odiaba – I used to hate
Me gustaría – I would like
Quiero – I want
Quisiera – I would like
Tengo – I have
Hay – There is
No hay – There isn't

Mi día preferido es el... -
My favourite day is
lunes - Monday
martes - Tuesday
miércoles - Wednesday
jueves - Thursday
viernes - Friday
sábado - Saturday
domingo - Sunday

porque - because
es – it is
no es – it isn't
son – they are
era / eran – it was / they were
sería / serían – it would be / they would be
muy – very
bastante – quite
un poco – a bit
aburrido / aburrida / aburridos / aburridas – boring
divertido / divertida / divertidos / divertidas – fun
práctico / práctica / prácticos / prácticas – practical
simpático / simpática / simpáticos / simpáticas – kind
moderno / moderna / modernos / modernas – modern
antiguo / antigua / antiguos / antiguas – old
bonito / bonita / bonitos / bonitas – pretty
pequeño / pequeña / pequeños / pequeñas - small
grande / grandes – big
difícil / difíciles – difficult
fácil / fáciles – easy
útil / útiles – useful
inútil / inútiles - useless
interesante / interesantes – interesting

Por la mañana – In the morning
Por la tarde – In the afternoon
Por la noche – In the evening

A
Un = masculine
Una = feminine
Unos = masculine plural
Unas = feminine plural

The
El = masculine
La = feminine
Los = masculine plural
Las = feminine plural

Por favor - Please
Gracias – Thank you

Estudiar – to study
Estudio – I study
Estudias – you study
Estudia – he/she studies
Estudiamos – we study
Estudiáis – you plural study
Estudian – they study

En el futuro, me gustaría estudiar – I would like to study
Antes me gustaba estudiar – Before I used to like to study

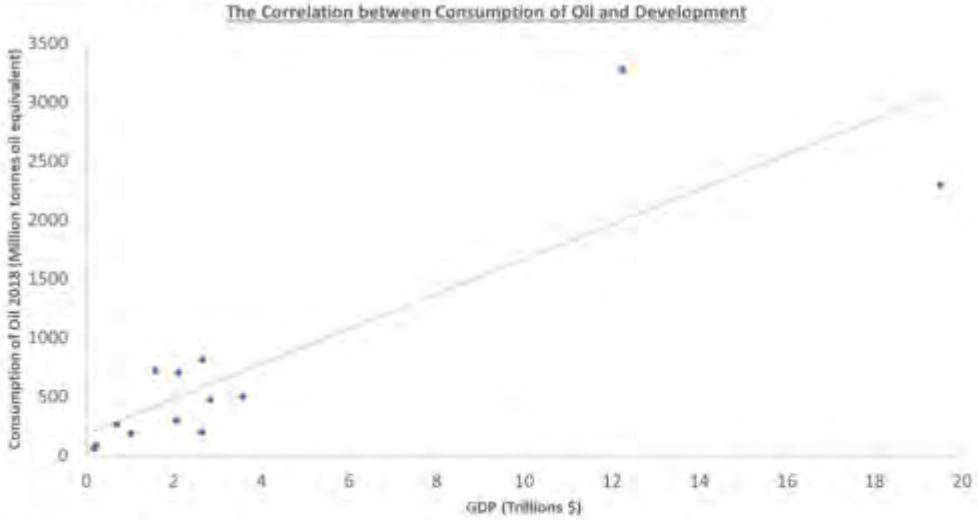
1. Resource Management

Resources are things that humans require for life or to make our lives easier. Humans are becoming increasingly dependent on **exploiting** (making use of) these resources, and as a result they are in high demand. Resources such as food, energy and water are what is needed for basic human development. For example without enough nutritious food, people can become **malnourished**. This can make them ill . This can prevent people working or receiving education. There are significant global differences in the global use and availability of food, water and energy this can seriously on quality of life. The choropleth map opposite clearly shows the countries where people do not have access to safe clean drinking water. A clear pattern can be seen.

Key Terms	
Carbon footprint	A measurement of all the greenhouse gases we individually produce
Energy mix	The range of energy sources of a region or country
Food miles	The distance covered supplying food to consumers
Fossil fuels	A natural fuel formed in the geological past from the remains of living organisms
Resource	Something that we use to make human life better.
Pollution	Human actions putting harmful materials into the water, sea, soil and air.
GNI	A measure of the wealth of a country given in dollars
Water stress	Water stress occurs when the demand for water exceeds the available amount
Micro plastics	Micro plastics are fragments of any type of plastic less than 5 mm in length

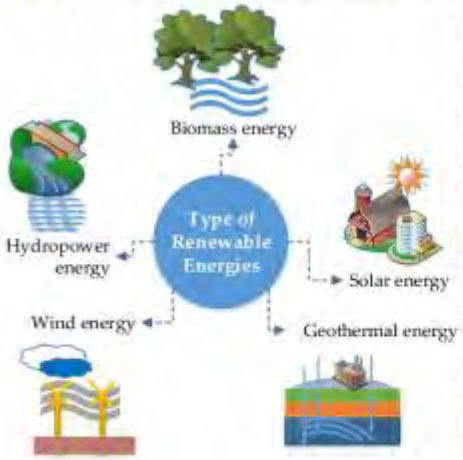
Is oil black gold?

Oil is a fossil fuel that powers much of our society. However, it is **finite** (it will run out) and mining and burning oil can cause. pollution issues. **Fossil fuels** like oil are **non-renewable**. They take a very long time to form and we are using them up faster than they can be replaced – so They will run out. Countries oil use is tied to their development and oil is vital for countries industry and economic development.



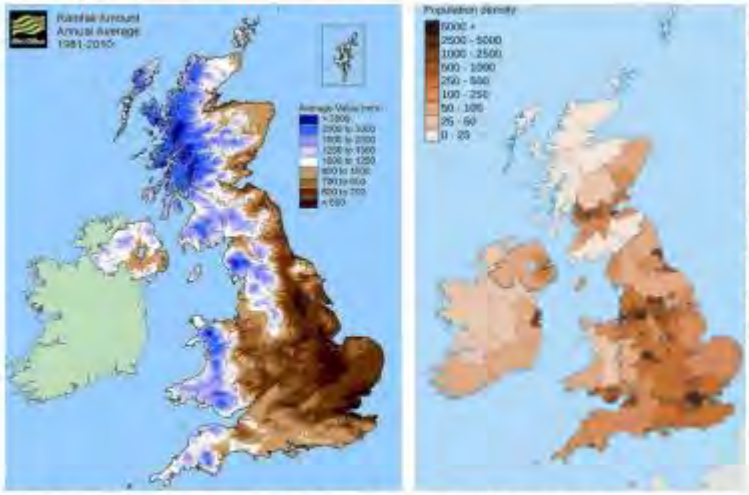
The correlation between wealth and oil consumption the scattergraph shows the link between countries wealth and their oil consumption. The line of best fit shows us that there is a positive correlation. It shows us that the more oil a country consumes the bigger its economy is. This shows us that oil is still a very important resource.

Are renewable all they're cracked up to be?



Renewable energy produces less CO2 and they will last forever. However, they do not provide enough power to fulfil our energy mix yet. Which means we are still reliant on fossil fuels and nuclear. A huge current issue with renewables are that on a windy day we can create 50% of our energy needs from wind turbines. But on a calm day this drops to zero.

Why is water so precious?



Water is essential for people to maintain health and wellbeing. In addition access to enough water is also vital for a countries economy to grow.

The north and west of the UK receives the highest rainfall and the south and east the lowest. There is a water surplus in the west as there is more than we require whereas the south east has a deficit.
Our country uses dams and reservoirs, water transfer and abstraction to ensure water demand can be satisfied.

Where does our food come from?

The UK population is increasing which increases our demand for food. We import approximately 50% of foods which gives us greater choice at a cheaper price. In addition, this means we can enjoy seasonal food whenever we want and gives us greater choice as some foods we are unable to grow in the UK due to the climate. However, it leads to a carbon footprint on our food miles (how far our food has travelled to reach us.) There are a number of environmental issues associated with transporting food large differences. Some are listed below:

- Ships, aeroplanes and lorries emit CO2 and other greenhouse gases when transporting our food contributing to the enhanced greenhouse effect.
- Some food can end up being wasted if it is travelled long distances due to issues with transport.
- Some countries grow food just to export at a higher price rather than feed their own population.
- The packaging we use to transport food is usually made of plastic which has its own environmental issues.
- We do not buy local which would support local farmers and communities as it is cheaper to import from abroad.

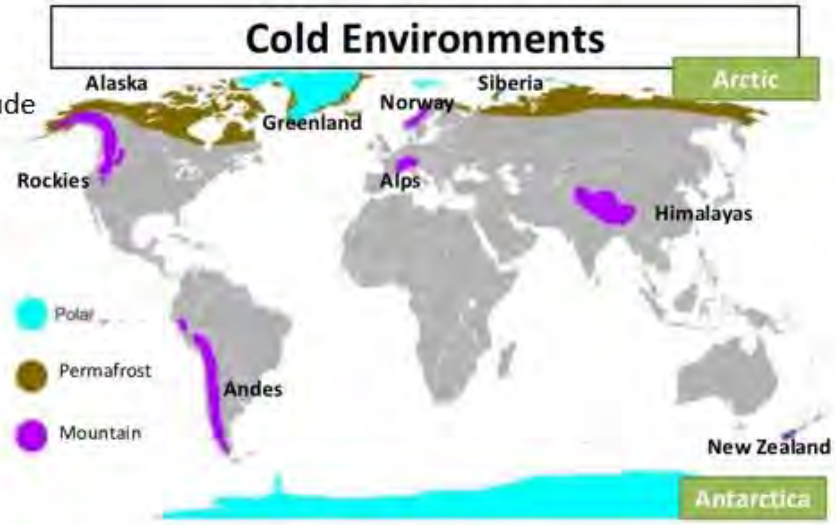
Is plastic fantastic?

- There are many benefits to using plastic and it is undeniable plastic products have made our lives easier; durable, lighter, hygienic etc.
- Though there are many problems associated with plastic including animals becoming entangled, the fact that it is made from oil which in a non-renewable resource and they take hundreds of years to break down. When it breaks down it forms microplastics which never completely decompose. These are toxic to organisms when eaten.
- Our reliance on plastic is causing serious problems for ocean life and also microplastics which are caused when plastics are eroded by the sea could cause further significant issues for people.

1. Cold Environments

What is the location of our cold environments?

They make up 35% of our planet and are found at the north and south poles, they also include tundra biomes which are located along the northern edges of North America, Europe and Asia. Tundra is a landscape that remains frozen for 9 months of the year and only thaws during summer. High mountain ranges including the Alps, Himalayas and Andes are also classed as cold environments.



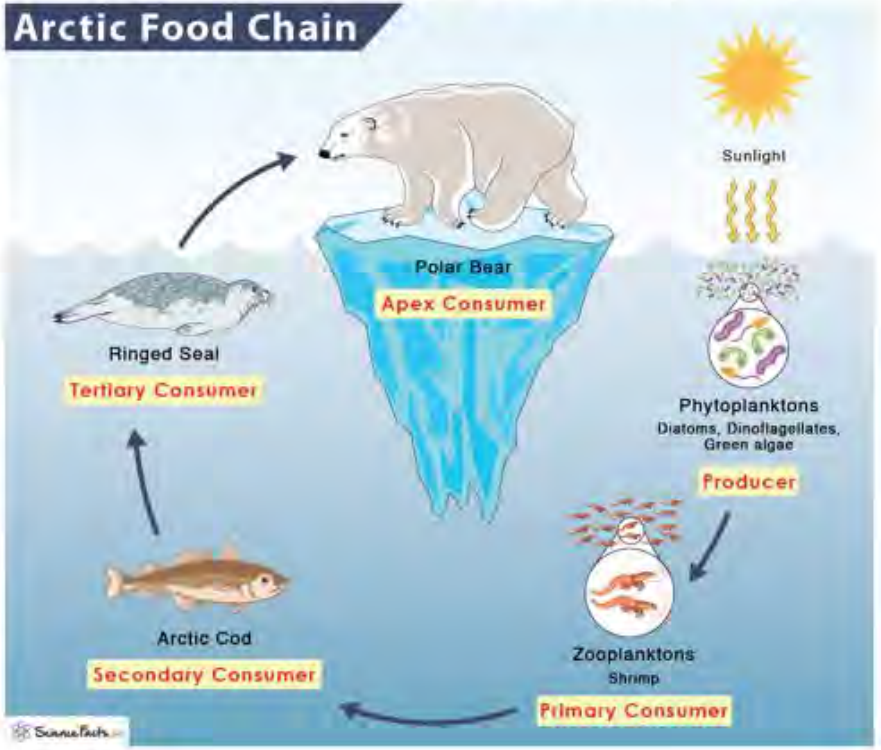
Key Terms	
Food Chain	A series of organisms each dependent on the next as a source of food.
Organism	Plants and animals
Characteristics	The human and physical features of a place.
adaption	How we evolve to suit the climate in a place
Svalbard	Norwegian owned islands in the far North
Challenge	Difficulties faced because of the characteristics of a place
Opportunity	Characteristics that humans can use
fragile	Easy to damage

How do animals adapt to life in the cold

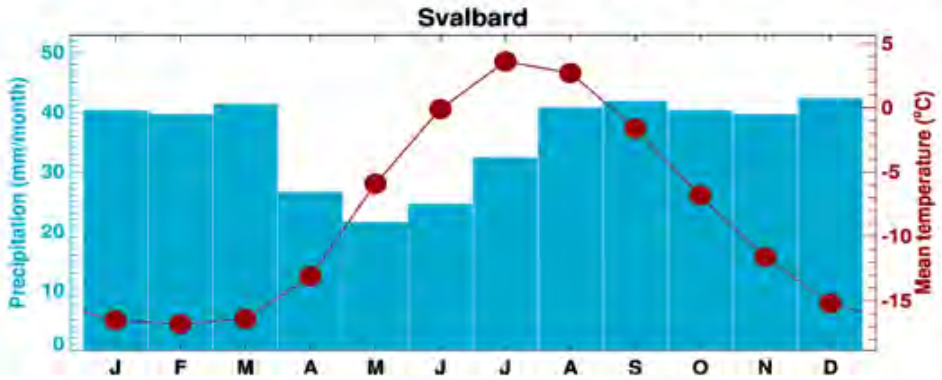
Characteristics of a cold environment

- In the centre of Antarctica temperatures never get above zero degrees Celsius which is why you only find plants and animals near the coast.
- In the Artic temperatures remain below zero 9 months of the year so growing seasons for plants are very short and animals are migratory.

How do animals adapt to life in a cold environment



How do we overcome the challenges and survive in a cold environment?



Hypothermia and Frost bite are two major issues in cold environments.

By keeping warm and dry we can help minimize these emergencies

What Human Features are there in a cold environment like Svalbard?

The human population of the archipelago is **approx 2,640** – a full 2,370 of which live in Longyearbyen, a small coal-mining town on Spitsbergen in Svalbard. It's one of the northernmost settlements in the world. The economy of Svalbard is based on **mining, tourism, and research.**

What physical Features are there in a cold environment like Svalbard?

The cold climate gives Svalbard a distinct physical landscape and processes.

- Rock, ice and sea are the main landscape features.
- There is no tall vegetation and only lichen above 1100m.
- Svalbard is glaciated, 60% of the land is ice covered, and it has small valley glaciers as well as large outlet glaciers draining ice-caps.
- Ground is permanently frozen and impermeable nearly everywhere above 100m altitude. This is called permafrost and varies from 10m to 45m thickness.
- Only the very top layer thaws in summer enabling some plant growth. It causes problems for constructing and heating buildings and explains why some buildings and pipes are on short stilts.
- Glacial landforms include include **fjords, glacial valleys, arêtes** and **nunataks** (erosional), **outwash plains, alluvial fans and moraines** (depositional).

Year 9 Knowledge Organiser: The Rise of Dictators

What do I need to know?

- ✓ What are the differences between a democracy and a dictatorship?
- ✓ Why were Joseph Stalin (USSR) and Adolf Hitler (Germany) able to become dictators in the 1920s and 1930s?
- ✓ What was it like to live in a country controlled by a dictator (with a focus on whether this benefitted the people who lived in the USSR and Germany)?

KEY VOCABULARY	
Dictatorship	A country ruled by one strong leader who has total power **(a dictator).**
Totalitarian	A form of government that attempts to assert total control over the lives of its citizens.
Democracy	A system that allows people to vote for who should be in the government.
Autocracy	A system of government where one person has absolute power e.g. an absolute monarchy
Communism	A system where all property and business is owned by the government. Each person contributes and receives according to need and ability.
Fascism	A form of government with one strong leader; usually a totalitarian state.

WHAT WERE THE DIFFERENCES BETWEEN A DEMOCRACY AND A DICTATORSHIP?

Democracy	Dictatorship
Elections will be held regularly to vote for who leads the country.	There are no elections (and no rival political parties) so the people have no say in who leads the country.
The people will be able to vote in secret. There will be a choice of political parties for the people to chose from.	Freedom of the press does not exist. The news is censored so the people only see what the government wants them to see.
Freedom of the press exists – the news can report events without government interference.	Freedom of speech does not exist – people learn to keep their views to themselves for fear of what will happen if they are overheard or reported.
Freedom of speech is important - people are free to share their views even if they criticise the government.	No opposition of any kind is allowed. Those people who oppose the government are often sent to prison camps or even killed.
People can protest to show their opposition to the government as long as they do not break the law.	

WHY DID RUSSIA BECOME COMMUNIST?

Before the First World War Russia was ruled by a **Tsar,** who had total and absolute power.

Problems

- ✓ Peasant farmers had hard lives and had no way to complain about bad treatment.
- ✓ Workers in towns were badly paid and working conditions were poor; they had no way to protest.
- ✓ In 1905 bad harvests and an economic depression led to demonstrations and strikes but resulted in no real change.
- ✓ During the First World War peasants were forced into the army which made it hard to grow enough food to feed everyone. This led to an increase in prices and starvation killed thousands. The government became unpopular.
- ✓ In March 1917 the Tsar was forced to abdicate and arrested. In July he was assassinated.
- ✓ In November 1917, a man called Lenin led a successful communist revolution, promising people 'Peace, Bread, Land'.

What was it like to live in the USSR?

KEY VOCABULARY			
Industrialisation	Developing industry by building more factories and increasing production.	**Gulag**	Forced labour camps in Siberia.
Collectivisation	A system where peasants work together on large farms to increase production of crops.	**Purges**	Attempts to get rid of anyone who was a threat to Stalin's power.

WHAT WAS THE IMPACT OF INDUSTRIALISATION ON THE USSR?

A series of **Five-Year Plans** were introduced to increase production of coal, iron and steel and set clear targets for workers and managers.

As a result of the Five-Year Plans:

- ✓ 15,000 new factories were built creating more jobs, so unemployment vanished.
- ✓ The USSR became a major producer of oil, coal, iron, steel and electricity.
- ✓ Living conditions gradually improved especially in cities - electricity for everyday use and some blocks of flats had central heating.

But

- ✓ Factory managers who did not meet their targets were accused of being enemies of communist rule and were arrested, so many factory managers lied about how much their workers were producing.
- ✓ Working conditions were harsh. Workers worked 7-day weeks with little pay. Being late or absent was a crime.
- ✓ If you lost your job, you lost your house as well. There was also little concern for health and safety, accidents were common.

WHAT WAS THE IMPACT OF COLLECTIVISATION ON THE USSR?

Problem: Small peasant farms using old tools and old methods were not producing enough food for the growing number of industrial workers.

Solution: The State combined peasant farms into collective farms. These would be farmed by the peasants and use new machinery provided by the State.

As a result of collectivisation:

- ✓ Better organisation and the growing use of machinery meant grain and milk production rose.
- ✓ Food could now be exported abroad to pay for more industrial equipment.
- ✓ By 1930, over half of all farmland had been collectivised. By 1937, it was almost all.

BUT:

- ✓ Many peasants destroyed their homes, crops and livestock rather than hand it over to the State.
- ✓ 1929 – 33 – food production actually fell due to bad harvests and peasant destruction of crops and animals. Millions of people died during the famine that followed.
- ✓ The kulaks (rich peasants) were destroyed (dekulakisation). Many were imprisoned in labour camps called gulags and over 5 million were killed.

THE GREAT TERROR: HOW DID STALIN CONTROL THE USSR?

Stalin believed that he had to be in complete control of the country; opposition could not be tolerated.

- ✓ Between 1934 and 1938 he 'purged' all the people in the Communist Party who he saw as his enemies. They were arrested and tortured until they confessed, often to crimes they had not committed.
- ✓ The NKVD, Stalin's secret police, purged the armed forces. Purges were extended to teachers, engineers, scientists, doctors, miners, factory managers and workers.

- ✓ Everyone was encouraged to report suspicious behaviour by colleagues and friends. Some people denounced others to avoid being arrested themselves. Those who did inform on a friend or colleague were more likely to gain promotion and better housing.
- ✓ It has been estimated that, by 1937, 18 million people had been transported to the gulags; over half died there usually of cold or starvation.

1917 The Russian Revolution → **1924** Stalin became leader of the USSR → **1928** The start of collectivisation → **1928 – 1932** The first Five Year Plan → **1934 – 1938** The Great Terror

What was it like to live in Nazi Germany?

KEY VOCABULARY	
Treaty	An agreement between countries
SA	Also, known as 'storm troopers', they were the private army of the Nazi Party.
Propaganda	Information used to make people believe an idea or support a leader; often misleading.
Fuhrer	The German word for supreme leader.

WHAT WAS THE IMPACT OF THE FIRST WORLD WAR ON GERMANY?

When the First World War ended a new democratic government was formed in Germany. The first act of the new government was to sign the Armistice that ended the fighting on 11th November 1918. Its next job was to sign the **Treaty of Versailles** on 28th June 1919.

The terms of the Treaty of Versailles were very harsh.

- ✓ The German army limited to 100,000 soldiers, the navy limited to 6 battleships and no submarines, and the air force disbanded.
- ✓ Germany lost 10% of its land.
- ✓ In the War Guilt Clause, Germany had to admit that she alone caused the war.
- ✓ Germany forced to pay reparations (compensation) to the Allies. This was later set at £6,600 million.

Germany was humiliated by this treaty. A day of national mourning was declared after the Treaty of Versailles was signed.

WHY WAS HITLER ABLE TO BECOME CHANCELLOR?

During the Munich Putsch of 1923, Hitler attempted to overthrow the Weimar government by force. This was unsuccessful and Hitler was arrested and sent to prison. When he was released, he decide that he would try to get legally elected as Chancellor of Germany. The following helped him to do this:

- ✓ The Great Depression caused 6 million people to be unemployed as businesses closed. The Weimar government dealt with this badly, but Hitler seemed to be a strong leader who had the answers to the problems caused by the Depression.
- ✓ Hitler's message was attractive to people – he promised to tear up the Treaty of Versailles, make Germany a great country again.
- ✓ The SA –to target the Communists, who were the Nazis main opposition, by breaking up their meetings and making it difficult for them to campaign in elections.
- ✓ Propaganda –The Nazis spread their ideas through posters, pamphlets and Nazi controlled newspapers. Posters showed Hitler as 'Our Last Hope' and used catchy slogans like 'work and bread.'

By January 1933, the Nazis were the largest party in the Reichstag and Hitler was Chancellor of Germany.

HOW DID HITLER BECOME DICTATOR?

A week before the March 1933 elections, the Reichstag building was set on fire. Hitler said this was the start of a Communist plot to take over the country, so the Law for the Protection of People and State was passed which banned Communists from taking part in the election campaign.

As a result, Hitler and the Nazis won the March elections. Hitler got the Reichstag to agree to pass the Enabling Law on 23 March 1933. He used this to ban all political parties other than the Nazis and to ensure that Nazis were placed in important positions in the government, and that opponents of the Nazis were removed.

Finally, Hitler needed the support of the army if he was to become dictator, but the army hated the SA. On the night of 30th June 1934, now known as the Night of the Long Knives, Hitler used the SS to arrest and shoot leading members of the SA. Hitler's position was greatly strengthened. The army supported him and he was able to become 'the Fuhrer.'

1923
Munich Putsch
→
1929 - 32
The Great Depression
→
January 1933
Hitler becomes Chancellor of Germany
→
August 1934
Hitler becomes dictator of Germany

What was it like to live in Nazi Germany?

KEY VOCABULARY	
Censorship	Controlling what information people are allowed to see.
Persecution	Unfair or cruel treatment over a period of time- usually because of race or religion.
Indoctrination	To brainwash people with a set of ideas or beliefs.

HOW DID HITLER CONTROL THE GERMAN PEOPLE?

- ✓ The Nazis used the Gestapo (secret police) to arrest anyone who criticised the government. They spied on people, tapped their phones and used networks of informants to identify suspects. In 1939 alone, 160,000 people were arrested.
- ✓ The Nazis used concentration camps to house political opponents, such as communists, and journalists who spoke out against the Nazi Party and minority groups such as Jews and homosexuals. By 1939, there was six concentration camps, holding about 20,000 prisoners.
- ✓ The Nazis used propaganda to promote ideas which they supported. For example, the Nazis made around 1,300 films which were shown in cinemas.
- ✓ The Nazis used censorship to stamp out ideas which they didn't support. For example, new books could not be published without Nazi approval.

HOW DID HITLER REDUCE UNEMPLOYMENT?

- ✓ National Labour Service (RAD) - This was for young men between 18 and 25. They did various jobs such as digging ditches and planting forests.
- ✓ German Labour Front – organised public works schemes such as new motorways (autobahns) were built, as were hospitals, schools, sports stadiums and other public buildings. These schemes created thousands of jobs.
- ✓ Rearmament - the army grew from 100,000 in 1933 to 1.4 million in 1939. Men doing their military service did not count as unemployed. Huge amounts were spent on producing military equipment such as aircraft and tanks. This also employed thousands of men.
- ✓ Some groups were not included in the unemployment statistics such as women who were forced out of their jobs to look after their families and homes and Jews who were dismissed from their jobs.

HOW DID HITLER INDOCTRINATE YOUNG PEOPLE?

Hitler use **education** to make sure that young people were loyal to him and to the Nazi Party.

- ✓ All teachers had to swear an oath of loyalty to Hitler and join the German Teachers' League. They taught students to do the Nazi salute, started and ended each lesson with the children saying 'Heil Hitler', and decorated their classrooms with Nazi posters.
- ✓ From 1935, all new textbooks had to be approved by the Nazis.
- ✓ The teaching of school subjects was changed to indoctrinate pupils. History was distorted to celebrate German victories, and all disasters were blamed on Jews and Communists. Race Study explored the differences between races, explaining the greatness of the Aryan race and the inferiority of other races especially Jews.

Hitler Youth

- ✓ It was made compulsory for all young Germans to join Nazi youth groups from the age of 10. Boys joined the Hitler Youth and girls were required to join the League of German Maidens.
- ✓ It was very attractive to young people – they liked the uniform and the sense of discipline and importance it gave them.
- ✓ It was designed to mould young people's characters and prepare them for the roles they were to play in Germany's future. Boys received military training, practicing map-reading, signalling and small-arms shooting, while girls were trained in the skills of housewifery, including cooking, ironing and sewing.
- ✓ It was also used to teach Nazi ideas e.g. members were taken to the cinema to see a film called 'The Eternal Jew' which was anti-Jewish propaganda.

Year 9 Knowledge Organiser: Turning Points in the Second World War

What do I need to know?

- ✓ Why and how did the Second World War begin?
- ✓ What were the key turning points in the Second World War and why they can be seen as turning point?

Why and how did the Second World War begin?

1935 Rearmament	Hitler broke the terms of the Treaty of Versailles by increasing the German army to 550,00 men and creating an air force.
1936 Remilitarisation of the Rhineland	Hitler sent 30,000 troops into the Rhineland. This again broke the terms of the Treaty of Versailles.
1938 Anschluss with Austria	Hitler sent the German army into Austria claiming he was helping to restore order after a series of riots. He then reunited Germany and Austria which was forbidden by the Treaty of Versailles.
1938 Occupation of the Sudetenland	Hitler claimed that the Czechoslovakian government was mistreating the Germans who lived in the Sudetenland and was prepared to send in the German army to protect them.
1938 Munich Agreement	Neville Chamberlain, the British Prime Minister persuaded the Czechoslovakians to give Hitler the Sudetenland to avoid a war, but Britain and France promised to protect the rest of Czechoslovakia.
1939 Invasion of Czechoslovakia	Hitler invaded the rest of Czechoslovakia. Britain and France did nothing to stop him, but they promised to protect Poland if he tried to invade.
1939 Nazi-Soviet Pact	Hitler and Stalin signed the Nazi-Soviet Pact. Publicly they agreed not to fight each other; secretly they agreed to invade Poland and split it between them.
1939 Invasion of Poland	The German army invaded Poland on 1st September 1939. Britain asked the Germans to leave but they refused. Britain and France kept their promise to Poland and declared war on Germany.

KEY VOCABULARY

Appeasement	Giving in to demands made by Hitler to avoid war
Rearmament	When a country begins to build up its armed forces and weapons
Remilitarisation	Rearming an area that had previously been disarmed e.g. Putting soldiers into an area they had not been allowed in before.
Invasion	When one country used its army to enter and take control of another country by force.

Was appeasement a mistake?

No because ...	Yes because ...
❑ Britain reduced the size of her army after the First World War and needed time to build up her armed forces.	❑ Each time Hitler got away with an act of aggression, he became more confident that Britain and France would never act.
❑ Most people could remember the effects of the First World War. They would agree to anything to avoid war.	❑ Every time Hitler took land, Germany grew stronger and more difficult to defeat. It gained soldiers, weapons and raw materials.
	❑ The use of appeasement made Britain and France look weak.

KEY VOCABULARY			
Turning point	An event or moment in history that leads to a decisive change (usually with positive results).	**Evacuation**	The action of moving people from a place of danger to a place of safety.
Occupation	When a country uses its army to establish control of land or another country.	**Retreat**	When an army moves back or withdraws from fighting the enemy.

What were the key turning points in the Second World War?

1. Evacuation – was it a success?

In September 1939, the British government began the evacuation of people, mainly children from British cities in an attempt to protect them from German air raids.

Yes because ...

- ❑ It was well organised - the transport system of the entire country was taken over for 4 days to evacuate 1,500,000 people.
- ❑ The health of many children improved because of better food and fresh air in the countryside.
- ❑ Many lives were saved as a result – 1,500,000 were evacuated.

No because ...

- ❑ Some evacuees ended up in villages that were expecting pregnant women.
- ❑ Some potential foster families tried to avoid taking in evacuees.
- ❑ Some children were exploited by those who took them in e.g. made to work hard on farms.
- ❑ By January 1940, many parents had brought their children home as no bombs were dropped during 'The Phony War.'

2. Dunkirk – was it a triumph or a disaster for the British?

In June 1940, the British and French armies retreated from the advancing German army. They became stranded on the beaches of Dunkirk. It looked as though all would be killed or taken prisoner. Operation Dynamo was launched to rescue British and French soldiers from the beach at Dunkirk.

A triumph because ...

- ❑ More than 338,000 men were brought back to Britain from the beaches of Dunkirk.
- ❑ The rescue of British and French soldiers meant that the war could continue to be fought.
- ❑ It was a propaganda victory for the British – the government turned a military defeat into a positive.

A defeat because ...

- ❑ The Germans captured 1200 field guns, 1250 anti-aircraft guns, 11,000 machine guns and 75,000 vehicles.
- ❑ The beaches at Dunkirk were attacked by the German air force; 68,000 men were lost.
- ❑ The morale of the army was low after Dunkirk.

3. The Battle of Britain – was it a turning point?

By July 1940, Nazi Germany occupied most of Europe. Operation Sea Lion was the code name for the German attempt to take over Britain; to do this they needed to destroy the RAF (British air force) . Throughout the summer of 1940, German and British pilots fought each other in the skies above southern England. Britain won.

It was a turning point because ...

- ❑ The German air force had failed to destroy the RAF in time for an invasion to take place.
- ❑ Short of planes and pilots the RAF held off the Luftwaffe. If the Luftwaffe had won Britain would have been invaded and conquered.
- ❑ Britain was able to carry on fighting and played a key role in events such as D-Day that led to eventual German defeat.
- ❑ Germany had been defeated for the first time in the war. It made victory seem possible.

September 1939 – April 1940
The Phony War

→

September 1940
Evacuation of children to the countryside

→

June 1940
Evacuation of Dunkirk

→

Summer 1940
Battle of Britain

→

September 1940
The Blitz begins

KEY VOCABULARY			
Turning point	An event or moment in history that leads to a decisive change (usually with positive results).	**Allies**	Countries who work together. In the Second World War the Allied Powers were Britain, France, the USSR and the USA.
Surrender	Giving into an enemy and letting them win or take control.	**Liberation**	Freeing a country or a person from unfair or cruel treatment

4. Operation Barbarossa – was it a turning point?

In June 1941, the German army invaded the USSR getting as far as Moscow. However, the Soviet army destroying anything that might be of use to the Germans and a harsh Russian winter slowed the German advance. At the Battle of Stalingrad, 100,000 German soldiers surrendered. Gradually, with Russian troops fighting in conditions they were used to, the German army was forced out of the USSR and back towards Germany.

It was a turning point because ...

- ❑ This was the first time that the Germans had been forced to retreat in large numbers.
- ❑ The USSR took the full force of the German army, giving Britain and the USA time to build up their forces.
- ❑ The strength of the German army was reduced with almost 775,000 casualties and many German soldiers being captured.

5. Pearl Harbor – was it a turning point?

For the first two years of the war, the USA was not involved in the fighting. However, it did lend Britain supplies of food and weapons. This changed when Japan, an ally of Germany, launched a surprise attack on the American naval base at Pearl Harbor in Hawaii, hoping to cripple the American Pacific Fleet that was stationed there. In under two hours, on the morning of 7th December 1941, Japan sank 18 warships, destroyed 177 planes and killed over 2300 men.

It was a turning point because ...

- ❑ The attack brought the US into the war. Many US soldiers fought in Europe and on D-Day.
- ❑ American military forces were crucial in the Allied victory against Germany and Japan. They had a major influence on the war.

6. D-Day – was it a turning point?

On 6 June 1944, the Allies launched Operation Overlord. It's aim was to liberate Western Europe from Nazi Germany's control. Allied troops successfully stormed Normandy's beaches. Less than a week later, the beaches were fully secured. By the end of August 1944, the Allies had liberated Paris, and the Germans had been removed from north-western France. They had won the Battle of Normandy.

It was a turning point because ...

- ❑ Western Europe was liberated from Nazi control – the Allies now had a way to send troops to fight the German army in Europe.
- ❑ The Germans had to split their army to fight Russia in the East and the Allies in the West.
- ❑ Less than a year later the Allies formally accepted the unconditional surrender of Nazi Germany'.

7. Was the dropping of the atomic bomb justified?

By June 1945, the war was over in Europe. However, the USA was still fighting the Japanese in the Pacific. To force the Japanese to surrender the USA dropped two atomic bombs, the first on Hiroshima and the second on Nagasaki.

Yes because ...

- ❑ The USA believed Japan would never surrender.
- ❑ The USA could have invaded but it would have led to huge loss of American lives.

No because ...

- ❑ There were alternatives e.g. invasion of Japan leading to supply shortages.
- ❑ Japan was seeking peace talks before the bomb was dropped on Hiroshima.

June 1941
Operation Barbarossa

→

December 1941
Attack on Pearl Harbor

→

June 1944
D-Day

→

August 1945
Dropping of the atomic bomb on Japan

Using a calculator

Component Knowledge

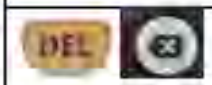
- Know the various positions and key functions
- Be able to use the calculator for index calculations
- Be able to use the calculator to find the square/cube root of a number
- Be able to use the negative number and fraction functions in calculations

Key Vocabulary

Brackets	Used to assist in setting out the order of operations for a calculation
Indices	Also known as powers, e.g. $3^4 = 9$
Negative	Having a value less than zero, not to be mistaken for subtraction

Key buttons

It is vital that you know how to use it properly and confidently. Being familiar with the layout of your own scientific calculator will help save time, allowing you to concentrate on the maths you're working on.

	Pressing the SHIFT button means you will select the instruction written above the next button you press, rather than what is written on the button itself.
	The replay button has four arrows on it and allows you to direct your cursor on-screen. It's useful if you enter a large calculation incorrectly, as you can use the arrows to go back and insert or remove characters. Replay also allows you to move between the numerator and denominator when you're working with fractions, or to move out of a root or index.
	The delete button erases characters: when you press it, the character to the left of the cursor will be erased. It can be useful to fix a calculation, when used with the replay button.
	The Ans button can be used to put an answer you have just found back into your next calculation.
	This button allows you to square numbers.
	This button allows you to write a number to **any** power e.g. 4^5
	This button allows you to square root numbers. SHIFT followed by this button, allows you to find **any** root.
	This button allows you to calculate using fractions. SHIFT followed by this button, allows you to write a **mixed number**.
	This button allows you to change to format of your answer- from a fraction to a decimal and vice versa.
	You should input negative numbers into your calculator using (-). NOTE: When inputting a negative number which is raised to a power, you should write them in brackets.

Examples of using a calculator

Find the value of 86^2

Type 

The answer is 7396.

Find the value of $\sqrt{2209}$

Type 

The answer is 47.

Find the value of $\frac{2}{5}$ of 990

Type 

The answer is 396.

Convert $2\frac{4}{5}$ to a decimal.

Type 

The answer is 2.8.

Online clips

M757

Powers of 10

Component Knowledge(F)

- Multiply and divide by powers of 10
- Understand what a square and a cube number is

Key Vocabulary

Index	The index of a number says how many times to use the number in a multiplication
Power	Another word for an 'index'. These include square/cube

Powers of 10 : We can use index form to write powers of 10 to a positive power.

$10000 = 10 \times 10 \times 10 \times 10$
$= 10^4$ ← We are multiplying 10 by itself 4 times

$100 = 10 \times 10$
$= 10^2$ ← We are multiplying 10 by itself 2 times or '10 squared'.

We can also use index form to write powers of 10 to a negative power

$\frac{1}{10} = 10^{-1}$ ← We are diving by 10

$\frac{1}{1000} = 10^{-3}$ ← We are diving by 10x10x10 or we are diving by 10^3

Powers of 10 and calculations

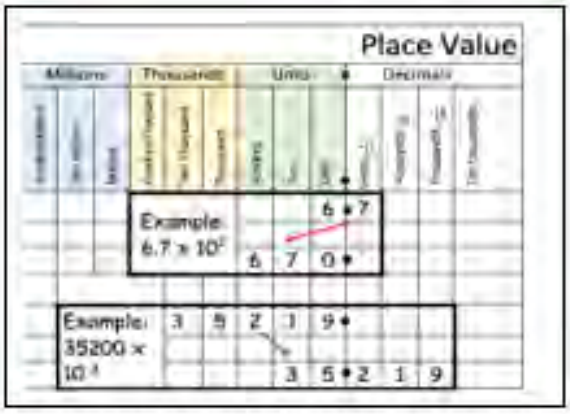
Powers of 10 : Using place value we know the value of each column is ten times greater than the column to the right.

Multiplying by 10, means the number is ten times greater, and moves one column to the left

Example:

$6.7 \times 10^2 = 670$

This means that 6.7 is 10 times and then 10 times bigger (or moves **two** columns to the



Example:

$35219 \times 10^{-3} = 35.219$

This means that 35219 is 10 times, then 10 times and then 10 times smaller (or moves **three** columns to the right)

Online Clip

M113

Index Laws

Component Knowledge

- To be able to apply the different index laws
- To be able to calculate negative indices

Key Vocabulary

Index notation	A way of writing numbers or letters that have been multiplied by themselves a number of times
Square number	The product of a number multiplied by itself
Cube number	The product of a number multiplied by itself three times.
Root	The inverse of a square number is a square root. The inverse of a cube number is a cube root
Reciprocal	1 divided by the number

Multiplication law

When multiplying the terms, we add the powers together

$3^7 \times 3^5 = 3^{7+5} = 3^{12}$

$x^3 \times x^4 = x^{3+4} = x^7$

The base number does not change

Division law

When dividing the terms, we subtract the powers.

$2^7 \div 2^3 = 2^{7-3} = 2^4$

Divides can only be written as fractions

$\frac{5^{11}}{5^2} = 5^{11-2} = 5^9$

$\frac{y^5}{y^{-1}} = y^{5--1} = y^6$

Subtracting a negative is the same as adding a positive

Brackets law

$(4^5)^3 = 4^{5\times3} = 4^{15}$

When raising to the power we multiply the powers together

$(2x^4)^3 = 2^3 \times x^{4\times3} = 8x^{12}$

Facts

$p = p^1$

$y^0 = 1$

$456^0 = 1$

Anything to the power of zero is equal to 1

Index Laws – You can only use index laws when the base number is the same.

$2^3 \times 4^5 \neq 8^{15}$

Negative indices

A negative power performs the reciprocal

$x^{-a} = \frac{1}{x^a}$

Example

$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

Online clips

M135, M608, M120

Standard form

Component Knowledge

- Identify numbers in standard form
- Write an ordinary number in standard form
- Write a standard form number as an ordinary number

Key Vocabulary

Power/index	A notation and word used to show repeated multiplication of the same number
Standard form	A method of writing numbers that uses multiplication with powers of 10
Integer	Whole number

Multiplying by powers of 10

The Positive Powers of 10

$10^1 = 10$

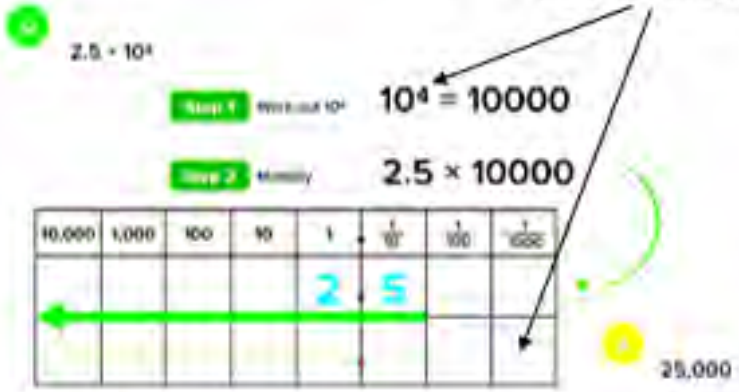
$10^2 = 100$

$10^3 = 1000$

$10^4 = 10000$

$10^5 = 100000$

Each digit is shifted 4 places values higher



The power of 10 indicates how many place values each digit is increased/decreased in value

(move left for positive powers of 10, and move right for negative powers)

The Negative Powers of 10

$10^{-2} = \frac{1}{10^2} = \frac{1}{100}$

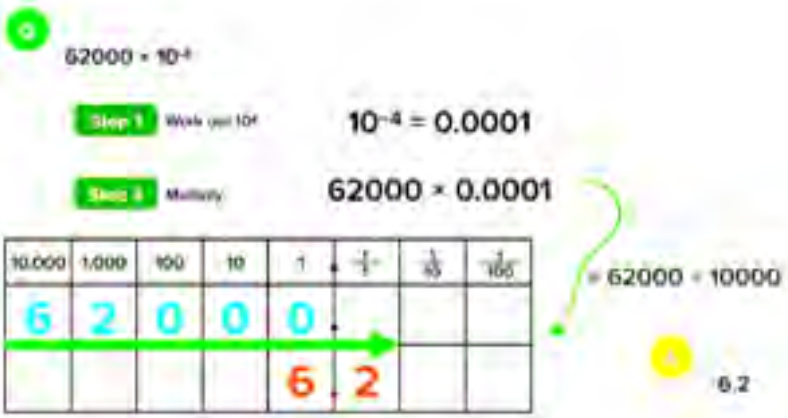
$10^{-1} = 0.1$

$10^{-2} = 0.01$

$10^{-3} = 0.001$

$10^{-4} = 0.0001$

$10^{-5} = 0.00001$



Writing in standard form

Ordinary Form	Standard Form
200	2×10^2
3,500	3.5×10^3

A number: $1 \leq x < 10$ — Integer power of 10

Any (positive) number can be written in standard form:
a number greater than or equal to 1 but less than 10, multiplied by an integer power of 10

Why is 12×10^2 **not** in standard form?

12 is greater than $1 \leq x < 10$ so we need to convert it into standard form.

$= 12 \times 10^2$

$= 12 \times 100$

$= 1200$

$= \underline{1.2 \times 10^3}$

a) 5,430,000 (6 places)

$5{,}430{,}000 = 5.43 \times 10^6$

b) 0.00608 (3 places)

$0.00608 = 6.08 \times 10^{-3}$

Writing standard form as ordinary numbers

5.23×10^4

$= 5.23 \times 10 \times 10 \times 10 \times 10$

$= 5.23 \times 10{,}000$

$= 52{,}300$

Remember that multiplying by a power of 10 has the effect of increasing/decreasing the place value of each digit

$4860 \times 10^{-2} \rightarrow 48.6$

$0.0486 \times 10^4 \rightarrow 486$

$48.6 \times 10^{-1} \rightarrow 4.86$

Online clips

M719, M678

Standard form

-Arithmetic

Component Knowledge

- Write an ordinary number in standard form
- Write a standard form number as an ordinary number
- Perform arithmetic operations on standard form numbers, giving the answer in standard

Key Vocabulary

Power/index	Shows how many times to multiply the same number by itself.
Standard form	A method of writing numbers that uses multiplication with powers of 10.

Adding and Subtracting with Standard Form

E

Calculate the following giving your answer in ordinary form:

$(3.6 \times 10^4) + (4.2 \times 10^7)$

Step 1 Write each in ordinary form

$3.6 \times 10^4 \rightarrow 36{,}000$

$4.2 \times 10^7 \rightarrow 42{,}000{,}000$

Step 2 Add with column addition

$$\begin{array}{r} 42000000 \\ +\ \ 36000 \\ \hline 42036000 \end{array}$$

A 42,036,000

You can leave the answer in ordinary form ...

D

Calculate the following giving your answer in standard form:

$(3.6 \times 10^6) - (1.4 \times 10^6)$

Step 1 Write each in ordinary form

$3.6 \times 10^6 \rightarrow 3{,}600{,}000$

$1.4 \times 10^6 \rightarrow 1{,}400{,}000$

Step 2 Subtract with column subtraction

$$\begin{array}{r} 3600000 \\ -\ 1400000 \\ \hline 2200000 \end{array}$$

Step 3 Give your answer in standard form

A 2.2×10^6

... unless the question asks for answer in standard form too

Multiplying and dividing with standard form

$2 \times 10^3 \times 4 \times 10^4$

$2 \times 4 \times 10^3 \times 10^4$

8×10^7

$= 8 \times 10^7$

$5 \times 10^2 \times 3 \times 10^6$

$5 \times 3 \times 10^2 \times 10^6$

15×10^8

$= 1.5 \times 10^9$

If after calculating the first number is not in standard form, rewrite so it is. For example, write $15 = 1.5 \times 10$. So, $1.5 \times 10 \times 10^{11} = 1.5 \times 10^{12}$

Remember the rules of indices:

- Add powers when multiplying (and the base numbers are the same)
- Subtract powers when dividing

$8 \times 10^5 \div (2 \times 10^3)$

$8 \div 2 \times 10^5 \div 10^3$

4×10^2

$= 4 \times 10^2$

$3 \times 10^6 \div (6 \times 10^3)$

$3 \div 6 \times 10^6 \div 10^3$

0.5×10^3

Not in standard form

$= 5 \times 10^2$

Not in standard form

Online clips

M719, M678, U264, U290, U161

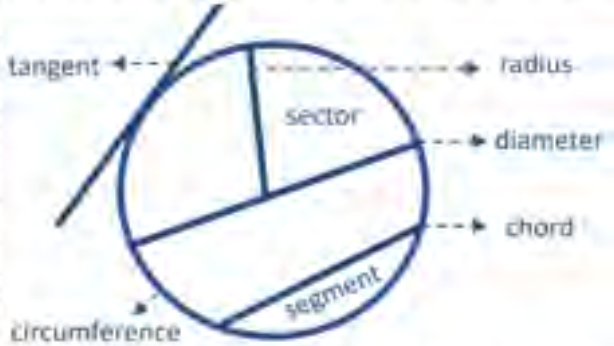
Circles

Component Knowledge

- Identify parts of a circle
- Calculate the area of a circle
- Calculate the circumference of a circle
- Find the area of a sector
- Find arc length

Key Vocabulary

Circle	A 2 dimensional shape made by drawing a curve that is always the same distance from the centre
Radius	The distance from the centre to the circumference of a circle
Diameter	The distance from one point on a circle through the centre to another point on the circle
Circumference	The distance around the edge of a circle
Tangent	A line that just touches a curve at a point, matching the curve's slope at that point
Chord	A line segment connecting two points on a curve
Arc	Part of the circumference of a circle
Sector	A "pie slice" part of a circle – the area between two radiuses and the connecting arc of a circle
Segment	The smallest part of a circle made when it is cut by a line



Sectors — Fraction of areas

Semi-circle		Area = $\pi \times r^2 \times \frac{180°}{360°}$
Quarter-circle		Area = $\pi \times r^2 \times \frac{90°}{360°}$
30°		Area = $\pi \times r^2 \times \frac{30°}{360°}$
165°		Area = $\pi \times r^2 \times \frac{165°}{360°}$
283°		Area = $\pi \times r^2 \times \frac{283°}{360°}$

Formula to remember

$$\textbf{Radius} = \frac{diameter}{2}$$

$$\textbf{Diameter} = 2 \times radius$$

$$\textbf{Area} = \pi \times radius^2$$

$$\textbf{Circumference} = \pi \times diameter$$

$$\textbf{Arc length} = \frac{\theta}{360} \times \pi \times diameter$$

$$\textbf{Area of a sector} = \frac{\theta}{360} \times \pi \times r^2$$

What is Pi?

Pi is the ratio between the circumference of a circle and its diameter

Pi is denoted by the Greek symbol π

The value of Pi is approximately 3.14159265.....

Example 1

Calculate the **area** of a circle with a **radius** of 5cm

$$\textbf{Area} = \pi \times radius^2$$

$$= \pi \times 5^2$$

$$= 78.5cm^2$$

Example 2

Calculate the **circumference** of a circle with a **radius** of 12cm

$$\textbf{Circumference} = \pi \times diameter$$

$$= \pi \times 24$$

$$= 75.4cm$$

Example 3

Calculate the **area of a sector** with a **radius** of 7cm and an angle of 50°

$$\textbf{Area of a sector} = \frac{\theta}{360} \times \pi \times r^2$$

$$= \frac{50}{360} \times \pi \times 7^2$$

$$= 21.4cm^2$$

Example 4

Calculate the **arc length of a sector** with a radius of 11cm and an angle of 75°

$$\textbf{Arc length} = \frac{\theta}{360} \times \pi \times diameter$$

$$= \frac{75}{360} \times \pi \times 22$$

$$= 14.4cm$$

Example 5

Calculate the **area** of a semicircle with a **diameter** of 8cm

$$\textbf{Area} = \pi \times 4^2$$

$$= \pi \times 4^2$$

$$= 50.27cm^2$$

This answer is the area of the full circle so we need to half it to find the area of the semicircle

$$= 25.13cm^2$$

Example 6

Calculate the **perimeter** of a semicircle with a **diameter** of 8cm

$$\textbf{Circumference} = \pi \times diameter$$

$$= \pi \times 8$$

$= 25.13cm$ (full circle) = 12.57 (curved edge of semicircle

Total perimeter = curved edge + straight edge

$$= 12.57 + 8 = 20.57cm$$

Online clips

M595, M169, M280, M231, M430

Ordering Decimals

Component Knowledge

- To be able to use place value to order decimals

Key Vocabulary

Decimal	Part of a whole in base 10
Decimal Point	A point or dot place after a figure representing units in decimal fraction
Digit	Numerals (0-9) representing part of a number
Order	Arranging things in a certain way
Place value	The value of digits in a number based on its place
Ascending	Increasing or going up
Descending	Decreasing or going down

Place Value

Trillions			Billions			Millions			Thousands			Units			Decimals			
Hundred Trillion	Ten Trillion	Trillion	Hundred Billion	Ten Billion	Billion	Hundred Million	Ten Million	Million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Unit	Tenths, $\frac{1}{10}$	Hundredth, $\frac{1}{100}$	Thousandth, $\frac{1}{1000}$	Ten thousandths
													2	7 •	1	0	4	
														0 •	0	1	2	

Comparing decimals: It is important when comparing decimals to compare each digit in the same column. For example, compare the tenths with each other as they have the same place value.

Compare the tenths - 3 is less than 6 so we know that 3.17 must be smaller than 3.62.

Ordering decimals: When ordering decimals it is important to ensure that all of the decimals have the same number of digits.

For example:
0.3, 0.43, 0.03, 0.043 would become 0.300, 0.430, 0.030, 0.043

It is then easy to order them: 0.03, 0.043, 0.3, 0.43

You must still use the decimals given to help you order the decimals, you must not amend any of the numbers in the question as your answer.

Order Decimals

Once we can compare decimals, we can place them in ascending and descending order.

1.503 1.53 1.867 2.001 2.094

(ascending order)

8.64 8.509 8.1 7.854 7.805

(descending order)

Online clips

M553, M522

Fractions, decimals, & Percentages

Component Knowledge

- Convert between simple fractions, decimals and percentages.
- Order fractions, decimals and percentages by converting.

Key Vocabulary

Fraction	Made up of a numerator (top) and denominator (bottom). Compares parts in question to total number of parts.
Integer	Whole number
Ascending order	Place numbers in order from smallest to largest
Descending order	Place numbers in order from largest to smallest
Percentage (percent)	'Out of' (per) one hundred (cent)
Decimal	Comparable number to a fraction or mixed number, written using place value, e.g. $\frac{2}{5} = 0.4$, or $3\frac{3}{4} = 3.75$

Convert % to fraction:

% "means out of 100" = $\frac{}{100}$

eg 65% = $\frac{65}{100}$ simplify where possible

$= \frac{65}{100} = \frac{13}{20}$ (÷5, ÷5)

Convert % to fraction to decimal:

Convert to fraction out of 100, $\frac{}{100}$

as % "means out of 100" = $\frac{}{100}$

eg 9% = $\frac{9}{100}$ use place value table to write as a decimal

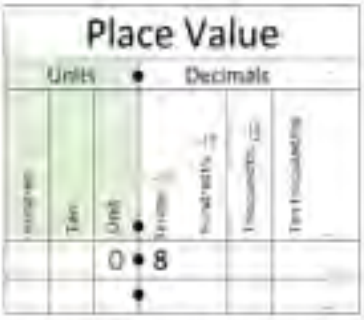
Convert decimal to a fraction

Use place value to convert to fraction out of 10, 100, 1000, etc

eg 0.8 = $\frac{8}{10}$

then simplify where possible

eg $\frac{8}{10}$ becomes $\frac{4}{5}$



Convert decimal to a fraction to a percentage

Use place value to convert to fraction out of 10, 100, 1000, etc

eg 0.126 = $\frac{126}{1000}$

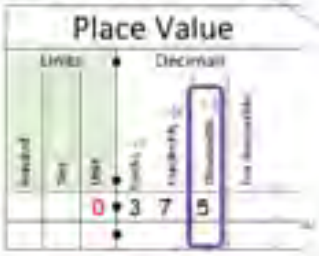
% means out of 100 so convert to equivalent fraction out of 100 = $\frac{}{100}$

eg $\frac{126}{1000}$ becomes $\frac{12.6}{100} = 12.6\%$

Convert fraction to decimal

Convert to fraction out of 10, 100, 1000, etc" = $\frac{}{10}$ or $\frac{}{100}$ or $\frac{}{1000}$
then use place value to write as a fraction

eg $\frac{3}{8} = \frac{\times}{10} = \frac{\times}{100} = \frac{375}{1000}$



place the end digit

in the thousandths column

fill in with any zeros

Convert fraction to percentage

Convert to fraction out of 10, 100, 1000, etc" =

$\frac{}{10}$ *or* $\frac{}{100}$ *or* $\frac{}{1000}$

eg $\frac{3}{200} = \frac{\times}{10} = \frac{\times}{100} = \frac{15}{1000}$
then write as an equivalent fraction "out of 100" as percentage

eg $\frac{15}{1000} = \frac{1.5}{100}$ (÷ 10 / ÷ 10) *once "out of 100" write as a percentage = 1.5%*

Ordering FDP

To be able to order FDP, we need to write them all in the same format.

Example: Order from smallest to largest $\frac{1}{4}$ 0.19 0.3 26% $\frac{1}{5}$

You can choose to convert them all into fractions, decimals or percentages as long as you convert them all into the same.

Changing them to percentages:

$\frac{1}{4} = 25\%$ 0.19 = 19% 0.3 = 30% $\frac{1}{5} = 20\%$

Rewrite the list with the numbers all in the same format.

25%, 19%, 30%, 26%, 20%

From smallest to biggest:

19%, 20%, 25%, 26%, 30%

Answer:

Make sure you write your answer using the original numbers in the question.

0.19, $\frac{1}{5}$, $\frac{1}{4}$, 26%, 0.3

Online clips

M958, M264, M553

Percentages

Component Knowledge

- To be able to calculate percentages of amounts with a multiplier.
- To be able to calculate percentage increases and decreases.
- To be able to calculate simple interest

Key Vocabulary

Percentage	Parts per 100. The unit is %.
Increase	Make bigger.
Decrease	Make smaller.
Multiplier	Decimal used to calculate percentages with a calculator.
Simple Interest	The amount of interest is fixed over a period of time.

Percentage of an amount – non calculator

Calculate 15% of 250

Find 10% by dividing by 10

250 ÷ 10 = 25

Find 5% by halving the 10% value

25 ÷ 2 = 12.5

Add the 10% and the 5% value together

25 + 12.5 = 37.5

Percentage of an amount – using a multiplier

When we have a calculator we can use a multiplier; this is a decimal equivalent of the percentage.

80% of 120: 80% = 0.80

80% of 120 = 0.80 x 120 = 96

33% of 90: 33% = 0.33

33% of 90 = 0.33 x 90 = 29.70

Percentage increase using a multiplier

Increase 50 by 15%

15% = 0.15 convert percentage to a decimal

0.15 + 1 = 1.15 add to 1 as we are adding on to 100%

50 x 1.15 = 57.5 now multiply

Calculating an original amount

Sinead buys a watch. 20% VAT is added to the price of the watch. Sinead then has to pay a total of £60. What is the price of the watch with no VAT added?

120 % = £60 original amount (100%) + 20%

120% = 1.2 convert percentage to a decimal

£60 ÷1.2 = £50 divide new amount by multiplier

Original cost of watch = £50

Percentage decrease using a multiplier

Decrease 70 by 25%

25% = 0 .25 convert percentage to a decimal

1 – 0.25 = 0.75 subtract from 1 we are decreasing

70 x 0.75 = 52.5 now multiply

The population of an island has decreased by 40% over 50 years. The population in 2018 was 360 What was the population in 1968?

60% = 360 original amount (100%) – 40%

60% = 0.6 convert percentage to a decimal

360 ÷ 0.6 = 600 divide new amount by multiplier

Population in 1968 = 600

Percentage Change

$$\text{Percentage change} = \frac{change}{original} \times 100$$

Change = New amount - Original amount

The population of an island in 2017 was 30,000. In 2018, the population was 31,500. Calculate the percentage increase.

Difference in populations

$$\text{Percentage change} = \frac{31500-30000}{30000} \times 100$$

Original population

$$\text{Percentage change} = \frac{1500}{30000} \times 100$$

Percentage change = 5%

$$\text{Percentage profit} = \frac{sales-cost}{cost} \times 100$$

Keira buys a coffee table for £120 and sells it for £204. Work out her percentage profit.

$$\text{Percentage profit} = \frac{204-120}{120} \times 100$$

$$\text{Percentage profit} = \frac{84}{120} \times 100$$

Percentage profit = 70%

Simple Interest

To calculate simple interest we start by calculating the percentage and multiplying it by the period of time.

Example: £250 is in a bank account which is paying 5% simple interest per year. How much would be in the account at the end of 3 years?

5% = 0.05

0.05 x 250 = £12.50 find the amount of interest per year

3 x £12.50 = £37.50 3 years X amount of interest per year

£250 + £37.50 = £287.50 add the total interest to the original amount

Online clips

M437, M905, M476, M533, M528, M235

Compound interest and depreciation

Component Knowledge

- Use percentage multipliers
- Calculate compound interest and depreciation
- Understand growth and decay

Key Vocabulary

Multiplier	Decimal used to calculate percentages with a calculator
Growth/Increase	When an amount goes up
Depreciation/Decay	When an amount goes down
Simple interest	The amount of interest is fixed over a period of time
Compound interest	The interest earned over time will continue to increase
Annum	This word usually replaces the word year (per annum = per year)

Key Concepts

Multipliers are used to increase or decrease an amount by a particular percentage

Percentage increase:

Value x (1 + percentage as a decimal)

Percentage decrease:

Value x (1 − percentage as a decimal)

These questions are not always about money in a bank or house/car prices.

Growth and decay problems might be to do with populations, atmospheric pressure, height or radioactivity.

E.g. 2 months ago, you had 3 mice, you now have 18.

You can use the compound interest formula to find that the population is growing by 144% every month!

Calculating compound interest

E.g.

Anya invests £200 at 3% **compound interest**.
How much does she have after 5 years?

$$Value \times (1 + decimal\ multiplier)^{time}$$

Substituting into the formula:

value = £200, decimal multiplier = 3% =0.03, time = 5 (years)

$$£200 \times (1 + 0.03)^5$$

$$£200 \times (1.03)^5 = £231.85$$

Calculating depreciation

E.g.

A car is valued at £850. The car depreciates by 15% per year. What is it worth after 4 years?

$$Value \times (1 - decimal\ multiplier)^{time}$$

Substituting into the formula:

value = £850, decimal multiplier = 15% =0.15, time = 4 (years)

$$£850 \times (1 - 0.15)^4$$

$$£850 \times (0.85)^4 = £443.71$$

Online clips

U332, U988

Column vectors

Component knowledge

- Understand that vectors are a way of showing the magnitude (size) and direction an object moves (translates).
- Represent vectors
- Add, subtract and multiply vectors

Key Vocabulary

Vector	A vector has magnitude (size) and direction
Magnitude	Size of an object- can be a distance or quantity
Scalar	A scalar on has a magnitude (size) and no direction
Constant	A variable that remains the same

Vectors

Vectors are often written as column vectors

Left or right → $\begin{pmatrix}3\\-4\end{pmatrix}$ ← Up or down

Positive values are right and up. Negative values are left and down.
This is 3 right and 4 down

This is the vector $\begin{pmatrix}4\\1\end{pmatrix}$

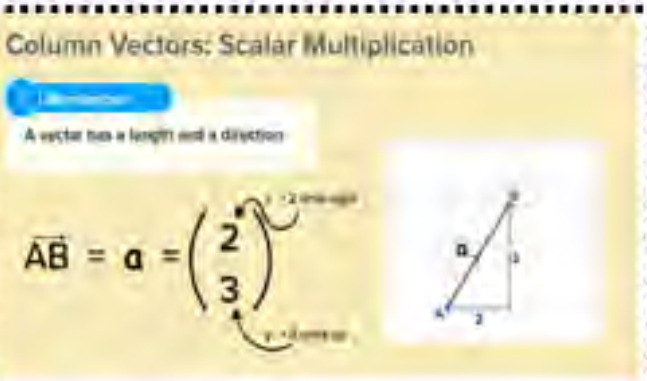
It goes 4 units right and 1 unit up.

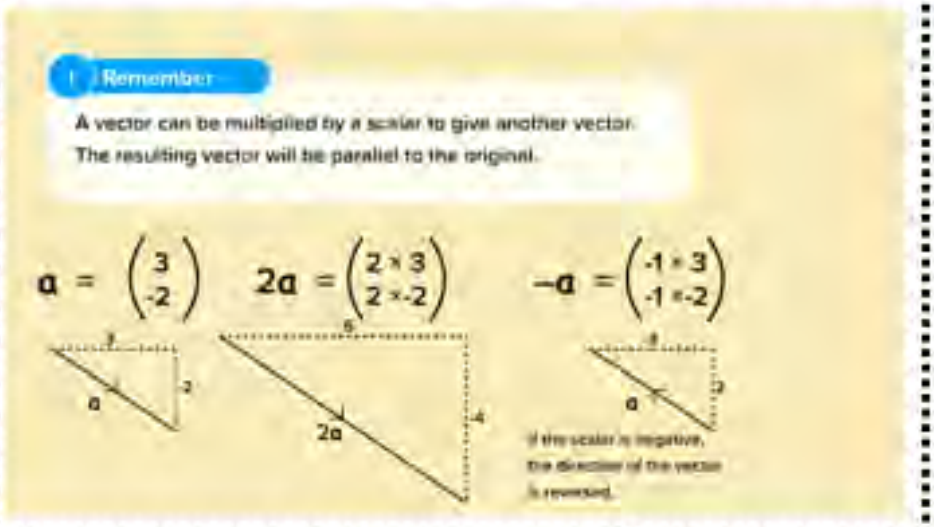
Add/subtract vectors:

$$\begin{pmatrix}8\\4\end{pmatrix} - \begin{pmatrix}3\\6\end{pmatrix} = \begin{pmatrix}5\\-2\end{pmatrix}$$

Multiply vectors by a constant

$$3\begin{pmatrix}4\\7\end{pmatrix} = \begin{pmatrix}12\\21\end{pmatrix}$$





Online clips

U632, U903, U564

Transformations

Component Knowledge

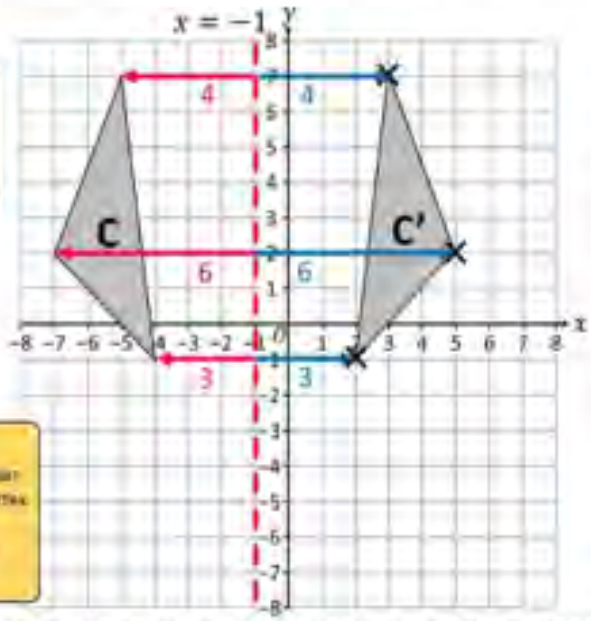
- Rotate, reflect and translate a shape.
- Describe a rotation, reflection and translation.

Key Vocabulary

Rotation	The turning of a shape around a fixed point.
Reflection	An image of a shape as it would be seen in a mirror.
Perpendicular	At a right angle to a point or line.
Translation	Moving every point by the same distance in a given direction.
Vertex	Corner of a shape- where two lines meet in a polygon.

Reflection:

Reflect shape C in the line $x = -1$. Label the new shape C'



1) Plot the line
2) Count squares perpendicular from the line to each vertex
3) Plot each vertex an equal distance away on the opposite side.

Information needed to perform a reflection:

- Mirror line. This usually an equation e.g. y=2, x= -2.

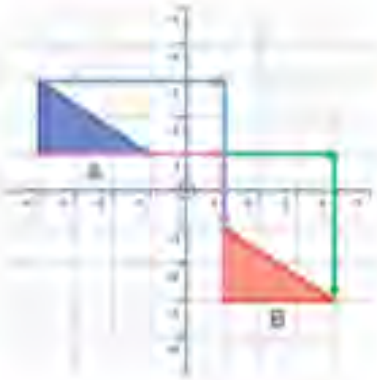
Translation:

Translate shape A by the vector $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

Move each vertex 5 right.

$\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

Move each vertex 4 down.

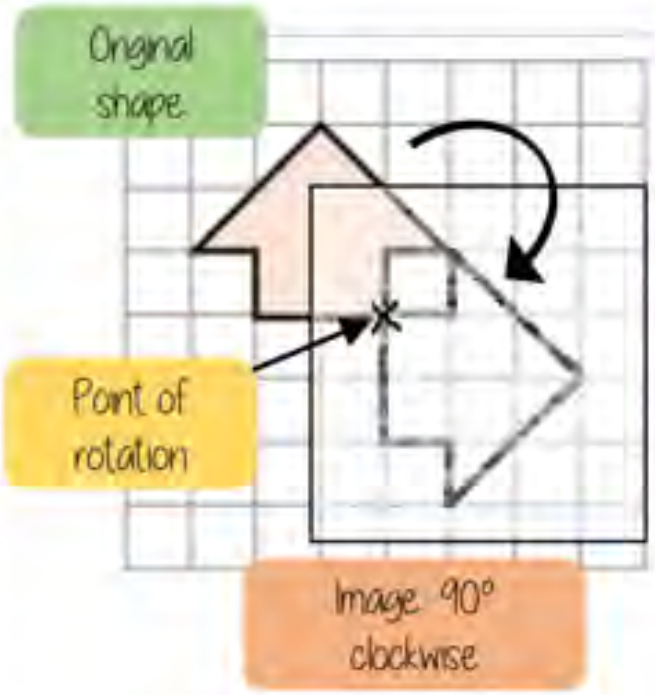


$\begin{pmatrix} x \\ y \end{pmatrix}$ Positive-Right, Negative - Left; Positive-Up, Negative - Down

Information needed to perform a reflection:

- Vector. This is usually as a column vector e.g. $\begin{pmatrix} 3 \\ -7 \end{pmatrix}$

Rotation:



1 Trace the original shape (mark the point of rotation)

2 Keep the point in the same place and turn the tracing paper

3 Draw the new shape

Clockwise Anti-Clockwise

Information needed to perform a rotation:

- Centre of rotation. This is usually a co-ordinate.
- Direction of rotation. Either Clockwise or anti-clockwise.
- Degrees of rotation. 90° or 180° or 270°
- Tracing paper.

Online clips

M910, M290, M139

Reading Map Scales

Component Knowledge

- To be able to measure and calculate real-life distances using a map scale.

Key Vocabulary

Map	A diagrammatic representation of an area of land or sea showing physical features, cities, roads, etc.
Scale	The ratio that defines the relation between the actual distance and its model.
Ratio	A relationship between values comparing one part to another
Proportion	To enlarge something by a common ratio
Distance	The length of space between 2 points
Key	A set of instructions used for reading a map
Grid	A network of lines that cross each other in series of squares

Scale can be shown on a map in different ways

Scale Line		A scale line on a map shows that 1cm on a map is equal to 1km in real life. Sometimes it can also be shown in miles.
Ratio	**1:25,000**	Ratio can be shown in different ways on a map. You will need to check this. If there are no units, you need to assume they are the same e.g. 1 : 25,000 means 1cm on the diagram = 25,000cm in real life.

Scale Drawing

- Scale drawing allows us to draw large objects on a smaller scale while keeping them accurate.
- All scale drawings must have a scale written on them. Scales are usually expressed as ratios
- Example: 1cm : 100cm
- The ratio 1cm:100cm means that for every 1cm on the scale drawing the length will be 100cm in real life

A map has a scale of 1cm : 4 kilometres. The actual distance between two cities is 52 kilometres. What is the distance between the cities on the map?

$52 \div 4 = 13$

Map distance = 13 cm

Map Directions

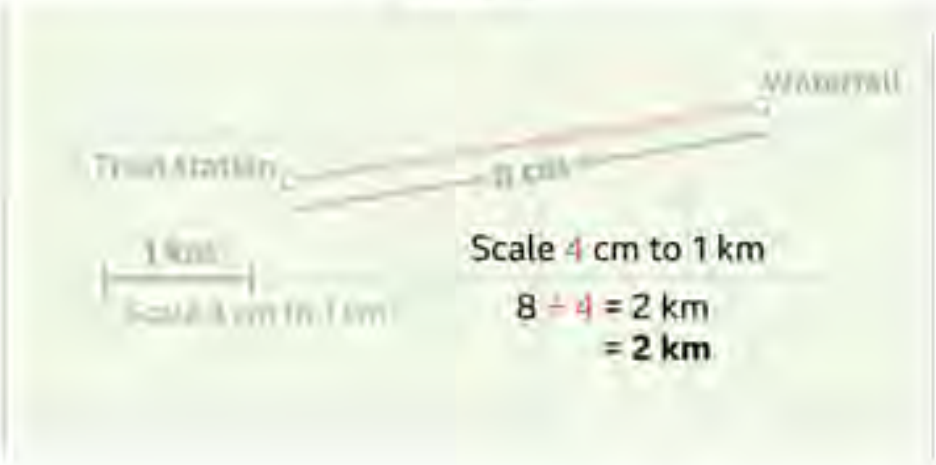
- North
- East
- South
- West

A map has a scale of 1cm : 10 miles. The distance between two towns on the map is 3.5 cm. How far apart are the towns in real-life?

$3.5 \times 10 = 35$

Actual distance = 35 miles

Examples



If we measure the actual distance between the Post Office and Supermarket, we get a length of 4.2cm.

We then use the scale of 1:20,000 to find the real/actual distance.

4.2 x 20,000 = 84,000 cm. This is not a sensible unit to use.

We then convert 84,000 cm to metres by dividing by 100.

84,000 cm = 840 m. This is now a sensible unit to use.

Online clip

M112

Loci

Component Knowledge

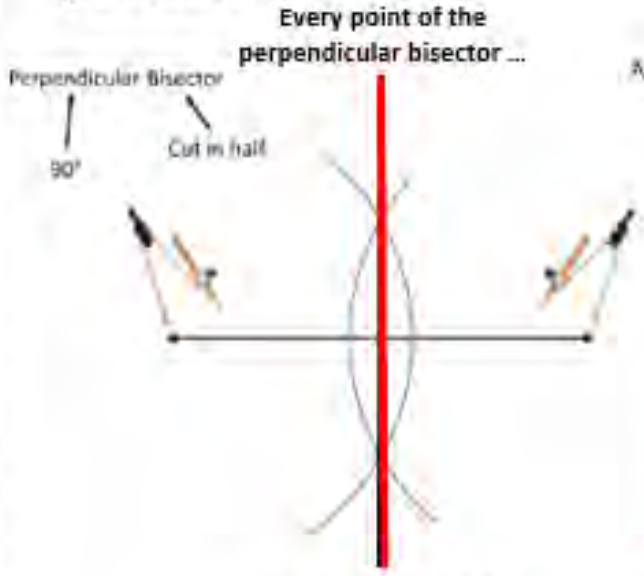
- Construct bisectors of angles and line segments.
- Construct circles with given radii and centres.
- Solve simple geometric problems by constructing a suitable locus.
- Solve multi-step locus problems by constructing suitable sequences of loci.

Key Vocabulary

Locus	The set of points that satisfy a condition. The plural of locus is *loci*.
Perpendicular	Two lines are perpendicular if the angle of intersection is 90°.
Bisector	A line that intersects another line at midpoint; or the vertex of an angle to halve it..

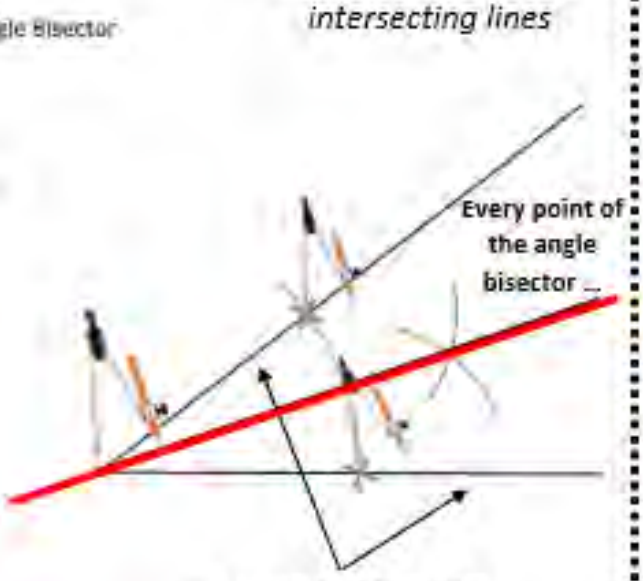
Basic locus constructions

The locus of points equidistant from two given points



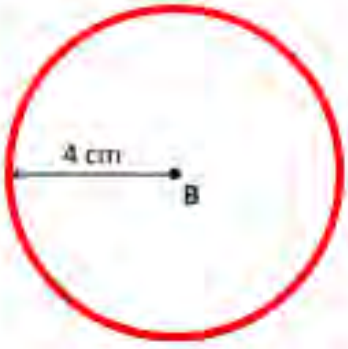
... is equidistant from both edges incident at the vertex

The locus of points equidistant from two intersecting lines



... is equidistant from both edges incident at the vertex

The locus of points at a given distance from a point



Every point of the circumference of a circle is the same distance from the centre (4cm in this example)

Finding loci using basic constructions

The locus of points from a line segment

Step 1] Take your compass and open it up to **4cm** wide using your ruler.

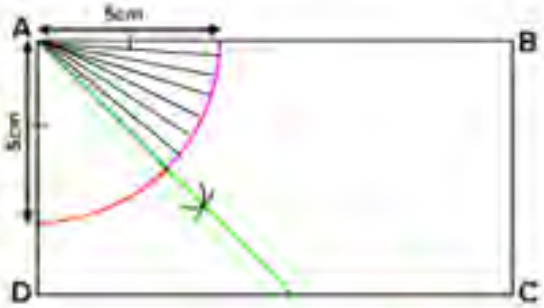
Step 2) Place compass on one end of the line segment and draw a semi-circular arc of radius **4cm**. Repeat at the other end.

Step 3) Draw 2 lines parallel to AB by joining up the arcs with a straight line using your ruler.

Q

Shade the area which is:

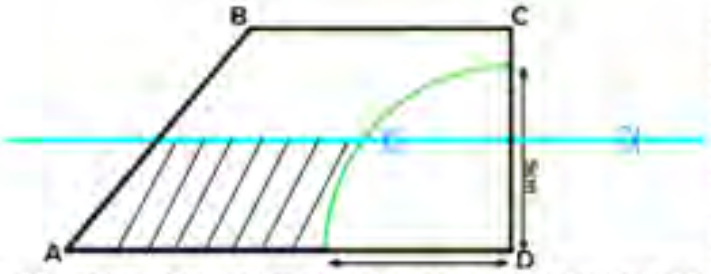
- Less than 5cm from A — Circle at point A
- Nearer AB than AD — Angle bisector of ∠DAB



Q

Shade the area which is:

- Nearer AD than BC — Perpendicular bisector of CD
- More than 5cm from point D — Circle at point D



Online clips

M253, M232, M239

Index Laws

Component Knowledge

- To be able to apply the different index laws
- To be able to calculate negative indices
- To be able to calculate fractional indices

Key Vocabulary

Index notation	A way of writing numbers or letters that have been multiplied by themselves a number of times
Square number	The product of a number multiplied by itself
Cube number	The product of a number multiplied by itself three times.
Root	The inverse of a square number is a square root. The inverse of a cube number is a cube root
Reciprocal	1 divided by the number

Multiplication law

When multiplying the terms, we add the powers together

$3^7 \times 3^5 = 3^{7+5} = 3^{12}$

$x^3 \times x^4 = x^{3+4} = x^7$

The base number does not change

Division law

When dividing the terms, we subtract the powers.

$2^7 \div 2^3 = 2^{7-3} = 2^4$

Divides can only be written as fractions

$\frac{5^{11}}{5^2} = 5^{11-2} = 5^9$

$\frac{y^5}{y^{-1}} = y^{5--1} = y^6$

Subtracting a negative is the same as adding

Brackets law

$(4^5)^3 = 4^{5\times3} = 4^{15}$

When raising to the power we multiply the powers together

$(2x^4)^3 = 2^3 \times x^{4\times3} = 8x^{12}$

Facts

$p = p^1$

$y^0 = 1$

$456^0 = 1$

Anything to the power of zero is equal to 1

Index Laws – You can only use index laws when the base number is the same.

$2^3 \times 4^5 \neq 8^{15}$

Negative indices

A negative power performs the reciprocal

$$x^{-a} = \frac{1}{x^a}$$

Example

$$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

Fractional

The denominator of a fractional power acts as a "root. The numerator of a fractional power acts as a normal power.

General rule

$$x^{\frac{a}{b}} = \left(\sqrt[b]{x}\right)^a$$

$$64^{\frac{2}{3}} = \left(\sqrt[3]{64}\right)^2 = 4^2 = 16$$

Changing the base

Write

$$(4)^3 \text{ as a power of } 2$$

$4 = 2^2$, so

$$(4)^3 = (2^2)^3 = 2^6$$

Example

Given that

$$3 \times \sqrt{27} = 3^n$$

Find the value of n

$$27 = 3^3$$

$$3 \times \sqrt{3^3}$$

$$3^1 \times (3^3)^{\frac{1}{2}}$$

A square root can be changed to the power of $\frac{1}{2}$

$$3^1 \times 3^{\frac{3}{2}} = 3^{1+\frac{3}{2}} = 3^{\frac{5}{2}}$$

Online clips

M135, M608, M150, M120 X647, X783

Recurring Decimals

Component Knowledge

- To be able to convert recurring decimals to fractions with one or more recurring digits.
- To be able to convert a recurring decimal (with non-recurring and recurring digits)

Key Vocabulary

Recurring Decimal	It is a decimal fraction in which a figure or group of figures is repeated indefinitely, as in 0.666... or as in 1.851851851.... It is denoted by a dot above the recurring parts. E.g. $0.\dot{6} = 0.666\ldots$ *or* $0.\dot{3}\dot{4} = 0.343434\ldots$

When there are no non-recurring digits after the decimal point:

To convert a recurring decimal to a fraction, use the following steps

a) Name out decimal (write as x = ...)
b) Identify the number of places that are recurring
c) Multiply by a power of 10 to move the recurring part past the decimal. (This should make the recurring parts line up).
d) Subtract x from the new power of x to cancel out the decimal part.
e) Then divide to leave x in a fractional form and simplify if possible.

Convert $0.\dot{5}$ to a fraction.

Let $x = 0.\dot{5}$,
$10x = 5.\dot{5}$
$9x = 5$
$\div 9$ $x = \frac{5}{9}$

How could we remove the recurring parts?

$5.\dot{5}$
$-\ 0.\dot{5}$

Convert $0.4\dot{2}\dot{7}$ to a fraction.

Let $x = 0.4\dot{2}\dot{7}$,
$1000x = 427.\dot{4}\dot{2}\dot{7}$
$999x = 427$
$\div 999$ $x = \frac{427}{999}$

$427.\dot{4}\dot{2}\dot{7}$
$-\ \ 0.4\dot{2}\dot{7}$

How could we remove the recurring parts?

Convert $2.\dot{4}\dot{8}$ to a fraction.

Let $x = 2.\dot{4}\dot{8}$,
$100x = 248.\dot{4}\dot{8}$

How could we remove the recurring parts?

$248.\dot{4}\dot{8}$
$-\ \ 2.\dot{4}\dot{8}$

$99x = 246$
$\div 99$ $x = \frac{246}{99} = 2\frac{48}{99}$

When there is a non-recurring digit after the decimal point:

Use the same steps as previously however we will need to multiply x two separate ways, once by a power of 10 to move the non-recurring digits before the decimal point and secondly by a different power of 10 to move the recurring digits before the decimal point. (Again, all recurring digits should line up in the two equations.)

Convert $0.7\dot{2}$ to a fraction.

Let $x = 0.7\dot{2}$,

How could we remove the recurring parts?

$100x = 72.\dot{2}$

$10x = 7.\dot{2}$

$72.\dot{2} - 7.\dot{2}$

$90x = 65$

$\div 90$

$x = \frac{65}{90} = \frac{13}{18}$

Convert $0.4\dot{8}\dot{1}$ to a fraction.

Let $x = 0.4\dot{8}\dot{1}$,

How could we remove the recurring parts?

$1000x = 481.\dot{8}\dot{1}$

$10x = 4.\dot{8}\dot{1}$,

$481.\dot{8}\dot{1} - 4.\dot{8}\dot{1}$

$99x = 477$

$\div 99$

$x = \frac{477}{990} = \frac{53}{110}$

Online clips

M701, M922

What Makes a Good Song?

Exploring Popular Songs and Musical Arrangements

A. Popular Song Structure

SONG STRUCTURE – How a song is made up of or divided into different sections (see below) and the order in which these sections occur. To work out the structure of a song, it's helpful to analyse the **LYRICS and** listen to a recording for the song (for instrumental sections).

INTRO – often shortened to 'intro', the first section of a song which sets the mood of the song and is sometimes, but not always, an instrumental section using the song's chord pattern.

VERSES – songs normally have several verses. Verses introduce the song's theme and have the same melody but different lyrics for each verse which helps develop the song's narrative and story. Songs made up entirely of verses are called **STROPHIC**.

LINK – a optional short section often used to join different parts of a song together, often instrumental, and sometimes joins verses together or appears at other points within a song.

PRE-CHORUS – an optional section of music that occurs before the **CHORUS** which helps the music move forward and "prepare" for what is to come.

CHORUS – occurs several times within a song and contains the most memorable **HOOK/RIFF**. The chorus relays the message of the song and is repeated with the same melody and lyrics each time it is heard. In popular songs, the chorus is often repeated several times towards the end of the song.

MIDDLE 8/BRIDGE – a section (often 8 bars in length) that provides contrasting musical material often featuring an instrumental or vocal solo using new musical material allowing the performer to display their technical skill on their instrument or voice.

CODA/OUTRO – The final section of a popular song which brings it to an end (Coda is Italian for "tail"!)

B. Key Words

LYRICS – The words of a song, usually consisting of **VERSES** and a **CHORUS**.

HOOK – A 'musical hook' is usually the 'catchy bit' of the song that you will remember. It is often short and used and repeated in different places throughout the piece. Hooks can be either **MELODIC, RHYTHMIC** or **VERBAL/LYRICAL**.

RIFF – A repeated musical pattern often used in the introduction and instrumental breaks in a song or piece of music. Riffs can be rhythmic, melodic or lyrical, short and repeated.

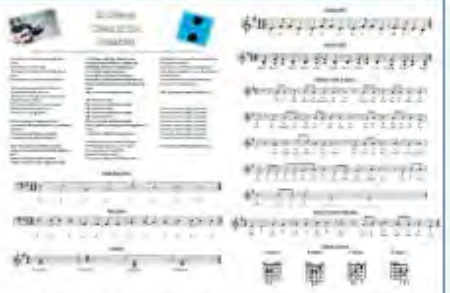
MELODY – The main tune of the song often sung by the **LEAD SINGER**.

COUNTER-MELODY – An 'extra' melody often performed 'on top of' the main melody that 'fits' with it a **DESCANT** or **INSTRUMENTAL SOLO**.

TEXTURE – The layers that make up a song *e.g., Melody, Counter-Melody, Hooks/Riffs, Chords, Accompaniment, Bass Line*.

C. Lead Sheet Notation and Arrangements

A **LEAD SHEET** is a form of musical **NOTATION** that contains only the essential elements of a popular song such as the **MELODY, LYRICS, RIFFS, CHORDS** (often as guitar chord symbols) and **BASS LINE**; it is not as developed as a ***FULL SCORE ARRANGEMENT*** and is open to interpretation by performers who need to use and adapt the given elements to create their own musical **ARRANGEMENT:** their "version" of an existing song.



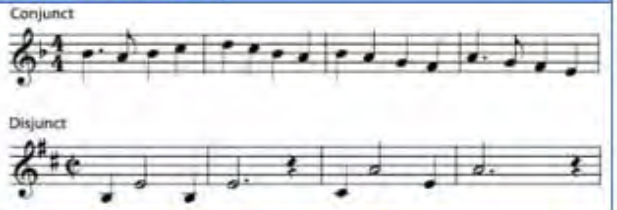
COVER (VERSION) – A new performance, remake or recording by someone other than the original artist or composer of the song.

D. Conjunct and Disjunct Melodic Motion

CONJUNCT MELODIC MOTION – Melodies which move mainly by step or use notes which are next to or close to one another.

DISJUNCT MELODIC MOTION – Melodies which move mainly by leap or use notes which are not next to or close to one another.

MELODIC RANGE – The distance between the lowest and highest pitched notes in a melody.



E. Song Timbre and Sonority (Instruments that are used to Accompany Songs)

Pop Bands often feature a **DRUM KIT** and **PERCUSSION** to provide the rhythm along with **ELECTRIC GUITARS (LEAD GUITAR, RHYTHM GUITAR** and **BASS GUITAR)** and **KEYBOARDS**. Sometimes **ACOUSTIC INSTRUMENTS** are used such as the **PIANO** or **ACOUSTIC GUITAR**. **ORCHESTRAL INSTRUMENTS** are often found in pop songs such as the **STRINGS, SAXOPHONE, TROMBONE** and **TRUMPET.**

Singers are essential to a pop song - **LEAD SINGER** – Often the "frontline" member of the band (most famous) who sings most of the melody line to the song. **BACKING SINGERS** support the lead singer providing **HARMONY** or a **COUNTER-MELODY** (a melody that is often higher in pitch and different, but still 'fits with' the main melody) and do not sing all the time but just at certain points within a pop song e.g. in the chorus.

WESTHOUGHTON HIGH SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: FOOTBALL

Passing/ Receiving

- Head down and eye on the ball.
- Ensure that non-kicking foot is planted along side the ball.
- Side footed pass- strike the ball in the centre of the ball.
- Laces pass- strike the ball with the top of your boot to ensure ball stays along the floor.
- Chip pass- strike ball slightly under the ball to gain height.
- Follow through in the direction you want the ball to go.
- When receiving the ball, ensure head is up.
- Eye contact with the passer to receive the ball.
- On the balls of your feet.
- Check shoulder to see of any defenders

Dribbling

- Keep the ball close to your feet.
- Use the inside and outside of your foot
- Keep head up.
- Use your body to throw the defenders off balance to create space.
- Look for spaces to move the ball into.

Moving with the ball

- Big touches.
- Use the laces to knock the ball forwards so you can run onto it.
- Accelerate into the run and keep speed up

Shooting

- Lean forward when you go to kick the ball.
- Make sure your leg is fully extended.
- Lock your ankle into the kick.
- Kick the ball in the centre of the ball.

Attacking Play

- Using different tactics to beat your opponent.
- Working on attacking overloads i.e 2v1 or 3v1.
- Breaking on set plays i.e Corners or Free kicks to gain advantage.

Heading

- Use the middle of your forehead to head the ball.
- Aim for the centre of the ball.
- Attacking heading and defensive headers.

Defensive Play

- Jockeying your opponent, don't dive in and be patient.
- Force the attacker on their weaker foot.
- Be on your toes.
- Keep your eye on the ball.

Key Words:

Side foot pass
Lofted pass
Corner
Free Kick
Throw-in
Dribble
Shoot
Heading
Tackle
Jockey
Marking
Attacking
Defending
Crossing

WESTHOUGHTON HIGH SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: FOOTBALL

Tactics:

➔ Teams attack and defend together

➔ Create width to create more space

➔ Tactics are also used in different formations and how best they suit different teams.

➔ 4-3-3, This formation is great with having the extra midfielder in the middle of the pitch which can add that overload system.

➔ 5-3-2, This formation gives more a defensive option but allows the two wing backs to push forward, giving more attacking options.

Rules:

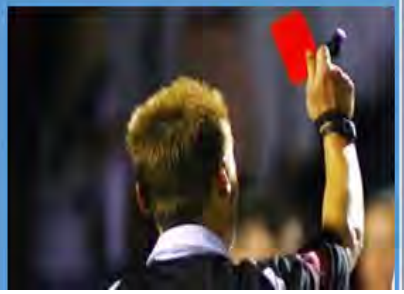
➔ The Game is started by one team in the middle of the pitch

➔ One referee officiates the game with the help of two assistant referees

➔ Players are not allowed to use their hands or arms to control the ball unless they are the goalkeeper

➔ Usually a game consists of 45 minutes each half

➔ Depending on the level of football will depend on how many substitutes you can use



Positions:

1. Goalkeeper
2. Left Back
3. Right Back
4. Centre Back
5. Centre Defensive Midfielder
6. Centre Attacking Midfielder
7. Left Wing
8. Right Wing
9. Striker/ Number 9

- Year 7's will play 9 a side which will consist of different formations such as: 3-3-2 or 2-4-2. Year 7 will also play 30-minute games.
- Year 8-11 will be 11 a side games. 35–40-minute games.

Scoring System:

➔ To score a goal, the ball must be put over the line into the goal

➔ The team with the most goals at the end of the game wins.

➔ In case of a cup game and both teams have scored the same, it will then go to extra time and penalties

Key Words:

Side foot pass
Lofted pass
Corner
Free Kick
Throw-in
Dribble
Shoot
Heading
Tackle
Jockey
Marking
Attacking
Defending
Crossing

WESTHOUGHTON HIGH SCHOOL - PE and Sport Dance knowledge organiser

Skills and Techniques:

→ **Actions** (eg travel, turn, elevation, gesture, stillness, use of different body parts, floor work, transfer of weight)

→ **Dynamics** (eg fast/slow, sudden/sustained, strong/light, flowing/abrupt)

→ **Space** (pathways, levels, directions, size of movement, patterns, spatial design)

→ **Relationships** - lead and follow, mirroring, action and reaction,, complement and contrast, formations)

→ **Timing**

→ **Rhythm**

Choreographic devices:

→ Motif and development
→ Repetition
→ Contrast
→ Highlights
→ Climax
→ Changes in numbers of dancers
→ Unison and canon.
→ Chance Choreography

Positions and groupings:

Solo
Duet
Trio
Group

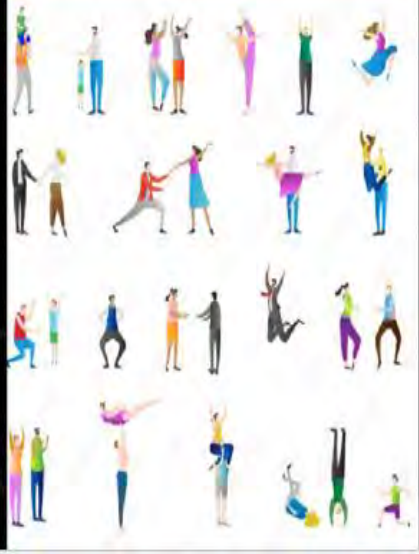
Centre stage
Upstage
Downstage
Stage Left
Stage Right
Onstage
Offstage

Performance skills:

→ Posture
→ Alignment
→ Balance
→ Coordination
→ Control
→ Flexibility
→ Mobility
→ Strength
→ Stamina
→ Extension
→ Focus

Key Words:

Choreography
Pathways
Direction
Level
Speed
Extension
Timing
Phrase
Stimulus



WESTHOUGHTON HIGH SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: NETBALL

Skills and Techniques:

→ Catching:
Hands form W shape behind ball. Catch at speed, catch with one hand and catch a ball at different heights

→ Passing:
Perform different types of passes selecting the right pass under pressure. Place throwing hand behind ball, move opposite foot in front of body. Full extend arm when passing, following through with pass.

→ Footwork:
Land correctly wither one foot landing or two-foot landing. Pivot to send the ball in a different direction.

→ Shooting:
Ball on fingertips, use non-throwing hand to steady ball. Bend knees and elbows, lifting ball up to net.

Rules:

→ Game is started by centre pass within the centre third

→ Two umpires officiate the game

→ Players are not allowed to travel with the ball

→ Players must remain within their designated zones

→ A defending player must stand three feet away from the person with the ball.

Positions:

GK - Goalkeeper
GD - Goal Defence
WD - Wing Defence

C - Centre

WA - Wing Attack
GA - Goal Attack
GS - Goal Shooter

7 players in total

Scoring System:

→ To score a goal, the ball must be put through the opposition's goal ring

→ The team with the most points at the end of the game wins.

Tactics:

→ Quick Passing
→ Dodging and changing speed to receive ball

Key Words:

Chest Pass
Bounce Pass
Shoulder Pass
Intercept
Marking
Defensive Third
Centre Third
Attacking Third
Goal Circle
Net Attacking
Defending
Centre Pass

Westhoughton High School KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: HANDBALL

Skills and Techniques:

→ Dribbling used to keep possession of the ball and travel around the court. The ball should always be kept close to the body (under control) Dribbling with one hand.

→ Shooting-Used to score points for the team(See Scoring system for how to score)

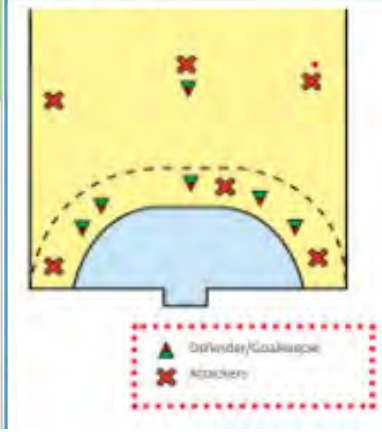
→ Passing-Used to get up the court quickly. Another way for the team to maintain possession. Can be used to find a better scoring or dribbling opportunity.

Rules:

→ Each team can have a maximum of 7 players on the court at any one time.

→ The ball can only be moved by either dribbling (bouncing the ball) or passing the ball.

→ Violations in Handball include travelling (taking more than three step without bouncing the ball), double dribble (picking the ball up dribbling, stopping then dribbling again with two hands)



Positions:

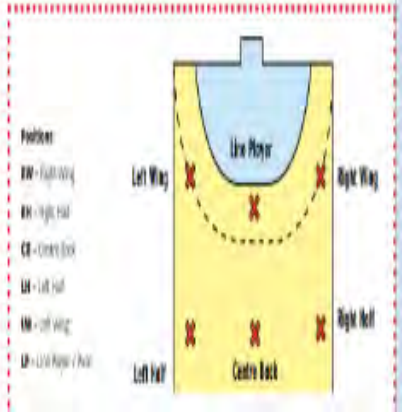
→ **Keeper- net only making sure no handballs go in.**

→ **Right/Left Half- wide and fast players getting the ball up the court quick but first back to defend.**

→ **Line player/Pivot- controller of the game in the middle passing and moving the ball.**

→ **Centre back-Holds the defence strong, command the defensive shapes needed.**

→ **Right/Left Half- attacking players, widest points of the pitch to create space, fast movement and quickness needed.**



Scoring System:

→ A goal is worth one point regardless of where it is scored and is registered when the ball completely breaks the vertical plane of the goal line. After a scored goal, the game is restarted with a free throw from the goalie

Tactics:

→ **Defend the D when your team hasn't got the ball. (Target Zone Defence)**

→ **Man to man marking when defending.**

→ **Short and quick passing when attacking.**

→ **Try to always play the ball to the forward. (target player)**

→ **Shoot on sight.**

Key Words:

Bounce Pass
Shoulder Pass
One arm throw
Intercept
Marking
Defensive wall
Goal
Circle
Net
Dribbling
Double Dribble
Attacking Play
Defensive Play
Jump Shot
Throw in
Corner

WARM-UP

1. Pulse Raising Activity

- Pulse raising activities gently raises the heart rate.
- E.g. Jogging, cycling, skipping.

2. Stretches

- Stretches should be dynamic (moving, not held). They prepare the muscles.
- E.g. High knees to stretch the hamstrings, heel flicks to stretch the quadriceps.

3. Skill-Based Activity

- This is the final part of the warm-up.
- This is where you familiarise yourself with the skills and actions that will be needed in the session.
- E.g. Passing the ball in rugby.

Cool down- starts with low intensity exercise such as light jogging, medium pace walking or easy cycling, anything that allows the heart rate to maintain an increased rate then gradually decrease. This is followed by stretching, which is usually more static (held) in a cool down.

Muscular system

Label and locate all the muscles and bones in arms, core and hands/feet

Year 9
Term 1: Health
Knowledge Organiser

Sedentary lifestyle

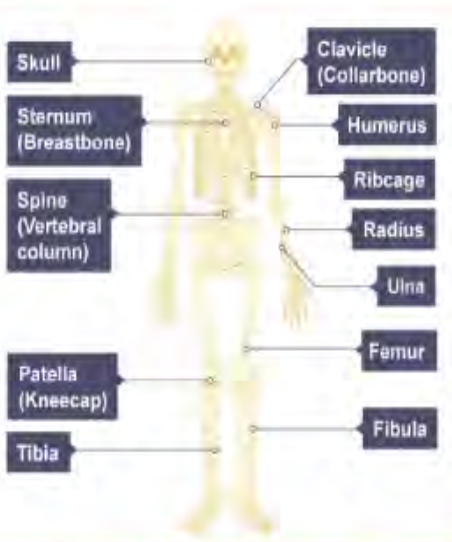
A sedentary lifestyle is one with no or irregular physical activity and an excessive amount of daily sitting.

Consequences of a Sedentary lifestyle-obesity, Depression, Type 2 diabetes, Poor muscle tone, osteoporosis.

Short term effects of exercise

on HR and breathing rate =increase
Long term effect of exercise =decrease

Skeletal System



Key Vocabulary: Pulse raiser Sedentary. Triceps Biceps Humerus Radius. Ulna Femur Patella Tibia Fibula Abdominals Tarsals. Metatarsals Phalanges

COMPONENTS OF Health related Fitness – FABS MS

1. **Flexibility** – The ability to move a joint fluidly through its complete range of movement.
2. **Body Composition** – The relative ratio of fat mass to fat-free mass in the body.
3. **Speed** - Measured in metres per second. The faster an athlete runs over a given distance, the greater their speed.
4. **Cardiovascular endurance**-The ability of the heart, lungs and blood to transport oxygen during sustained exercise

COMPONENTS OF SKILL RELATED FITNESS – CRAP B

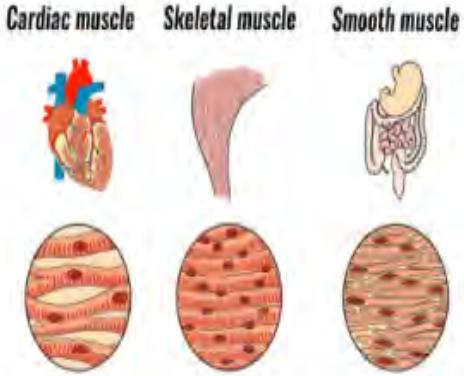
1. **Co-ordination** – The smooth flow of movement needed to perform a motor task efficiently and accurately e.g. do more than one thing at the same time.
2. **Reaction Time** – The time taken for a sports performer to respond to a stimulus.
3. **Agility** – The ability of a sports performer to quickly and precisely move or change direction without losing balance.
4. **Power** – The product of strength and speed. Power is needed in many sports.
5. **Balance** – The ability to maintain centre of mass over a bass support; dynamic and static.

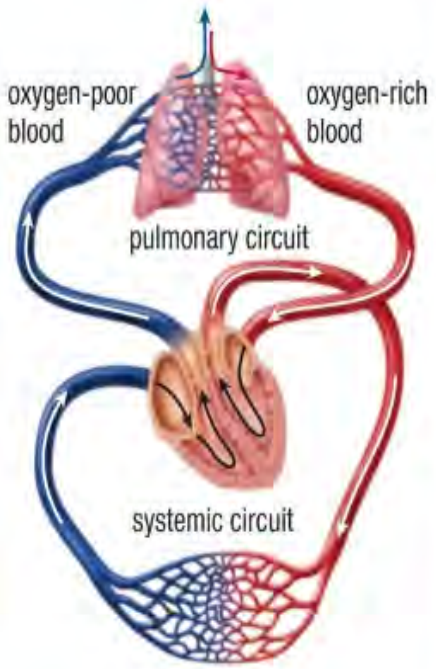
The cardiovascular system and respiratory system working together

The lungs bring oxygen into the body, to provide energy, and remove carbon dioxide, the waste product created when you produce energy. The heart pumps the oxygen to the muscles that are doing the exercise. When you exercise and your muscles work harder, your body uses more oxygen and produces more carbon dioxide

Year 9: Term 1
Health
Knowledge Organiser

Different types of muscle

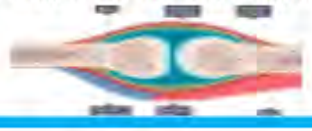




Key Vocabulary: Cardiovascular. Carbon dioxide Pulmonary circuit Skill related fitness components Health related

Joints

A joint is a place where two or more bones meet and is also called an articulation



Hinge - these can be found in the elbow, knee and ankle. They allow flexion and extension of a joint.

Ball and socket - these types of joint can be found at the shoulder and hip and allow movement in almost every direction.

Pivot - this joint can be found in the neck between the top two vertebrae. It allows only rotational movement such as moving your head from side to side as if you were saying 'no'.

Condyloid - this type of joint is found at the wrist. It allows you to flex and extend the joint,and move it from side to side.

- Short term effects of exercise
- Cardiovascular system-Increase in stroke volume (SV); increase in heart rate (HR); increase in cardiac output (Q); increase in blood pressure (BP)
- Respiratory system-Increase in breathing rate; increase in tidal volume\
- Cardio-respiratory system-increase in oxygen uptake; increase in carbon dioxide removal
- Energy system--increase in lactate production
- Muscular system-increase in temperature of muscles; increased pliability; muscle fatigue

Long term effects of exercise	
Cardiovascular system	Cardiac hypertrophy; increased stroke volume (SV); decrease in resting heart rate (HR); increase in maximum cardiac output (Q); capillarisation at the lungs and muscles; increase in number of red blood cells; increased size and strength of the heart; drop in resting blood pressure due to more elastic muscular wall of veins and arteries
Respiratory system	Increased vital capacity; increased number of functioning alveoli; increased strength of the respiratory muscles (internal and external intercostals and diaphragm); increased lung capacity and volume
Energy system	Increased production of energy from the aerobic energy system; increased tolerance to lactic acid
Muscular system	Muscle hypertrophy; increased strength of tendons; increased strength of ligaments
Skeletal system	Increase in bone density

Year 9: Term 1
PE Theory
Knowledge Organiser

Fitness Components

Strength = The maximum force that can be generated by a muscle or muscle group.

Muscular Endurance = The ability of muscles to continually contract over a period of time against a light to moderate resistance load.

Power = The product of strength and speed.

Agility-Ability to rapidly change body direction, accelerate, or decelerate.

Cardiovascular endurance-The ability of the heart, lungs and blood to transport oxygen during sustained exercise

Fitness Test

- Strength - Hand grip dynamometer
- Maximal strength - One rep max test\
- Select the body part that is to be tested and use the weightlifting technique for that body part - for example, quadriceps a leg extension, pectorals - bench press
- Cardiovascular endurance - Multi-stage fitness test
- Flexibility - Sit and reach test
- Speed - 30 metre sprint test
- Muscular endurance - 60 second press-up test
- Muscular endurance - 60 second sit-up bleep test
- Agility - Illinois agility test
- Coordination - Alternate hand wall toss test
- Reaction time - Ruler drop test
- Balance - Standing stork test
- Power - Vertical jump test

Key vocabulary: Hinge Ball and Socket. Hypertrophy. Vital Capacity. Tidal Volume Latic acid Fitness Component

KS3 Knowledge Organiser - Health

Physical Health

Impacts of poor nutrition and/or lack of exercise:

Short term:
- stress
- tiredness
- limit capacity to work

Long term:
- being overweight or obese
- tooth decay
- high blood pressure
- high cholesterol
- heart disease and stroke
- type-2 diabetes
- osteoporosis
- some cancers
- depression
- eating disorders.

The importance of sleep:

Teenagers need 8-10 hours of sleep every night.

Not enough sleep causes:
- Increased risk of obesity
- Increased risk of injury
- Increased risk of mental health issues
- Mood instability
- Forgetfulness
- Weakened immune system

Where to get more help and support:
- Parents and trusted family School Staff and Wellbeing Team
- NHS Eat Well: https://www.nhs.uk/livewell/eat-well/
- British Nutrition Foundation: https://www.nutrition.org.uk/healthyliving/lifestages/teenagers.html
- • Kids Health: https://kidshealth.org/en/teens/dieting.html

How much exercise should you do?

- Jogging or running
- Racewalking
- Hiking uphill
- Cycling more than 10 miles per hour or steeply uphill
- Swimming fast or lap swimming
- Aerobic dancing, fast dancing, step aerobics
- Heavy gardening with digging, hoeing, shoveling heavy snow, moving or pushing heavy objects, carrying loads of 50 pounds on level ground or 25 pounds or more upstairs.
- Martial arts
- Playing sports with lots of running such as basketball, hockey, soccer
- Singles tennis
- Court sports such as handball, racquetball, squash

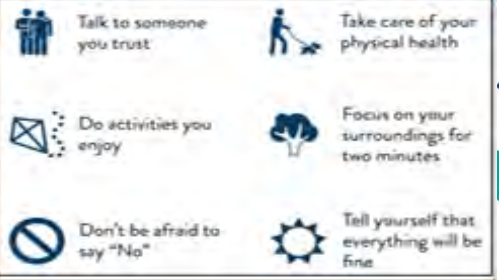
The Eat Well Plate

Mental Health

Good mental health means:

1. You feel relatively confident in yourself and have positive self-esteem
2. You feel and express a range of emotions
3. You can build and maintaining good relationships with others
4. You engage with the world around you
5. You can live and work productively
6. You can cope with the stresses of daily life
7. You can adapt and manage in times of change and uncertainty

Take care of your mental wellbeing:



Things to Remember:
- Everyone experiences stress and anxiety at points in their lives. Only a Doctor or Mental Health Professional can diagnose Chronic Stress or an Anxiety Disorder.
- There are treatments available and coping mechanisms.
- Having a stress or anxiety disorder is not a sign of weakness and is more common than people think.

Anxiety Disorders:
- Anxiety is an evolutionary and survival mechanism which is often linked to the flight or fight response. The brain responds to a perceived threat or danger by releasing stress hormones such as adrenaline and cortisol which cause the physical symptoms of anxiety. Once the threatening situation has stopped, the body will usually return to normal. But if someone has an anxiety disorder these feelings of fear and danger can be ongoing and interrupt their daily routine long after the threat has gone. They can make them feel like things are worse than they are.
- **Symptoms can include:**
  Racing thoughts, feelings of dread, heightened alertness, problems with sleep, Changes in appetite, wanting to escape from the situation you are in, sweating, hot flushes, fast heartbeat, extreme tiredness and nausea.

Chronic stress:
- Some stress is good as it can motivate people however too much can be detrimental, especially if over a long period of time.
- **Signs and symptoms of chronic stress can include:** irritability, which can be extreme, fatigue, headaches, difficulty concentrating, rapid, disorganized thoughts, difficulty sleeping , digestive problems and changes in appetite, a perceived loss of control, frequent infections or illnesses.

Where to get more help and support:
- Parents and trusted family
- School Staff and Wellbeing Team
- GP or Practice Nurse.
- MIND - https://www.mind.org.uk Help line - 0300 123 3393 open 9am to 7pm, Monday to Friday or Text: 86463
- Young Minds - https://youngminds.org.uk Text: 85258 or Parents Helpline: 0808 802 5544
- Stem4 - https://stem4.org.uk/

KS3 Knowledge Organiser - Health

Puberty

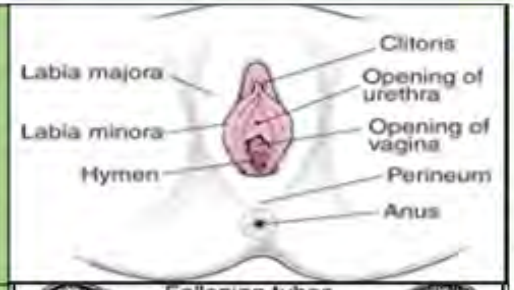
Key words:

- **Puberty:** The process of physical maturity in a person that takes place in adolescence
- **Menstruation:** Also known as a period. The process in a woman of discharging blood and other material from the lining of the uterus at intervals of about one lunar month from puberty until the menopause, except during pregnancy.
- **Hormones:** A chemical substance produced in the body that controls and regulates the activity of certain cells or organs.
- **Wet Dream:** An involuntary ejaculation that occurs whilst a person is asleep.

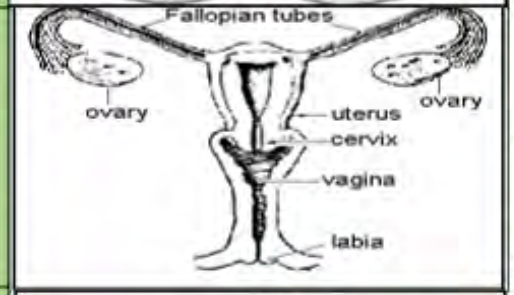
Things to Remember:

- Puberty begins at different times for different people.
- Changes will happen at different rates and in a different order for different people
- Everyone goes through puberty, you are not alone.
- A good diet and exercise can help deal with some of the physical changes.
- Puberty is normal despite feeling very abnormal.

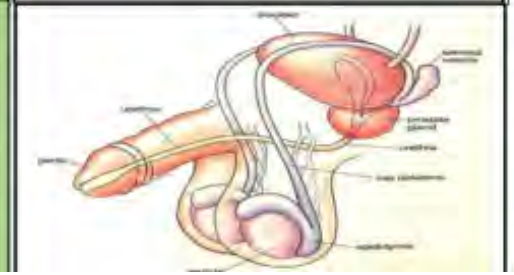
Female Genitalia – External



Female Genitalia – internal



Male Genitalia



Physical changes during puberty

Boys Only	**Starts between 10-12** • Facial hair • Voice breaking • Erections • Wet dreams • Widening of chest & shoulders
Girls Only	**Starts between 9-10** • Menstruation/periods begin • Breast growth • Stretch marks • Cellulite • Hips widen
Both	• Grow taller • Sweat more • Changes to hair and skin • Spots and pimples

Where to get more help and support:

- Parents and trusted family School Staff and Wellbeing Team
- NSPCC Helpline: 0808 800 5000 (24 hours, every day) www.nspcc.org.uk
- Childline Helpline: 0800 1111(24 hours, every day) https://www.childline.org.uk
- NHS Live Well Website www.NHS.UK/Livewell

Personal Hygiene

- **Hair:** Puberty causes the oil glands in the hair to produce more oil which can make hair more oily meaning that it needs to be washed more regularly.
- **Face:** During and after puberty people can be more prone to spots and acne. This can be managed using daily face washes. Exfoliants should be used twice weekly to remove dead skin cells.
- **Oral Care:** Brushing teeth twice a day, flossing and using a mouth wash can prevent bad breath and dental issues. Regular visits to the dentist are also important.
- **Body Odour:** Due to puberty, sweat glands not only become more active than before, but they also begin to secrete different chemicals into the sweat that has a stronger smelling odour. Daily washing is essential. Anti perspirant's will reduce the amount of sweat you produce whereas deodorants cover the smell and odour.
- **Body Hair:** Body hair in new places is something you can count on. You may want to start shaving some places where body hair grows, but whether you do is up to you. Some guys who grow facial hair like to let it develop into a moustache and beard. Some girls may decide to leave the hair on their legs and under their arms as is. It's all up to you and what you feel comfortable with.
- **Genital Hygiene Women:** The inside of the vagina never needs cleaning with the use of soap. It has a natural balance of substances that can become disturbed by washing causing any bacteria that enter to have the potential of developing into an infection. The labia should only need cleaning once a day using a mild soap and water. The area should also be cleaned following sexual intercourse. Over cleaning of the genital area can be harmful and lead to infections such as thrush.
- **Genital Hygiene Men:** The penis, scrotal area and anus, should only need cleaning once a day. No attempt should be made to try and clean the inside of the urethra; this can cause serious damage. Special care should be taken by uncircumcised men to make sure the head of the penis is cleaned. This can be done by allowing the warm water to act as a lubricant and the foreskin should be gently pulled back. Failure to clean this area properly will result in smegma collection, causing bad odours and an increased risk of infection. The area should be cleaned after sex, even if wearing a condom, to prevent bacterial build-up and unpleasant smells arising.

Menstrual Hygiene:

- Wash your hands before and after using a menstrual product.
- Change your sanitary pad or tampon every 4 hours.
- Use the lowest absorbency product needed.
- Wear breathable (cotton) clothing, especially underwear.
- Keep your genital area clean.
- Use unscented hygiene products.

KS3 Knowledge Organiser - Harm

Eating Disorders

Symptoms:

- Symptoms of eating disorders will vary between individuals and type of eating disorder. Not matching the symptoms exactly does not mean that someone does not have an eating disorder, however, some common symptoms include:
- eating very little food or eating large amounts of food in a short time in an uncontrolled way
- having very strict habits, rituals, or routines around food
- Spending a lot of time worrying about your body weight and shape
- Changes in mood
- Deliberately making yourself ill after eating
- Avoiding socialising when food may be involved
- Withdrawing from social groups, hobbies you used to enjoy or from family life
- Physical signs such as digestive problems or weight being very high or very low for someone of your age and height.

Where to get more help and support:

- Parents and trusted family or school staff and Wellbeing Team
- Your GP, Practice Nurse, or School Nurse
- Youth Access - www.youthaccess.org.uk
- The Mix - www.themix.org.uk Freephone: 0808 808 4994 (13:00-23:00
- daily)
- B-eat - www.b-eat.co.uk Helpline: 0808 801 0711 (Daily 3pm-10pm)
- Men Get Eating Disorders Too – www.mengetedstoo.co.uk
- Anorexia & Bulimia Care – www.exiabulimiacare.org.uk Helpline 03000 11 12 13 (option 1: support line, option 2: family and friends)

Self Harm

- **Self-harm** - deliberate injury to oneself, typically due to an overwhelming negative mental state.

Symptoms:

- Injuries observed on more than one occasion
- Injuries that appear too neat or ordered to be accidental Injuries on areas of the body that can be easily concealed with clothing .
- Secrecy or disappearing at times of high emotion
- Negative self-talk – feeling worthless, hopeless or aimless

Self-harm cycle

Where to get more help and support:

- Parents and trusted family or school staff and Wellbeing Team
- Your GP, Practice Nurse, or School Nurse
- Ring HOPELINEUK on 0800 068 4141 or the Samaritans on 116 123
- Text SHOUT to Shout's textline on 85258
- Stem4 - Calm Harm- www.stem4.org.uk

Female Genital Mutilation

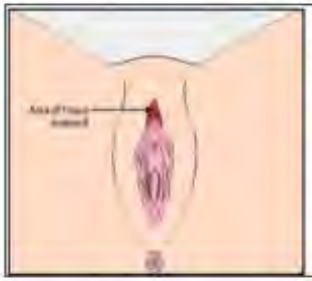
FGM: Female Genital Mutilation (FGM) comprises all procedures that involve partial or total removal of the external female genitalia, or other injury to the female genital organs for nonmedical reasons.

Why is FGM performed?

- Preservation of virginity and chastity
- Religion, in the mistaken belief that it is a religious requirement
- To ensure the girl is marriageable or to improve marriage prospect
- Belief that it increases the sexual pleasure for the male
- Mistaken belief that it enhances fertility

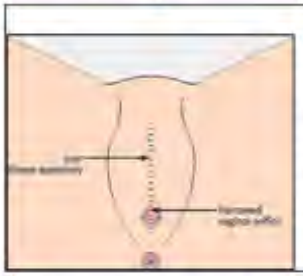
FGM and the Law:

- Over 24,000 girls under the age of 15 living in the UK are at risk of undergoing the most severe form of FGM at any one time.
- Female Genital Mutilation Act 2003 makes it illegal for FGM to be performed in the UK or anywhere in the world on UK citizens or permanent residents of any age.
- If you carry out or help in carrying out FGM or if you arrange for someone to undergo FGM you face up to 14 years in prison.
- It is also illegal to take a British national or permanent resident abroad for FGM or to help anyone trying to do this.

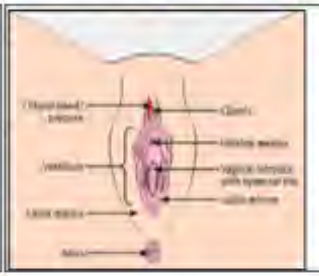


Type 1 – Clitoridectomy: partial or total removal of the clitoris and, in very rare cases, only the prepuce (the fold of skin surrounding the clitoris).

Type 2 – Excision: partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora (the labia are the 'lips' that surround the vagina).



Type 3 – Infibulation: narrowing of the vaginal opening through the creation of a covering seal. The seal is formed by cutting and repositioning the inner, or outer, labia, with or without removal of the clitoris. Sometimes referred to as **Pharaonic circumcision**.



Type 4 – Other: all other harmful procedures to the female genitalia for non-medical purposes, e.g. pricking, piercing, incising, scraping and cauterising the genital area.

Where to get more help and support:

- Parents and trusted family or school staff and Wellbeing Team
- NSPCC Helpline: 0808 800 5000 (24 hours, every day) www.nspcc.org.uk
- CEOPS - https://www.ceop.police.uk/safety-centre/

KS3 Knowledge Organiser - Harm

Drug	Analgesic	Hallucinogen	Stimulant	Depressant
Caffeine			✓	
Cocaine			✓	✓
Heroin	✓			✓
Cannabis		✓		✓
Crack Cocaine			✓	
Amphetamines		✓	✓	
Ecstasy			✓	
Alcohol				✓
Inhalants		✓	✓	
Tobacco				✓
LSD		✓		
Magic Mushrooms		✓		
Steroids	✓			

Definitions:

- **Stimulant:** causes a person to feel like they have more energy.
- **Depressant:** causes a person to feel calmer or lethargic.
- **Hallucinogen**: causes a person to experience sensations that are not there. This could be visual, auditory, or physical.
- **Analgesic:** reduces the feeling of pain.

Drugs

How cannabis affects the body:

- Reduces the effectiveness of the hippocampus, this causes memory problems.
- Slows your reaction time, coordination, and reflexive responses.
- Weakens your immune system.
- Impairs judgement
- Increases heart rate and expands blood vessels (resulting in bloodshot eyes).

	Example	Sentence for Possession	Sentence for Dealing
Class A	Ecstasy, heroin, cocaine, magic mushrooms.	Up to 7 years in prison and/or an unlimited fine.	Up to life in prison and/or an unlimited fine.
Class B	Amphetamines, methylphenidate (Ritalin)	Up to 5 years in prison and /or an unlimited fine	Up to 14 years in prison and/or an unlimited fine.
Class C	Tranquilizers, Cannabis, GHB, Ketamine	Up to 2 years in prison and/or an unlimited fine.	Up to 14 years in prison and/or an unlimited fine.

Alcohol

It is against the law:

- To sell alcohol to someone under 18 anywhere.
- For an adult to buy or attempt to buy alcohol on behalf of someone under 18.
- For someone under 18 to buy alcohol, attempt to buy alcohol or to be sold alcohol.
- For someone under 18 to drink alcohol in licensed premises,
- To give children alcohol if they are under five.

Smoking & Vaping

Facts about Nicotine:

- Nicotine is both a stimulant and a depressant.
- When a body is exposed to nicotine, the individual experiences a "kick." This is partly caused by nicotine stimulating the adrenal glands, which results in the release of adrenaline

Smoking and the law:

It's illegal:

- For shops to sell you cigarettes if you are under 18
- For an adult to buy you cigarettes if you are under 18
- To smoke in all public enclosed or substantially enclosed area and workplaces.
- To smoke in a car with a child.

Facts about vaping

- Users inhale e -cigarette aerosol into their lungs. Bystanders can also breathe in this aerosol when the user exhales it into the air. E - cigarette aerosol is NOT harmless "water vapor."
- The e - cigarette aerosol that users breathe from the device and exhale contain harmful and potentially harmful substances, including:
  - Nicotine
  - Ultrafine particles that can be inhaled deep into the lungs
  - Flavouring such as diacetyl, a chemical linked to a serious lung disease
  - Volatile organic compounds C
  - Cancer-causing chemicals
  - Heavy metals such as nickel, tin, and lead

Vaping and the law:

It's illegal:

- For shops to sell you vapes if you are under 18
- For an adult to buy you vapes if you are under 18
- To vape in public areas if the property owner has banned it.
- To vape while you're driving (can result in a £2,500 fine).

Where to get more help and support:

- Parents and trusted family or school staff and Wellbeing Team
- Your GP, Practice Nurse, or School Nurse
- Drink Aware 0300 123 1110 (weekly 9am - 8pm, weekends 11am - 4pm) https://www.drinkaware.co.uk
- Al-Anon Family Group 0800 0086 811 from 10 am - 10 pm, 365 days a year https://www.al-anonuk.org.uk/
- AddAction https://www.addaction.org.uk

Year 9 Religion & Society - What Really Matters?

Unit 1: Citizenship – Crime & Justice

What do I need to know about the criminal justice system?

1.What is a crime and why do we have laws?

- A crime is when the law has been broken.
- There are two types of law, criminal law and civil law.
- Laws keep us safe and protects our basic human rights.
- Laws also keeps order in our society and avoids chaos.
- Civil is law deals with disputes about such things as contracts including marriage, land and employment.
- Criminal law deals with 3 categories of crime:
  - Crimes against property - eg theft or burglary
  - Crimes against people's health and safety - e.g. assault, robbery or drug dealing
  - Crimes against the Crown (the state or government) e.g. treason or perjury.
- Although we might not agree with every law, we are all expected to obey them all which is called 'Rule of Law'
- In the UK, laws are made by elected MPs in Parliament.

2. How are criminals dealt with in the justice system?

- Police can arrest anyone suspected of committing a crime
- Anyone arrested is entitled to receive advice from a solicitor to ensure they are dealt with fairly.
- This suspect can be charged with the offence if the police feel that there is enough evidence. The police pass the file to the Crown Prosecution Service (CPS) who decide if there is enough evidence for the case to proceed to court.
- A court then issue a summons requiring them to appear in a particular court on a certain date and at a certain time.
- The suspect then attends a Magistrates court where the Magistrate listens to the evidence and decides on the verdict and a sentence.
- More serious cases are passed onto a Crown Court where the verdict is reached by a jury although the sentencing is done by the Judge who is well trained to apply the law.

3. What powers and duties to the police have?

Some of the duties of the police include:

- Provide a visible presence to reassure the community
- Teach the community about the law
- Diffuse violent situations and direct traffic
- Respond to calls from the public and conduct arrests
- Interview suspects or witnesses and gather crime scene
- Gather evidence at a crime scene

The police have certain powers to do their job effectively:

- Police can stop and search you in the street or in your vehicle if they have reasonable suspicion that you are carrying drugs, weapons, stolen goods, alcohol / tobacco if you are underage
- Police can ask you to remove outer clothing in the street
- Police can force you to go to the police station if arrested
- Police can arrest you if you refuse to co-operate

4. What is the age of criminal responsibility?

- The age of criminal responsibility is the age at which the courts decide a person is responsible for their actions.
- There is much debate about what age a person knows the difference between right and wrong and should therefore stand trial in court for committing a crime.
- The age of criminal responsibility in England, Wales and Northern Ireland is 10.
- The age of criminal responsibility in Scotland is 12, as it also is in the Netherlands and Belgium.
- The age of criminal responsibility in France is 13.
- The age of criminal responsibility is 14 in Germany, Italy and Spain and 15 in Scandinavian countries such as Sweden, Denmark, Finland and Iceland.
- ***Learners know arguments for and against raising the age of criminal responsibility in the UK***

5. What is the impact of crime? (Case Study)

Learners can explore the direct and indirect impact of crime on individuals, groups and society giving examples. Learners will link this to the stories of James Bulger or Rhys Jones.

The James Bulger Story

James was two years old on 12 February 1993 when he was abducted from a shopping centre in Merseyside by two boys, then known as Jon Venables and Robert Thompson. His body was found on a railway line, after he had been beaten to death. His killers were both just 10 years old. They were both jailed for life but were later released with new identities on license in 2001. Venables, was sent back to prison in 2010 and 2017 for additional offences.

The Rhys Jones Story

On 22 August 2007, **Rhys Jones**, eleven, was murdered in Liverpool while walking home from football practice. Sean Mercer, aged 16 at the time of the shooting, went on trial on 2 October 2008,and was found guilty of murder on 16 December. Mercer was sentenced to life imprisonment serving a minimum of 22 years. Rhys's murder was later revealed to be a result of Mercer's failed attempt to shoot one or more rival gang members from the Strand Crew who had come into Croxteth, instead missing and hitting Rhys.

Learners can clearly identify how the crime has affected a range of victims and groups both directly and indirectly.

6. What are the risks associated with gang culture?

- County lines - gangs sending young people from cities into smaller towns and villages to sell drugs.
- Disenchantment- to be disillusioned, in this case with society, and feeling like there is no part in it for you.
- Grooming - when young people are given attention, compliments, money, food or presents to build a relationship with a gang member. The young person being groomed is then made to feel like they owe something to the gang, which is how they are recruited.
- County Lines criminal activity has a negative impact on the communities involved. It brings further violence, abuse and drugs into rural communities. By flooding the market with class A drugs, it increases social problems associated with drug use, for example anti-social behaviour & theft.
- As well as harming communities, County Lines activity has a negative impact on the individuals involved; if caught, drug dealers can face prison sentences of nine years.
- For young people, there is also the risk of becoming a user of drugs, as well as becoming trapped in gang activity.
- While some see criminal gangs as an escape from their life of poverty and abuse, many find that they are trapped in a vicious cycle of working for violent gangs.
- If you are worried about you or someone you know being involved in County Lines, call Crimestoppers (0800 555 111)

KS3 Genetics

Variation

Variation: Is the difference amongst a species. This can be due to the environment or genetics or both.
Characteristic: Features on organisms e.g. eye/hair colour
Species: Individuals of the same species are able to interbreed to produce fertile offspring.

Environment Differences between individuals of a species due to factors in their surroundings.

Inherited: Differences between individuals of a species due to their genetic information.

DNA

DNA: Deoxyribonucleic acid, found in the nucleus of cells, carrying the genetic information of a living being.
Gene: A gene is a section of DNA
Chromosome: The structure made of DNA that codes for all the characteristics of an organism

Evolution

Evolution: Change over time resulting in the formation of a new species.

Natural Selection: Best-adapted individuals survive longer, have more offspring.

Adaptation: A feature of an organism's body which helps it to survive.

Extinction

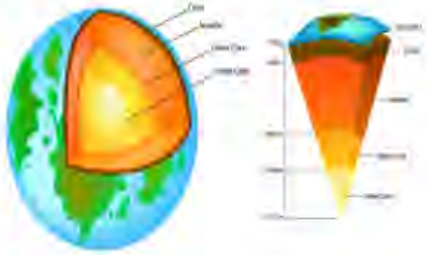
Extinct: A species that has completely died out
Endangered Species: Animals that are close to extinction because of their low numbers.
Biodiversity: The number and variety of organisms found in an area.
Ecosystem: a biological community of intera organisms and their physical environment

Keywords

Variation
Characteristic
Species
DNA
Gene
Inherited
Population
Evolution
Natural Selection
Adaptation
Extinction
Endangered Species
Biodiversity
Ecosystem

KS3 Earth resources

- The Earth's structure comprises:
  - The **crust** (the solid, outermost layer)
  - The **mantle** (a semi-solid which flows slowly)
  - The **outer core** (liquid iron and nickel which generates magnetic field)
  - The **inner core** (solid iron and nickel, very hot).
- The crust of the Earth is divided into **tectonic plates** which move on the surface of the mantle.
- Scientists study how seismic waves from earthquakes travel through the layers of the planet to work out the structure of Earth



Weathering is the process where rocks are **eroded** in 3 ways:

1. **Physical weathering**: Breakdown of rocks by temperature changes and mechanical forces.
2. **Chemical weathering**: Decomposition of rocks through chemical reactions which alter their mineral composition.
3. **Biological weathering**: Disintegration of rocks by plants, animals, and microbial activity.

There are 3 main types of rock:

- **Igneous rocks**: Formed from cooled magma or lava; crystalline structure; example: granite.
- **Sedimentary rocks**: Compressed sediments in layers (called **strata**) ; often porous; example: limestone.
- **Metamorphic rocks**: Altered by heat and pressure; may appear to have a distorted strata structure; example: marble.

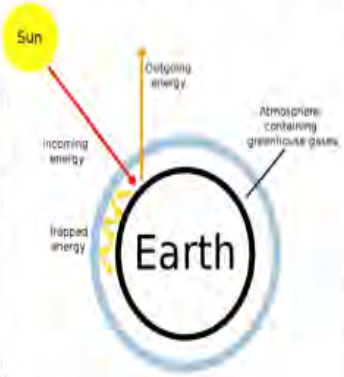
- The rocks within the crust are recycled from one type of rock to another through processes of weathering, sedimentation and metamorphosis.
- The **rock cycle** describes how rocks transform:
  - Lava or Magma cool to form **igneous** rocks
  - Rocks erode into sediments that compress into **sedimentary** rocks
  - Sedimentary rocks undergo heat and pressure to become **metamorphic** rocks
  - Metamorphic rocks can melt into magma, restarting the cycle

Keywords

- Core
- Crust
- Erosion
- Igneous
- Lava
- Magma
- Mantle
- Metamorphic
- Rock cycle
- Sedimentary
- Strata
- Tectonic plates
- Weathering

KS3 Earth resources

- The greenhouse effect is caused mainly by human activities such as burning fossil fuels (coal, oil, gas), deforestation, and farming which releases **carbon dioxide** and **methane** gases into the atmosphere.
- Thermal energy from the sun is **absorbed** by the planet's surface and emitted back out towards space.
- Greenhouse gases absorb the escaping thermal energy and **re-radiate** it back towards the surface of the planet, leading to global warming.
- The greenhouse effect describes the similarities with how a greenhouse traps thermal energy.
- The 96% carbon dioxide atmosphere on Venus causes it to have an extreme version of the greenhouse effect, making it the hottest planet in the solar system
- Climate change is the term used to describe changes to the normal climate of the planet including more extreme **weather** patterns, melting ice caps leading to coastal flooding, and impacts on ecosystems and food chains.



The earth's atmosphere is a layer of gases between the Earth's crust and outer space.
The atmosphere is composed of 78% Nitrogen, 21% Oxygen with a final 1% Argon with other gases
A mere 0.04% Carbon dioxide in the atmosphere is in a delicate balance because of human activities.

Recycling conserves **finite** resources by reducing the need to extract raw materials, saving energy, and minimizing waste disposal.
Reduce, Reuse, Recycle are important to promote environmental sustainability

The **carbon cycle** is the natural process where carbon atoms move between the atmosphere, oceans, the rocks of the Earth's crust and the biomass of living organisms
The processes of photosynthesis, respiration, decomposition, and combustion regulate the atmosphere's carbon balance and climate linked to the greenhouse effect.

Ceramics are hard & brittle materials which are able to resist high temperatures
Polymers are large molecules made of repeating units.
Composites are materials made by combining two or more different materials to create a new material with enhanced properties

Keywords

- Atmosphere
- Biomass
- Carbon cycle
- Carbon sink
- Ceramic
- Climate
- Combustion
- Composite
- Decomposition
- Finite
- Fossil fuel
- Global warming
- Greenhouse effect
- Polymer
- Radiate
- Recycle
- Sustainable
- Weather

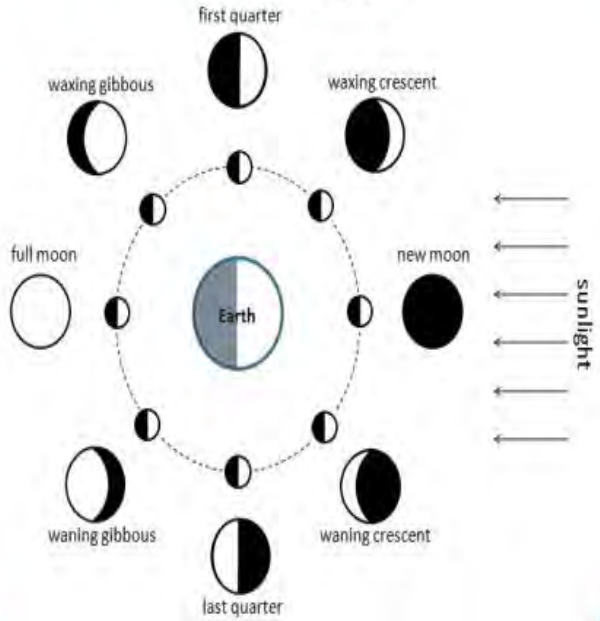
KS3 Space

The Night Sky

When we look up at the sky we can see:

- Stars (ball of fire)
- Constellations (groups of stars that make patterns)
- The Moon (Earth's **natural satellite**)
- Comets
- Planets

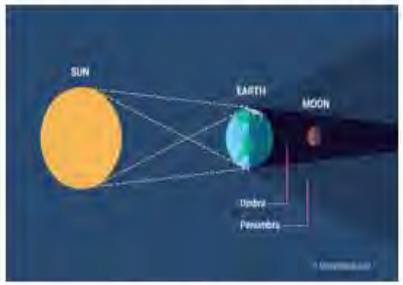
Moon Phases



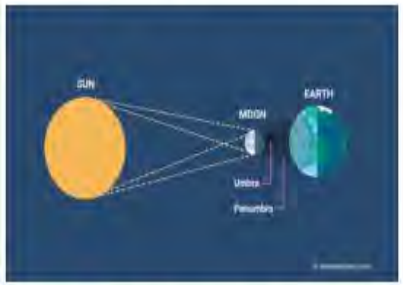
The Moon (Luna)

The **Moon** orbits Earth every 29.5 days. The Moon rotates on its axis at the same speed as it revolves around the Earth.

A lunar eclipse is where the Earth is between the Sun and the Moon.



A solar eclipse is where the Moon casts a shadow on Earth.



Keywords

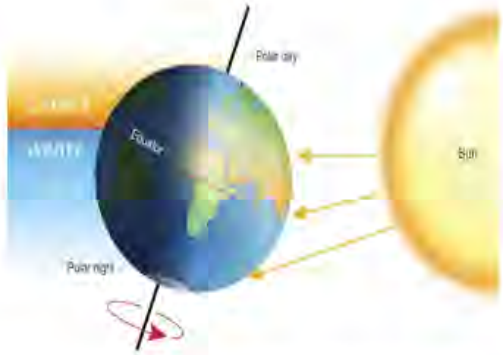
- Astronomical unit
- Light Year
- Universe
- Big Bang
- Red Shift
- Galaxy
- Nebula
- Vacuum
- Big Crunch
- Explore
- Extra-terrestrials
- Radio waves
- NASA
- SETI
- Astronaut
- Atmosphere

Keywords

- Rotates
- Revolves
- Moon phase
- Orbit
- Eclipse
- Time Zones
- Axis
- Anticlockwise
- Equator
- Hemisphere
- Geocentric
- Heliocentric
- Gravity
- Comet
- Dwarf Planet
- Natural Satellite

KS3 Space

EARTH'S SEASONS



There are four seasons on Earth, Winter, Spring, Summer, and Autumn.

The Earth tilts at an angle of 23.5° allowing these four seasons. Summer in the northern hemisphere means the northern hemisphere of Earth is facing the Sun. Winter is facing away from the Sun.

Day and Night

Earth rotates anticlockwise on its axis every 24 hours.

Day time is when the Earth is facing the Sun. Nighttime is when the Earth is facing away from the Sun. 1/2 of the Earth is in Day at one time.

The Universe and beyond

Dwarf planets (e.g Pluto) are smaller than planets.

Comets are balls of rock and ice that orbit the Sun, some (Haley's comet) with large orbits.

Natural Satellites are objects that orbit larger objects in space (e.g. moons).

Galaxies are large collections of stars (millions or billions). The Milky Way is our galaxy.

The Universe started with the Big Bang. The Universe is spreading out as a result (that is, expanding). Red shift is evidence that supports the Big Bang theory. The more red shifted the galaxy the further it is from Earth and the faster it is moving away.

The Solar System

Exploration

Humans have explored the universe for centuries. Starting with their eyes, new technology has improved exploration.

- Red shift – elongation of light waves to show light is moving away
- Telescopes (land or orbital)
- Hubble and James Webb Telescopes
- SETI – is searching for intelligent life in space
- Mars rovers
- Space probes
- Manned missions (Moon 1969)
- Mission to Mars