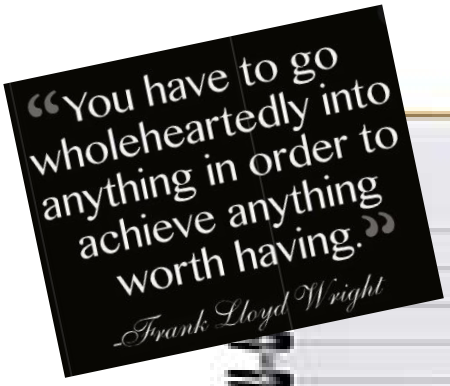
Knowledge Organisers

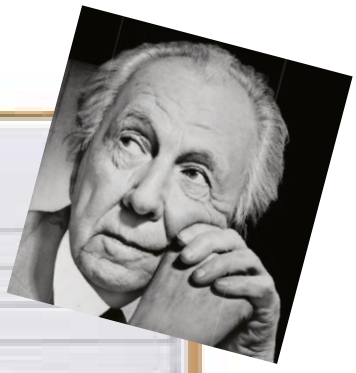
"I have come that they may have life and have it to the full"

John 10: 10

Year 10 - GCSE

You MUST bring this to every day for every lesson. It must be placed on your desk at the start of each lesson.





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look say cover write check

Knowledge Organisers at St John Fisher Catholic School

Why do we have Knowledge Organisers?

Knowledge Organisers show you the key information for that particular topic of study. It is the 'key take-aways' of what knowledge you will need to know to be successful in this topic. It will give you an excellent understanding of the topic you are studying and the expectations.

How do I use it?

Your teachers will use your knowledge organisers with you, explained in the section below, but you can also use it to support your understanding of the topic and develop further knowledge. You will have a test at the end of each unit of study and a PPE in the Summer term which will cover all that you have learnt therefore it is important that this new knowledge is embedded so that you can recall it later.

Use the Look, Say, Cover, Write, Check system to learn the information on your organisers. Complete any support/challenge tasks outlined. Research tells us that this method of practising is a good way to remember the knowledge. Over time, you will build up this knowledge and be able to recall it.

Use the Knowledge Organiser when completing class and homework especially with key vocabulary.

How will my teachers use it?

Your teachers may set homework to learn parts of the Knowledge Organiser or set tasks from what is on there. You will be expected to complete between 45-60 minutes of homework for each subject according to the homework timetable.

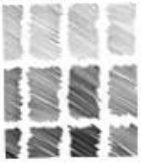
Your teachers will use the Knowledge Organiser in the lesson to support the new knowledge being taught so you must always keep this booklet with you and put on your desk at the start of each lesson.

You may be given low stake quizzes in your lessons which will test your recall of the current knowledge but also previous knowledge as the year progresses.

What do I do if I lose it?

All Knowledge Organisers are on the school website. However, you can purchase a copy at student services if you lose this.

Knowledge Organiser. Year 10 Project 2: **Natural Forms**

LINE	TONE	PATTERN	TEXTURE	FORM	COLOUR
					

This project marks the beginning of **Component 1** of your GCSE. This is coursework, and it will make up **60%** of your grade. In this project, the teacher guides you through the process of completing coursework, showing you how to meet the 4 assessment objectives.

AO1: Research	**A02: Experiment**	**AO3: Record**	**AO4: Present**

What will you learn? (overview of knowledge)

Students will be revisiting and honing important drawing skills to equip them with the standard of observation skills required at GCSE.

What skills will you learn/develop?

- Observational drawing
- Composition of an image
- Detailed tonal work
- Mark-making
- Selecting individual sources to create artwork

Support/Challenge:

https://www.bbc.co.uk/bitesize/subjects/z6hs34j
Your exam board is AQA. You can find information about GCSE Art here: https://www.aqa.org.uk/subjects/art-and-design/gcse/art-and-design-8201-8206

You will also have access to a St John Fisher Art handbook with more useful information.

What will I need to bring to lesson?

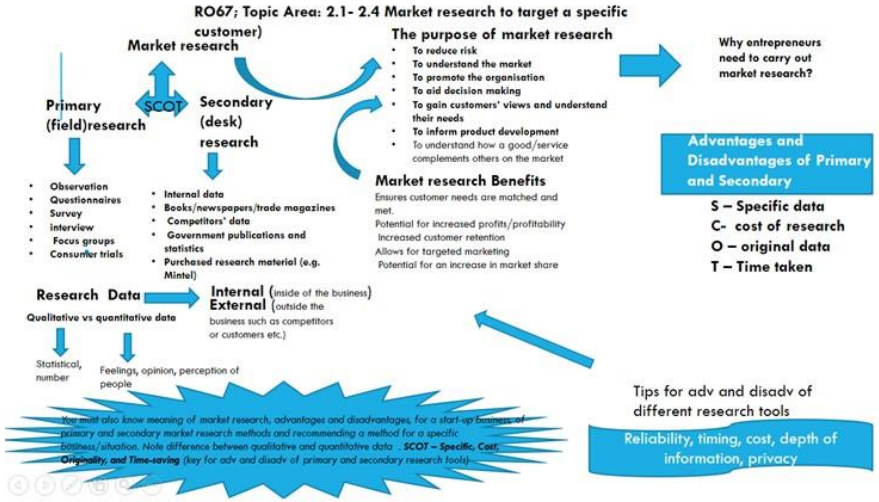
Equipment will be provided, but as a bare minimum it is a good idea to have:

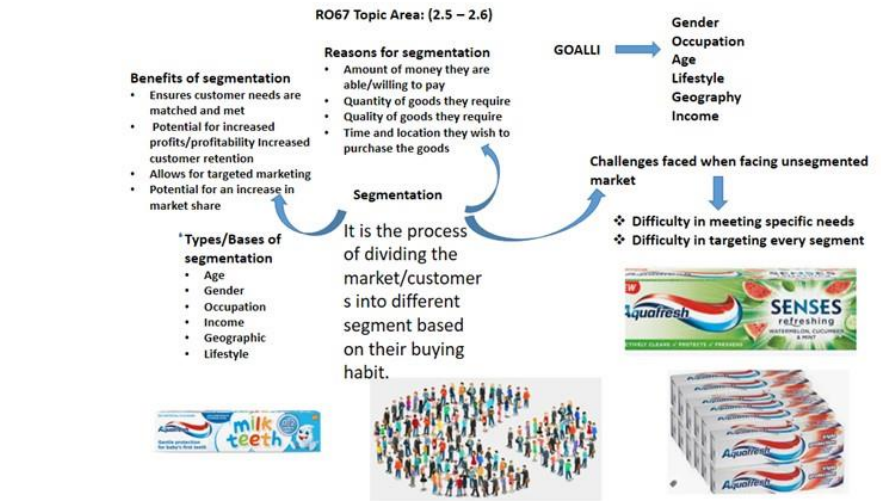
- B-6B pencils
- Rubber
- Sharpener
- Ruler
- Access to camera (phone or tablet is also fine)
- Watercolour paint set
- Acrylic paint set

Year 10 Enterprise and Marketing Knowledge Organiser (R067 and R068) Autumn term

AIM: This term we will learn market research and sampling tools, then conduct a research on a given case study.

Assessment: Coursework and homework which is set weekly





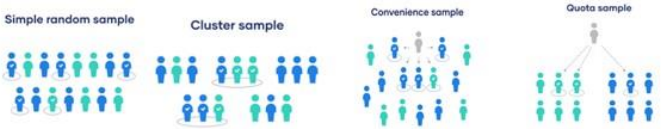
Sampling techniques

Random - every member of the population has an equal chance of being selected. Your sampling frame should include the whole population

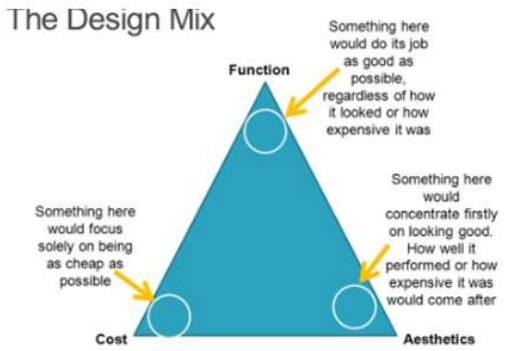
Clusters - also involves dividing the population into subgroups, but each subgroup should have similar characteristics to the whole sample. Instead of sampling individuals from each subgroup, you randomly select entire subgroups

Convenience - A convenience sample simply includes the individuals who happen to be most accessible to the researcher or have relevant information needed.

Quota - a type of non-probability sampling where researchers will form a sample of individuals who are representative of a larger population



Design Mix: The design mix refers to three aspects of design that companies need to consider when developing a product. All three are functions, manufacturing costs, and aesthetics.



KEY SKILLS: Research, I.T, Analytical and Evaluative skills

Year 10 TERM 1

Creative i-Media R093 part 1 & R094

Photopea Vectr Pixlr E

Colour	Feelings
Red	Excitement, Energy, Passion, Courage
Orange	Cheerful, Friendly, Optimistic, Playful
Yellow	Youthful, Energetic, Happiness
Green	Growth, Nature, Balance, Harmony
Blue	Trust, Serious, Security, Confidence
Purple	Creativity, Fantasy, Royalty, Luxury
Pink	Hope, Inspiration, Dreams, Childhood
Brown	Rugged, Reliability, Honest, Natural
Black	Efficiency, Power, Elegance, Luxury
Grey	Classic, Mature, Modest, Neutral
White	Youthful, Purity, Peace, Simplicity

What we are Learning This Term

R093 Creative iMedia in the media industry

In this unit you will learn how digital media products are planned and used to convey meaning, create impact and engage audiences.

- Factors influencing product design
- Pre-production planning

R094 Visual identity and digital graphics

In this unit you will learn to how to develop visual identities for clients and use the concepts of graphic design to create original digital graphics to engage target audiences.

- Develop visual identity
- Plan digital graphics for products
- Create visual identity and digital graphics.

Keywords

Assets	Mood boards
Audience	Planning
Brief	Properties
Client	Resources
Client Requirements	Software
Hardware	Target Audience
House Style	Visualisation Diagrams
Mind Maps	

Logo Design –

- Negative Space (the space surrounding a subject. Also called white space, it is typically empty and lacks details so as to simplify an image. Negative space surrounds positive space in a piece of work.)
- Typography (the art of arranging letters and text in a way that makes the copy legible, clear, and visually appealing to the reader.)
- Imagery (Adding Images)
- Colour (See Table)
- Font (Serif/San-Serif)

Serif

A small decorative line added as embellishment to the basic form of a character. Typefaces are often described as being serif or sans serif (without Serifs). The most common serif typeface is Times Roman.

Sans Serif

A Category of Typefaces that do not use serifs, small lines at the ends of characters. Popular sans serif fonts include Helvetica, Arial, Verdana and Tahoma.

	Raster Image	Vector Image
File size	Large	Small
Resolution	Nonscalable	Scalable
File extensions	GIF PNG BMP TIFF JPEG PCX	PDF CGM SVG EPS CDR
Examples of use	Print materials Photography Web imagery	2D or 3D animation Digital printing Laser engravings Logos Fonts
Software	Adobe Photoshop Canva Procreate Corel Painter Scanned images Digital cameras	Adobe Illustrator CorelDRAW Figma Sketch

What will I learn Term 2

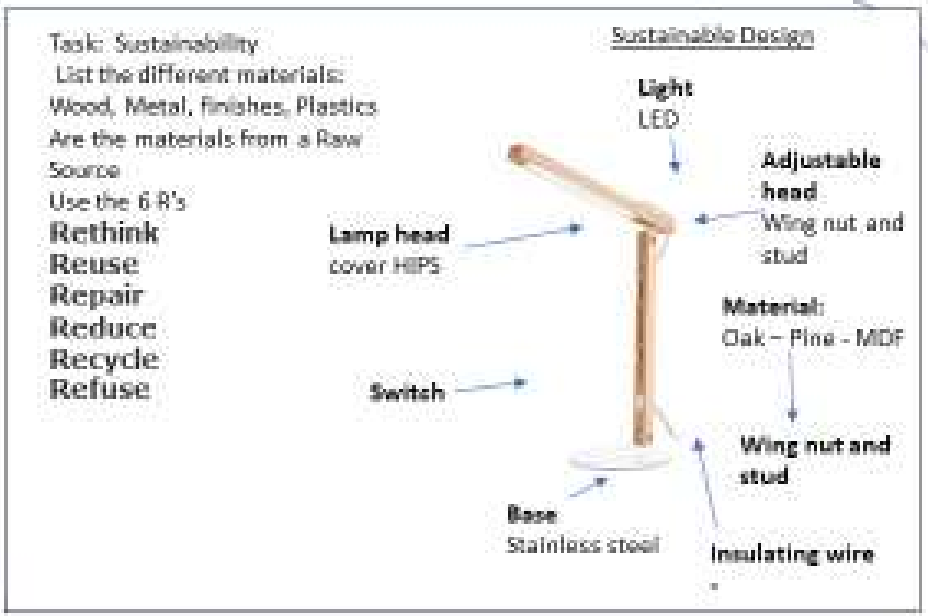
- Designer and the design
- Designing Repurposed
- Sustainability Design and the Environment
- Social, Moral, Ethical Design
- Manufacturing Processing, Mass, Batch, One off production
- Properties of Materials: Soft and Hard Woods, Manufactured Boards, Stock Materials, Metals and Alloys
- System and Control, Ergonomics and anthropometrics

Comprise:

Weekly Exam Questions

Task 3: Storage and Joints

- Lamps
- Modelling.: Templates, Stencils, Smart Materials
- Maths in D/T
- Exam Questions
- Problem Solving – Design Proposals –Modelling 2/3 CAD
- Orthographic and Isometric drawing
- Specification and Testing



Managing Research Data and Information

Manufacture boards

What will I learn:

NEA Course folder:

- Initial Design Sketching base on Designer Research
- Design Development
- Modelling 2D Draw, CAD and CAM
- Orthographic Drawing and Development
- Cutting List

Comprise:

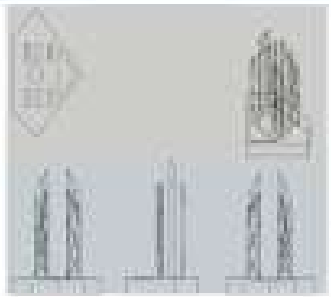
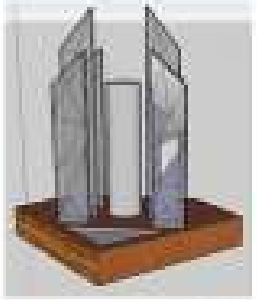
- Core Technical Principles
- Specialist Technical Principles
- Designing and Making Principles
- Assessments
- D/T Maths

Component 1 Title Written Paper	50%	Untiered	• Single paper of 2 hours duration • 100 marks • Questions vary from MCQs to extended response
Component 2 Title Non Examined Assessment	50%	Untiered	• 100 marks • Single design and make task • Select from a range of given contexts

Duration:2 hours and 2hrs. 30hr in total. Delivery of the theory in this instance will align with the NEA coursework






TERM 2 : NEA Course folder Jan 2023-March 2024

- Practical Making of Prototype
- Product Final Prototype- Evaluated against specification
- Testing and Evaluation of Product
- Client Feedback

TERM 2 –TERM3 : Jan 2024 until June Written Exam

- Weekly Revision and Exam Practise of Past Papers




TERM 1

Year 10 Drama

Autumn Term

An introduction to GCSE Drama and Holocaust Memorial Day

Introductory workshops
We will be exploring a variety of different dramatic techniques in a series of workshops. These techniques may well prove useful to you when you start to work on your devising and scripted components.

Holocaust Memorial Day
Every year, students from St John Fisher School produce a devised piece of theatre that is to be performed in January in the Cathedral Square. You will be working on devising this performance as a class in the second half of the Autumn Term.

Three different components
Devising Drama: Students research and explore a stimulus, work collaboratively and create their own devised drama. They complete a portfolio of evidence during the devising process, give a final performance of their drama, and write an evaluation of their own work. (30% of total GCSE)

Presenting and performing texts:
Students develop and apply theatrical skills in acting or design by presenting a showcase of two extracts from a performance text.
(30% of total GCSE)

Drama: Performance and response:
Students explore practically a whole performance text and demonstrate their knowledge and understanding of how drama is developed, performed and responded to. They also analyse and evaluate a live theatre performance.
(40% of total GCSE)

Useful Dramatic Terminology:
Improvisation-making a scene up on the spot with little to no prior preparation.
Mime-scenes that have no dialogue in.
Analysis-The process of examining how the elements of practical drama relate to each other in performance
Flashback-when a story transitions to a scene that has occurred in the past.
Tableaux-a series of images that are frozen onstage.
Split-stage-This is where you utilise the stage for two different locations. These two scenes take place at the same time on different sides of the stage.
Blocking-A traditional term used to describe the path traced by an actor's movement on stage, including entrances and exits.
Ensemble Skills-communicating a scene as a whole group, usually using movement.
Unison-performing movements at the same time as one another.
Canon-performing a movement one after another.

Live Theatre review
You will begin to watch some live theatre/recordings and will learn how to analyse and evaluate theatre. You will explore analysis of actor's, directorial choices and design choices.

A Christmas Carol

Key events (AO1)

A miserly old man called Ebenezer Scrooge is mean, selfish and cruel to all around him. One night when returning home he is visited by the ghost of his old friend and business partner Jacob Marley. Marley tells Scrooge he must change his ways and live a life of generosity or he will be punished and forced to walk the earth forever more. Scrooge is visited by three spirits (The Ghosts of Christmas Past, Present and Yet-to-Come) who all show him visions of his life and how his life will be if he doesn't change. Filled with regret, sorrow but a determination to change, Scrooge is returned to his home on Christmas Day where he sets out to change his life and use his wealth to help others. He goes on to embody the Christmas spirit better than anyone else.

Stave 1: Marley's Ghost

We discover Jacob Marley, who was Ebenezer Scrooge's business partner, died seven years ago. Scrooge is working in his counter-house, along with his clerk - Bob Cratchit. Scrooge's nephew Fred arrives and wishes him a Merry Christmas, but Scrooge dislikes his enthusiasm for the festive and answers: "Bah! Humbug!" Scrooge argues that Christmas is like any other day when there is money to be paid through bills. Fred has a different attitude, proclaiming Christmas to be a "as a good time: a kind, forgiving, charitable, pleasant time: the only time I know of, in the long calendar of the year, when men and women seem by one consent to open their shut-up hearts freely." Fred invites his uncle to visit him and his friends for Christmas, but Scrooge refuses. Two portly gentlemen then come into Scrooge's counter house and ask Scrooge if he would donate money for the poor. Scrooge asks them if the prisons and workhouses are still open and dismisses them - saying he wishes to donate nothing and to be left alone. The weather is getting colder and colder. Outside, a Christmas caroler tries to sing a song through the keyhole of Scrooge's office door but Scrooge scares him off. After closing up the counting office and before he goes home, Scrooge tells his clerk Bob Cratchit that he wants him to work on Christmas Day, but eventually he is persuaded to allow him to have the day off - but Cratchit must turn up all the earlier the next day.

Scrooge continues his usual routine of having dinner in a tavern and then returns home through awful, foggy London streets. As he arrives at his front door he thinks he sees Marley's face on the door knocker until it turns back into an ordinary knocker. He is surprised but refuses to accept what he has seen. Scrooge thinks he sees a hearse going up the stairs in front of him. He rushes into his room and locks the door behind him, putting on his dressing grown as well. He eats gruel by the fire, but suddenly the carvings on the mantelpiece change into pictures of Jacob Marley's face. Again, Scrooge is reluctant to accept what he has seen. All of the bells and in the room start ringing and Scrooge hears footsteps coming up the stairs. A ghost floats through the door - it is Jacob Marley - see-through and covered up in chains, cash-boxes, keys, padlocks, ledgers, deeds and heavy purses wrought in steel. Scrooge tries to deny Marley's Ghost exists, claiming he is just a symptom of food poisoning. The ghost explains to Scrooge that he has spent seven years wandering the world in his chains as a form of punishment for the way he lived his life. Marley's Ghost tells Scrooge he has come back to save Scrooge from the same fate he has suffered. He informs Scrooge that he will be visited by three different spirits over the next three nights. The first one will come at one o'clock, the next the same time and the final one will be there on the last stroke of midnight. The ghost moves towards Scrooge's window which opens by itself. Scrooge is terrified and full of fear. The ghost tells Scrooge to look out of the window and he sees many spirits, all covered in chains. They are all shouting about how they did not lead caring and honourable lives and did not help others. Marley disappears and Scrooge goes back to bed and falls asleep.

Stave 2: The First of the Three Spirits

Scrooge wakes up at midnight and is confused. When he went to sleep it was 2am! To begin with he believes he must have slept through an entire day or it's noon and the sun isn't out. He remembers that Marley's Ghost told him the first spirit will arrive at 1am. Terrified and anxious, Scrooge waits. At one o'clock Scrooge's curtains on his bed are blown away by an unusual, child-like character who exudes wisdom and experience. The spirit has a cap to cover the light that comes from its head. Scrooge is taken to the rural countryside where he was born and raised. He visits his old school, sees his young friends and remembers many parts of his childhood. The effect of seeing these memories makes Scrooge cry. The ghost moves Scrooge into the school where a lonely little boy - Scrooge as a youngster - is all alone at Christmas time. Scrooge and the ghost continue to visit different Christmases of the past and eventually we see a little girl - Scrooge's sister Fan - who runs into the room and tells Scrooge she has come to take him home. She says their father has allowed Ebenezer Scrooge to come home. Young Scrooge hugs his sister. Scrooge reveals to the ghost that Fan died years ago and she is the mother of his nephew Fred. The Ghost of Christmas Past and Scrooge visit other Christmases and see a party being held by Fezziwig, a merchant who had Scrooge as an apprentice when Ebenezer was younger. Scrooge sees an older version of himself in conversation with Belle - his fiancée. She tells Scrooge she is ending their engagement as his love of capital gain and greed has ruined their love that used to be everything to Scrooge. Scrooge is taken to see a more recent Christmas where an older Belle talks to her new husband about her former fiancé Scrooge. Her husband says that Scrooge is alone in the world. Scrooge is struggling to deal with these scenes and begs the ghost to allow him to go back home. Full of anger, sadness and loss, Scrooge grabs the ghost's cap and pulls it over the child's head, and the light begins to diminish. By the time he gets to the ground, Scrooge finds himself back in his bedroom, where he goes to bed again and falls asleep straight away.

Stave 3: The Second of the Three Spirits

In the distance the church clock strikes one and Scrooge wakes up in shock. He is glad to be awake and is waiting for the second spirit to arrive, but none seems to come. Scrooge waits 15 minutes and then suddenly a bright light beams down onto him. Scrooge moves into his other room where he finds the second spirit waiting for him. The Ghost of Christmas Present is very different to the first spirit. He is a giant, covered in green robes and sits on top of a throne made of a huge Christmas feast. He has a booming, loud voice and tells Scrooge he has more than 1800 brothers (one for each Christmas). He lives for only a single day. The spirit tells Scrooge to touch his robe, and when he does so the feast and room disappear. Scrooge finds himself in the middle of London on Christmas morning. It is very busy and full of life. He sees all sights of a joyful Christmas day as people shovel snow, take presents to each other and say to each other: "Merry Christmas!" The ghost and Scrooge then move on to visiting Bob Cratchit's family - remember that Cratchit is Scrooge's clerk. Mrs Cratchit prepares a Christmas meal of goose and all the trimmings. They are poor and this meal is one of the few treats they set money aside for. The eldest daughter Martha comes back from her job at the milliner's. Peter, the eldest son, wears a stiff-collared shirt which he received from his father. Bob arrives carrying his young son Tiny Tim on his shoulders. Tiny Tim has a debilitating condition that makes him very weak. The family is happy even though they have little food to celebrate Christmas with. Scrooge begs the Ghost to know whether Tiny Tim will survive. The spirit replies that given the current conditions in the Cratchit house, there will be an empty chair at next year's Christmas dinner. They move on to other people celebrating Christmas, including an isolated community of miners, lighthouse workers celebrating, and a crew on board a ship. Next they move on to Fred's Christmas party, where Scrooge enjoys watching the many party games, although none of the party guests can actually see him. As the night carries on, the Ghost of Christmas Present grows older. Lastly they come to a huge expanse of emptiness. Scrooge sees a pair of starving children who travel with the Ghost beneath his robes; their names are Ignorance and Want. Scrooge inquires if nothing can be done to help them. Mockingly, the ghost echoes Scrooge's own words from Stave 1: "Are there no prisons? Are there no workhouses?" The spirit vanishes as the clock strikes midnight and Scrooge sees a strange hooded ghost moving towards him.

Associated quotes

"Scrooge was his sole executor, his sole administrator, his sole assign, his sole residuary legatee, his sole friend and sole mourner."

"But what did Scrooge care? It was the very thing he liked. "

"Bah! Humbug!"

"Are there no prisons?" asked Scrooge.
"Plenty of prisons," said the gentleman, laying down the pen again.

"As a good time: a kind, forgiving, charitable, pleasant time" Fred on Christmas

"A solitary child, neglected by his friends, is left there still." Scrooge said he knew it. And he sobbed.

"Scrooge sat down upon a form, and wept to see his poor forgotten self as he used to be."

"Why, it's old Fezziwig! Bless his heart; it's Fezziwig alive again!"

"Spirit!" said Scrooge in a broken voice, "remove me from this place."

"Oh, a wonderful pudding! Bob Cratchit said, and calmly too, that he regarded it as the greatest success achieved by Mrs Cratchit since their marriage. "

But even here, two men who watched the light had made a fire, that through the loophole in the thick stone wall shed out a ray of brightness on the awful sea.

Fred on Scrooge: "I mean to give him the same chance every year, whether he likes it or not, for I pity him."

"Are there no prisons?" said the Spirit, turning on him for the last time with his own words. "Are there no workhouses?"

	Character summary	Key Quotes	Associated themes or ideas:
Jacob Marley 	Scrooge's former business associate and friend. Marley passed away seven years ago on Christmas Eve. Marley inspired Scrooge to be selfish, greedy and utterly ruthless when dealing with other people. However, it is Marley that comes back to Scrooge as a ghost to tell him to change his ways or end up with the same fate as him, cursed to forever travel the world filled with regret and sorrow.	"It is required of every man," the Ghost returned, "that the spirit within him should walk abroad among his fellowmen, and travel far and wide; and if that spirit goes not forth in life, it is condemned to do so after death. It is doomed to wander through the world -- oh, woe is me! -- and witness what it cannot share, but might have shared on earth, and turned to happiness!"	Christmas Spirit Regret Sorrow Greed Supernatural Choice Time Guilt and Blame Emotional Coldness Memory and the Past Compassion and Forgiveness
Ebenezer Scrooge 	The central protagonist (main character) of the novella, Scrooge is a selfish, greedy but ultimately isolated elderly man that has spent much of his life hoarding his wealth away from others despite being surrounded by poverty and suffering. He is initial cruel and callous to everyone else before the visits of Marley's Ghost and the Three Spirits bring about his epiphany and the change in his character. Through the help of the narrator we follow Scrooge on his journey through his own past, present and potential future and celebrate his embracing of the Christmas spirit at the end.	"Bah! Humbug!" "Since you ask me what I wish, gentlemen, that is my answer. I don't make merry myself at Christmas and I can't afford to make idle people merry." "I will honor Christmas in my heart, and try to keep it all the year. I will live in the Past, the Present, and the Future."	Isolation Christmas Spirit Regret Sorrow Greed Choice Guilt and Blame Emotional Coldness Emotional Warmth Catharsis Transformation Memory and the Past Compassion and Forgiveness
The Ghost of Christmas Past 	The first of the three spirits to visit Scrooge, The Ghost of Christmas Past takes Scrooge on a journey through his memories – ones he enjoys remembering and others that bring up emotions that he has long since buried. We see his absolute joy at seeing Fan and Fezziwig again, but his immense sorrow and regret for what happened between him and Belle. The Ghost is presented as very unusual looking and re-reading and re-analysing the use of description of the character would be very useful to you as part of your revision. 	"It wore a tunic of the purest white, and round its waist was bound a lustrous belt, the sheen of which was beautiful." "Why did his cold eye glisten, and his heart leap up as they went past? Why was he filled with gladness when he heard them give each other Merry Christmas, as they parted at cross-roads and-bye ways, for their several homes? What was merry Christmas to Scrooge? Out upon merry Christmas! What good had it ever done to him?"	Supernatural Memory and the Past Compassion and Forgiveness Regret Sorrow Guilt and Blame Choice Isolation Christmas Spirit Family Emotional Warmth Time
The Ghost of Christmas Present 	The second of the three spirits that is presented a giant representing all that is great and good about Christmas Day. He is more dominating than the previous spirit and mocks Scrooge's own words from Stave 1 when Scrooge previously asked about prisons and workhouses being in operation. This spirit shows to Scrooge how everyone across society takes joy from Christmas and celebrate together, they do not isolate themselves like Scrooge has done. In particular, the visit to the Cratchits and Scrooge seeing the love for Tiny Tim hits him hard.	"I am the Ghost of Christmas Present," said the Spirit. "Look upon me." "[Tiny Tim] told me, coming home, that he hoped the people saw him in the church, because he was a cripple, and it might be pleasant to them to remember upon Christmas Day, who made lame beggars walk, and blind men see."	Christmas Spirit Family Compassion and Forgiveness Isolation Emotional Warmth Supernatural Choice Guilt and Blame Time Self-awareness
The Ghost of Christmas Yet-to-Come 	The final spirit is a dark, silent phantom that terrifies Scrooge and in some ways resembles the Grim Reaper, a classical symbol of death. This spirit shows Scrooge how the death of an isolated and friendless man sees vagabonds still his personal items, people celebrating his death and others suffering at his lack of compassion in life. Finally, the Ghost shows Scrooge his own gravestone and it is as this point that Scrooge has his epiphany.	"He lay, in the dark empty house, with not a man, a woman, or a child, to say that he was kind to me in this or that, and for the memory of one kind word I will be kind to him." "We may sleep to-night with light hearts, Caroline."	Supernatural Regret Sorrow Choice Time Guilt and Blame Transformation Emotional Coldness Isolation Death Family
Fred 	Scrooge's nephew and the son of Ebenezer's sister Fan. Fred embodies everything good about Christmas and is filled with joy and happiness everywhere he goes. He is the antithesis of Ebenezer Scrooge. When Scrooge sees Fred spending Christmas with his friends Fred refuses to criticise Scrooge, only saying he pities him. Fred is delighted to see his uncle in Stave 5.	"He had so heated himself with rapid walking in the fog and frost, this nephew of Scrooge's, that he was all in a glow"	Family Christmas Spirit Memory and the Past
Other characters 	Bob Cratchit – An honourable man and a wonderful father. Scrooge comes to respect him very much. He is part of the Cratchit family including his wife, Martha, Belinda and Peter. Tiny Tim - Bob's crippled son who everyone loves and everyone pities. Dickens was arguably trying to evoke immense sympathy from his readers for this weak but wonderful young boy. Tiny Tim survives his illness thanks to Scrooge's financial help. Fan and Belle – Scrooge's sister and former fiancée. They represent Scrooge's past and his regrets. Fezziwig – Scrooge's old boss who represents the Christmas Spirit. The portly gentlemen – Scrooge is rude to them but apologizes to one of them in Stave 5. They raise money for charity.	"Hilli-ho!" cried old Fezziwig, skipping down from the high desk, with wonderful agility. (Stave 2) "I have come to bring you home, dear brother!" said the child, clapping her tiny hands, and bending down to laugh. "To bring you home, home, home!" Fan (Stave 3) "God bless us every one!" said Tiny Tim, the last of all. (Stave 3)	Christmas Spirit Family Memory and the Past Guilt and Blame Emotional Warmth Isolation Regret Sorrow Transformation Charity

Stave 4: The Last of the Three Spirits

This new phantom is very different to the others spirits. He wears a black hooded robe and moves towards Scrooge. Scrooge cannot help but kneel before him and asks if he is The Ghost of Christmas Yet to Come. The phantom says nothing and Scrooge feels terrified. Scrooge is still hugely affected by the visits of the last two spirits and asks the phantom to share his lesson so he can avoid the fate of Jacob Marley. The ghost takes Scrooge to the London Stock Exchange, where he overhears a group of businessmen discussing the death of a wealthy man. Next they see a pawn shop in a poor part of London, where a group of low-lives sell personal items taken from a dead man.

Scrooge sees the body of the dead man all alone and demands to be shown someone who feels sorry for this man who has passed. The ghost shows the dinner table of a poor family, where a husband and wife express relief at the death of a man to whom they owe money. They move on to the Cratchit household again, where the family struggles to cope with the death of Tiny Tim. Scrooge is desperate to know the identity of the dead man, struggling to understand what point or lesson the ghost is trying to make. Suddenly, he finds himself in a rundown churchyard where the spirit points him toward a freshly dug grave. Scrooge approaches the grave and reads the inscription on the headstone: EBENEZER SCROOGE. Stunned, Scrooge grabs at the spirit and begs him to stop the events of his nightmarish vision. He promises to honor Christmas within his heart and to live by the lessons of Past, Present, and Future. The spirit's hand begins to tremble, and, as Scrooge continues to ask for mercy, the phantom's robe shrinks and collapses. Scrooge finds himself returned to the his bed once more.

"He felt that it was tall and stately when it came beside him, and that its mysterious presence filled him with a solemn dread."

"I will honour Christmas in my heart, and try to keep it all the year."

I promised him that I would walk there on a Sunday. My little, little child!" cried Bob. "My little child!"

Stave 5: The End of It

Scrooge realizes he has a chance to live the rest of life in a way that will make him truly happy. He praises of the three spirits and the ghost of Jacob Marley. When he realises he hs been returned back to Christmas morning, he begins shouting "Merry Christmas!" as loud as he can. Full of energy and excitement, Scrooge struggles to dress properly and dances while he shaves. As quickly as he can, Scrooge runs into the street and offers to pay the first boy he meets a colossal sum to deliver a great Christmas turkey to Bob Cratchit's family. He meets one of the portly gentlemen who in Stave 1 asked for donations to the poor. Scrooge apologises for his rudeness, and whispers into the man's ear the massive sums of money he promises to give to charity. Scrooge moves on to Fred's Christmas party and shows such joy and enthusiasm that the other guests cannot understand Scrooge's sea change in behavior.

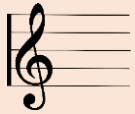
The next morning, Scrooge arrives at the office early and decides to put on his usual stern and serious expression when Bob Cratchit enters eighteen and a half minutes late. Scrooge, pretending to be disgusted, begins to criticize Bob, before suddenly telling Bob he will give him a large raise and will assist his family as much as he can. Bob cannot believe it, but Scrooge promises to keep his word. We are told by the narrator that Scrooge is as good as his word: He helps the Cratchits and becomes a second father to Tiny Tim who does not die as predicted in the ghost's dreadful vision. Many people in London are puzzled by Scrooge's new behavior, but Scrooge merely laughs at them. Scrooge brings the Christmas spirit into every day, respecting the lessons of Christmas more than any man alive. The narrator finishes the story by saying that Scrooge's words and thoughts should be shared by of all of us ... "and so, as Tiny Tim observed, God bless us, Every one!"

"I don't know how long I've been among the Spirits. I don't know anything. I'm quite a baby. Never mind. I don't care. I'd rather be a baby. Hallo! Whoop! Hallo here!"

"I'll send it to Bon Cratchit's!" whispered Scrooge, rubbing his hands, and splitting with a laugh. "He shan't know who sends it. It's twice the size of Tiny Tim. Joe Miller never made such a joke as sending it to Bob's will be!"

Context key idea	Why is this significant?
Philanthropy and Dickens' Sense of Social Justice 	Although now in Britain we have what is known as the welfare state (which includes support for the neediest including the NHS, social housing, unemployment benefits and more), there is was little government support for the poorest in society during the Victorian era. Many wealthy Victorians who were socially conscious (meaning they felt a responsibility to help those who could not help themselves) became heavily involved in philanthropy. They used their own money to give to charities and to set up their own charities to help those that needed help. Charles Dickens was one such person and he used his own money to help others, as well as working with wealthy benefactors to make changes in society, too. Dickens was philanthropic advisor to Angela Burdett-Coutts (1814-1906), known as 'the richest heiress in all England'. Dickens used her wealth to give to social causes as well. In 1847 her money was used to create Urania Cottage for homeless women. Under his guidance she also supported the Ragged School Union, which was founded in 1844 to provide free education to poor children by Lord Shaftesbury. Moreover, Dickens used his writing to act as a social commentator – bringing to the attentions of his middle and upper class readers the need for social upheaval. Some of his characters play a positive philanthropic role, such as Mr Brownlow in Oliver Twist, the Cheeryble brothers in Nicholas Nickleby, and Mr and Mrs Garland in The Old Curiosity Shop.
Victorian Deprivation  	Workhouses existed well before the Victorian era, but the 1834 Poor Law Amendment Act meant it a legal requirement for all able-bodied people to work in workhouses to get their 'poor relief' (financial support). Before this time the poorest in society had to rely on charity and hand outs to survive. However, Victorians saw poverty as a kind of illness or disease in society that needed to be eradicated. Governments were keen to move the poorest indoors, away from everyone. However, those in charge of the country made workhouses places to be feared in order to prevent 'lazy' citizens thinking it was an easy option instead of going out to find work. Workhouses meant the poorest would work for food and a place to sleep, but many people saw it as a form of slavery. workhouses also took in orphans, abandoned children, the mentally ill, the disabled, unmarried mothers and the elderly. Despite their age or abilities, all were required to work long and demanding hours. Whenever someone entered a workhouse they were stripped, bathed whilst being supervised and then provided with a uniform. This uniform separated them from the rest of society. If those from workhouses were out in the streets everyone else would instantly know they were in a workhouse. Often children were 'hired out' to wealthy business men and made to work in awful places such as mines. You were not allowed to try to contact your family and doing so could result in being punished. The standard of education provided was awful and would not help those within the workhouses get out of them. The food given to those in the workhouses was of a poor quality, simple and the same every day. Food was seen as a tool to keep you working, not as something to be enjoyed.

Linguistic devices (AO2)	Why is this significant?
Pathetic fallacy 	This is where a writer gives human feelings to non-human objects or places to get across a tone or emotion to readers. For instance, the weather is very foggy and dingy as Scrooge walks through London in Stave 1, indicating mystery and a lack of harmony in Scrooge's world. In Stave 1 he is surrounded by the "Piercing, searching, biting cold'", echoing Scrooge's cold heart and lack of human warmth. By Stave 5 after Scrooge has transformed into a joyful human being the weather has also changed: "'No fog, no mist; clear, bright, jovial, stirring, cold; cold, piping for the blood to dance to'".
Epiphany 	An epiphany is a sudden realisation of something. Scrooge has an epiphany as he reveals after seeing his own gravestone that he must love with Christmas in his heart (Stave 5). Because of this epiphany he is then able to go out at the end of the text and share his wealth with others and actually feel happy.
Symbols 	Each of the ghosts acts as a symbol for something much greater. The Ghost of Christmas Past embodies Scrooge's regrets that he changed so much from his past, that he did not make the most of his family and that he has lost his fiancée Belle. The Ghost of Christmas Present is a symbol of the happiness and joy all people feel at Christmas despite their often harsh and deprived conditions. The Ghost of Christmas Yet-to-Come symbolises what will happen to Scrooge and his friends and family if he does not change.
Metaphors and Similes, Personification, Parallelism, and Descriptive Language 	Dickens needs to use a lot of descriptive language to get across not only the Christmas London settings but also the unusual spirits that visit Scrooge. Marley's Ghost needs to be terrifying, the Ghosts of Christmas Past and Present are not human but supernatural. He uses numerous metaphors and similes to get across both characters and setting to his readers. Dickens was a master of description and this shines through in A Christmas Carol. Metaphor example: "But he [Scrooge] was a tight-fisted hand at the grindstone" Simile example: "It was a strange figure -- like a child: yet not so like a child as like an old man..."

Form (AO2)	Why is this significant?
Allegory 	An allegory is a type of story that has a hidden meaning, where characters represent bigger themes and ideas. For instance, Star Wars is an allegory of good and evil. The Jedi represent good and the Dark Side represents evil. In the same way A Christmas Carol represents turning away from greed, selfishness and an obsession with money and turning towards helping others and using your wealth to good for friends, family and society.
Frame Story 	Because A Christmas Carol begins with a narrator introducing the story and finishes with the narrator summing it up and ending it, this is known as a 'frame story'. At the beginning Scrooge's character is established by the narrator and at the end his dramatic shift in personality is explained by the narrator as well. In between these two parts of the plot we find out other stories from Scrooge's past, present and future in order for him to have his epiphany and change.
Cyclical Structure 	A cyclical structure to a text is where it begins and ends in the same way. In Stave 1 Scrooge is rude and unkind to Bob Cratchit, two portly gentleman raising money for charity, and his nephew Fred. In the final stave he sees all these people again and is able to apologise and show them his transformation. It's a structure that works very well for emphasising Scrooge's change in personality.
'Staves' instead of 'Chapters' 	A stave could refer to a wooden plank used to help in construction (a bit like scaffolding). It can also refer to a musical staff or symbol - used with sheet music. Whilst Dickens most likely used 'staves' instead of chapters in A Christmas Carol because he wanted to associate the plot with a literal 'Christmas Carol' or song, it could be said that each chapter helps in the construction of Scrooge as a transformed man. Similarly, in two other novellas by Dickens he also used musical symbols instead of 'chapters' ("quarters" in *The Chimes* and "chirps" in *The Cricket on the Hearth*).

Year 10 TERM 1

You will learn about

Introduction to the course and outline of the course
risk assessment and hygiene and safety instructions
Introduction to Protein
Planning and costings
Carbohydrates
To identify nutritional profile and science behind the recipe.
Micronutrients - Fat Soluble Vitamins
vitamins planning
Calcium, iron, sodium, iodine and fluoride.
Calcium and Vitamin D Plan

Foods high fat, salt and sugar

- Includes products such as chocolate, cakes, biscuits, full-sugar soft drinks, butter and ice cream.
- Are high in fat, sugar and energy and are not needed in the diet.
- If included, should be had infrequently and in small amounts.

The Claw

Curl your hand into a claw with the fingertips pressing down to stop ingredients slipping.

The hand then moves backwards in even steps as you slice.

To be used when the ingredient is stable, with a flat edge.

The Bridge

Grip both sides of the food, between your thumb and fingers so that it can't roll or slip.

Think of the knife as a train going into the bridge, then cutting down through the food.

This is used for cutting round and wobbly foods.

Key terms
The Eatwell Guide: A healthy eating model showing the types and proportions of foods needed in the diet.
Hydration: The process of replacing water in the body.
Dietary fibre: A type of carbohydrate found in plant foods.
Composite/combination food: Food made with ingredients from more than one food group.

Composite/combination food
Much of the food people eat is in the form of dishes or meals with more than one kind of food component in them. For example, pizzas, casseroles, spaghetti bolognese and sandwiches are all made with ingredients from more than one food group. These are often called 'combination' or 'composite' foods.

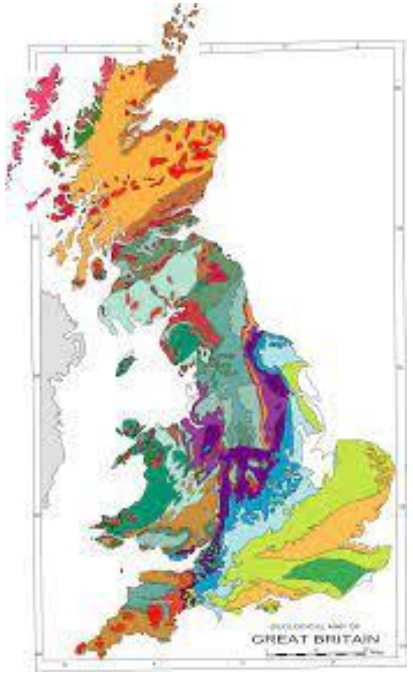
To find out more, go to:
https://bit.ly/31CBjke
https://www.bbc.co.uk/bitesize/topics/zjr8mp3/articles/zhkbn9q
The Eatwell Guide - NHS (www.nhs.uk)

Geography - Year 10 Term 1 – Changing Landscapes

The characteristics of the main UK rock types.
Three types: sedimentary (chalk and sandstone), igneous (basalt and granite) and metamorphic (slate and schist).

The distribution of the main UK rock types.
Uneven. Sedimentary cover most of the UK from as far south as Cornwall to the top of Scotland. They also stretch from mid Wales in the west, to Norfolk in the east. Igneous rocks are found mainly in Highland areas (England = Dartmoor, Wales = Snowdonia, Scotland = Grampian Mountains). Metamorphic rocks are found mainly in North Wales and Northern Ireland

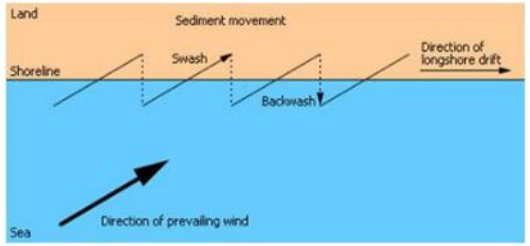
The role of geology and tectonics in the formation of upland and lowland landscapes.
Different types of rocks have varying resistance to physical processes. Igneous and metamorphic rocks tend to be more resistant and therefore form upland areas. The UK igneous and metamorphic rocks were formed when we had tectonic activity; eg, Haytor, Dartmoor. Sedimentary rocks tend to be more easily weathered and eroded and form lowlands. They can form hills such as the Cotswolds when there are slight differences in resistance. If rocks have faults or joints (weakness) then erosion is easier.



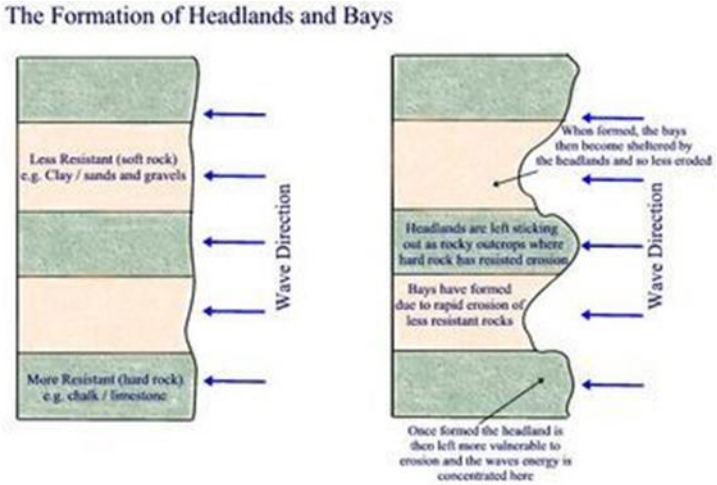
How upland and lowland landscapes are affected by physical processes such as glaciation, weathering, rivers, coastal and slope processes.
Glaciation: The uplands were covered in ice. Erosion by glaciers created features such as aretes, pyramidal peaks, corries, U shaped valleys and truncated spurs. The lowlands were covered with glacial sands and gravels which were deposited on floodplains as they were washed out of the uplands when the glaciers melted.
Weathering: In the upland, freeze thaw creates exposed and angular rock faces with scree slopes below. In the lowlands biological and chemical weathering processes break down material into smaller pieces which can then be transported.
Rivers: Erode in the uplands giving waterfalls, gorges, interlocking spurs and V shaped valleys. In the lowlands deposition produces flat floodplains, levees and deltas.
Coasts: Lowland only. Erosion process produce features such as cliffs, headlands and bays, caves, arches, stacks and stumps. Deposition processes create beaches, spits and bars.
Slope Processes: Mass movements include rotational slumping, soil creep and rockfalls cause slope material to move downhill due to the force of gravity, weathering and water is also a factor.

How upland and lowland activities are affected by human activity such as settlement, agriculture and forestry.
Settlement: houses, industries and roads connecting settlements have changed the landscape forever, with rural landscapes becoming urban.
Farming: land was farmed with hedges and walls as field boundaries; the hedges in some parts of the country have been removed and extensive areas of land have been created to allow for large machinery that is now used.
Forestry: The UK was covered by deciduous woodland. Over hundreds of years the woodland has been felled, which has allowed more moorland, settlement and farmland. There has also been a change in the type of woodland to faster growing coniferous.

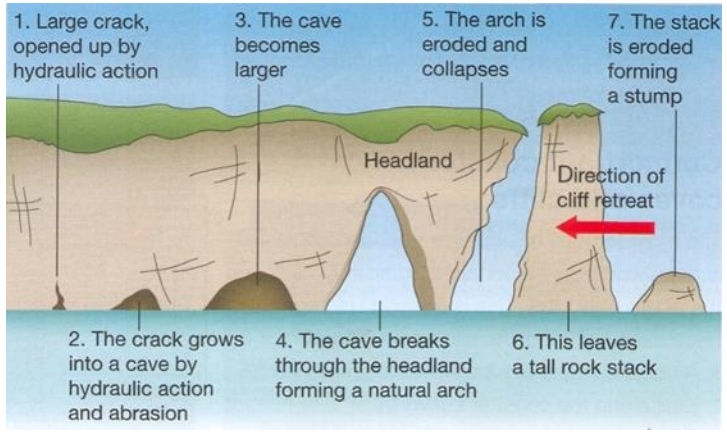
Geography - Year 10 Term 1 – Coastal Landscapes

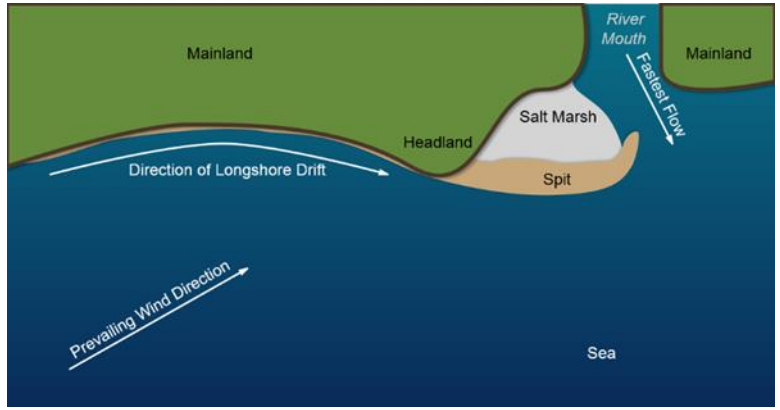


Constructive Waves	Destructive Waves
Strong Swash	Weak Swash
Weak Backwash	Strong Backwash
Deposition Occurs	Erosion Occurs
Low Wave Frequency	High Wave Frequency
Low Wave Height	High Wave Height
Shallow Beach Produced	Steep Beach Produced

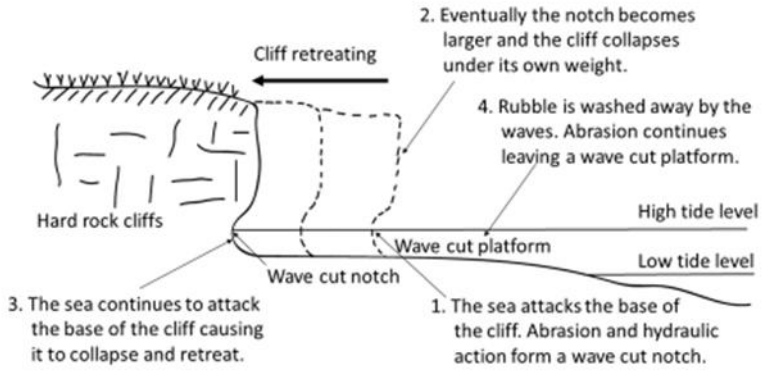


How weathering affects coastal landscapes.
Mechanical Freeze Thaw and Onion Skin
Chemical Carbonate Solution
Biological Plants and Animals



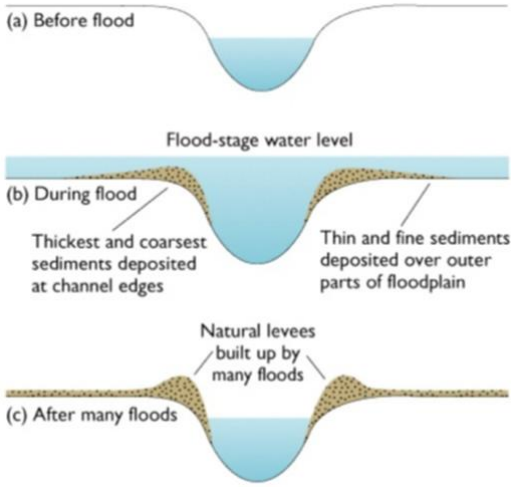


How mass movements affect coastal landscapes.
Mass movement is when material moves down a slope due to the pull of gravity. <u>Slumping (Rotational Slipping):</u> <u>Sliding:</u> <u>Rock Falls:</u>



Discordant coastlines	Concordant coastlines
• Rock layers perpendicular to the coast • **Headlands and bays** • E.g. South West of Ireland – Bantry Bay and Dingle Bay	• Rock layers are parallel to the coastline • UNUSUAL • Coves • Can be featureless. • E.g. Lulworth Cove, Dorset.

Geography - Year 10 Term 1 – River Landscapes

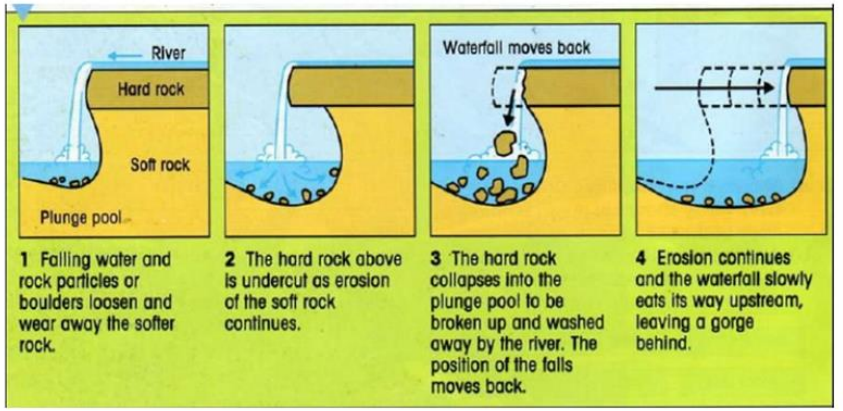


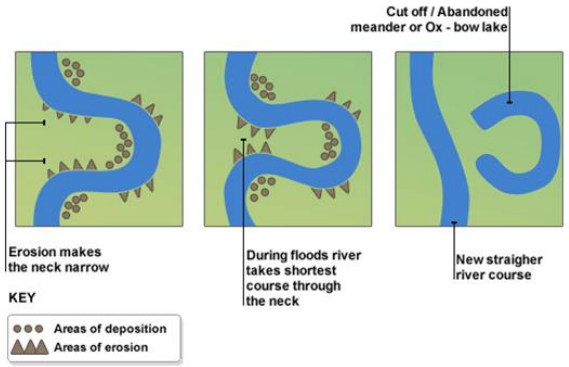
How mass movements affect river landscapes.
Mass movement is when material moves down a slope due to the pull of gravity. Slumping (Rotational Slipping): Sliding: Rock Falls:

Characteristic	Definition	Change
Width	The distance between banks.	Increases
Depth	The distance from bed to water surface.	Increases
Velocity	How fast the water is flowing.	Increases
Discharge	The volume of water that is moving.	Increases
Gradient	The steepness of the river bed	Decreases
Channel Roughness	How rough the bed and banks are	Smoother (less friction)
Sediment Size and Shape	Characteristics of the load	Becomes smaller and rounder.

How weathering affects river landscapes.
Mechanical Freeze Thaw and Onion Skin
Chemical Carbonate Solution
Biological Plants and Animals

Physical Factor - River Processes	Physical Factor - Weathering
The river erodes and deposits material forming features such as meanders, levees, floodplains, oxbow lakes, river cliffs and river beaches.	Mechanical, chemical and biological processes produce scree. Material is then available for the river to use in both erosional and depositional processes.
Human Factor - Industry	Human Factor – Settlement
Smelting of iron ore has left old iron mines, piles of slag and woodlands that were coppiced for fuel. Quarrying of limestone for building materials and for lime kilns has increased the gradient of the valley sides.	Settlement in the valley goes back 12000 years. The town of Hereford and Tintern Abbey were founded in the 12th century and continue to grow today. A road was built along the valley in the early 19th century and a railway in 1876.
Human Factor - Forestry	Human Factor - Tourism
Many trees were felled in the 18th and 19th centuries for ship building. Some coniferous plantations have been harvested whereas places like Coppet Hill have seen woodland planted on former pasture land. Since the 1980's broad leaved species are now planted.	The Wye Valley was one of the earliest tourist honeypots with visitors flocking since the 17th century. The cliff ascent and walks at Piercefield Park were landscape attractions by 1700 and the tourists are attracted to the many castles and other historical sites that are found in the valley.





	Above (Upland)	Below (Lowland)
Long Profile Gradient (Source to Mouth)	Steeper	Flatter
Geology	Igneous	Sedimentary
Rainfall	Higher	Lower
Land Use	Upland Farming / Forestry	Arable Farming / Settlement
Landscape Features	Waterfalls, Gorges, Interlocking Spurs, V shaped valleys	Floodplains, Meanders, Levees

Topic 1 the Weimar Republic 1918-1929

1.The Weimar Republic 1918-29

- The origins of the Republic 1918-1929
- Early challenges
- Recovery of the Republic (Stresemann)
- Changes in society

Key dates
1918 Kaiser Abdicates
1918
1919
1919 Weimar Constitution established Ebert as President
1919 Treaty of Versailles signed
1920
1923
1923
1923
1924
1925
1926
1928 Kellogg -Briand Pact
1929 Young Plan
1929

Topic 2 Hitler's rise to power 1919-33

Key dates
1918 Kaiser Abdicates
1918 Armistice signed
1919 Weimar Constitution established Ebert as President
1919 Treaty of Versailles signed
1920 25 Point Programme
1921 Hitler becomes leader of the Nazi Party
1923
1924
1925 Mein Kampf published
1926 Bamberg Conference
1932 Nazi Party largest party in the Reichstag
1933 January

2.Hitler's rise to power 1919-33

- Early development of the Nazis
- The Munich Putsch and the 'lean years'
- Growth in Nazi support
- How Hitler became Chancellor

Topic 3 Nazi control and dictatorship

3. Nazi control and dictatorship

- The creation of the dictatorship (Reichstag fire, Enabling Act Night of the Long Knives, Death of Hindenburg)
- The police State (the SS, Gestapo)
- Controlling and influencing people(propaganda, the Church)
- Opposition to the Nazis

Key dates
1933 30 January
1933 February
1933 March
1933 July
1933 Gestapo established & Dachau set up
1933 Concordat with the Catholic Church
1934 June
1934 2nd August Death of Hindenburg. Oath of Loyalty from the Army
1934 19 August Weimar Republic officially ended

Topic 4 Life in Nazi Germany

Role of Women	Young people
Employment & living standards	Minority groups & the Jews

4. Life in Nazi Germany

- Nazi policies and women
- Nazi policies and the young
- Employment and living standards
- Persecution of minority groups and the Jews

Key Individuals

Person	Linked to
Kaiser Wilhelm	
Ebert	
Spartacists	
Freikorps	
General Kapp	
Stresemann	
Anton Drexler	
Adolf Hitler	
Rudolf Hess	
Hermann Goering	
Ernst Rohm	
Joseph Goebbels	
Heinrich Himmler	
Bruning, Von Schleicher, Von Papen, Paul Von Hindenburg	

YEAR 8 - PROPORTIONAL REASONING...

Ratio and Scale

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Simplify any given ratio
- Share an amount in a given ratio
- Solve ratio problems given a part

Solutions should be modelled, explained and solved.

Keywords

Ratio: a statement of how two numbers compare
Equal Parts:: all parts in the same proportion, or a whole shared equally
Proportion: a statement that links two ratios
Order: to place a number in a determined sequence
Part: a section of a whole
Equivalent: of equal value
Factors: integers that multiply together to get the original value
Scale: the comparison of something drawn to its actual size.

Representing a ratio

"For every 5 boys there are 3 girls"

5:3

This is the "whole" – boys and girls together

This represents the 5 boys | This represents the 3 girls

Double Number Line

This represents the 5 boys

This is the "whole" – boys and girls together

This represents the 3 girls

Order is Important

"For every dog there are 2 cats"

Dogs: Cats

1:2

The ratio has to be written in the same order as the information is given.

e.g. 2:1 would represent 2 dogs for every 1 cat ✗

Simplifying a ratio

Cancel down the ratio to its lowest form

"For every 6 days of rain there are 4 days of sun"

6:4

÷ by 2

3:2

rain | sun

Find the biggest common factor that goes into all parts of the ratio

For **6** and **4** the biggest factor (number that multiples into them is **2**)

"For every 3 days of rain there are 2 days of sun" – when this happens twice the ratio becomes 6:4

Ratio 1:n (or n:1)

This is asking you to cancel down until the part indicated represents 1

Show the ratio 4:20 in the ratio of 1:n

The question states that **this part has to be** 1 unit. Therefore **Divide by 4**

4 : 20

1 : 5

This side has to be divided by 4 too – to keep in **proportion**

H the n part does not have to be an integer for this type of question

Units are important:

When using a ratio – all parts should be in the same units

Useful Conversions

mm ⇄ cm ⇄ m ⇄ km (×10, ×100, ×1000 / ÷10, ÷100, ÷1000)

g ⇄ kg (×1000 / ÷1000)

ml ⇄ L (×1000 / ÷1000)

Sharing a whole into a given ratio

James and Lucy share £350 in the ratio 3:4. Work out how much each person earns

Model the Question

James: Lucy

3 : 4

James | Lucy | £350

Find the value of one part

Whole: £350
7 parts to share between
(3 James, 4 Lucy)

£350 ÷ 7 = £50

□ = one part = £50

Put back into the question

James: Lucy

3 : 4 (×50)

£150 : £200

James = 3 x £50 = £150

Lucy = 4 x £50 = £200

Finding a value given 1:n (or n:1)

Inside a box are blue and red pens in the ratio 5:1. If there are 10 red pens how many blue pens are there?

Model the Question

Blue : Red

5 : 1

□ = one part = 10 pens

Blue pens | Red pens

One unit = 10 pens

Put back into the question

Blue : Red

5 : 1 (×10)

50 : 10

Blue pens = 5 x 10 = 50 pens

Red pens = 1 x 10 = 10 pens

There are 50 Blue Pens

Ratio as a fraction

Trees: Flowers

3 : 7

Trees | Flowers

Ratio

There are **3** parts for trees

Fraction of trees

Number of parts of in group / Total number of parts = 3/10

Fraction

Tree parts **3** + Flower parts **7** = **10**

Pi

Circumference | Diameter

The ratio of a circles circumference to its diameter

YEAR 9 – REASONING WITH ALGEBRA...

Straight Line Graphs

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

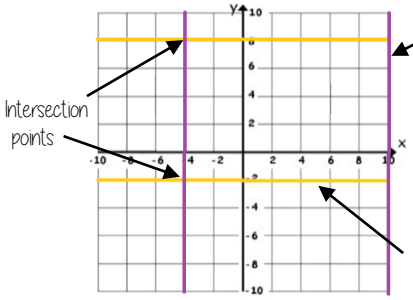
- Compare gradients
- Compare intercepts
- Understand and use y= mx + c
- Find the equation of a line from a graph
- Interpret gradient and intercepts of real-life graphs

Keywords

Gradient: the steepness of a line
Intercept: where two lines cross. The y-intercept: where the line meets the y-axis.
Parallel: two lines that never meet with the same gradient.
Co-ordinate: a set of values that show an exact position on a graph.
Linear: linear graphs (straight line) – linear common difference by addition/ subtraction
Asymptote: a straight line that a graph will never meet.
Reciprocal: a pair of numbers that multiply together to give 1.
Perpendicular: two lines that meet at a right angle.

Lines parallel to the axes

R



All the points on this line have a x coordinate of 10

'a' can be ANY positive or negative value including 0

Lines parallel to the **y axis** take the form **x = a** and are **vertical**

Lines parallel to the **x axis** take the form **y = a** and are **horizontal**

All the points on this line have a y coordinate of -2

e.g (3, -2) (7, -2) (-2, -2) all lay on this line because the y coordinate is -2

Plotting y = mx + c graphs

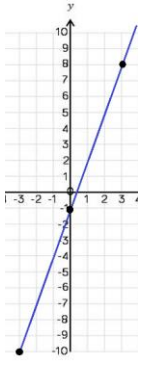
R

$y = 3x - 1$ → 3 x the x coordinate then – 1

x	-3	0	3
y	-10	-1	8

Draw a table to display this information

This represents a coordinate pair (-3, -10)



You only need two points to form a straight line

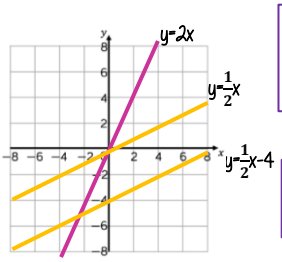
Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line

Compare Gradients

$y = mx + c$

The **coefficient** of x (the number in front of x) tells us the gradient of the line



The **greater** the gradient – the **steeper** the line

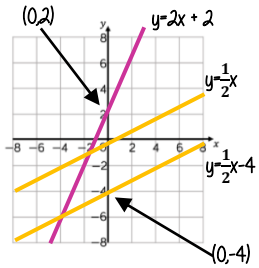
Parallel lines have the **same** gradient

Positive gradients

Negative gradients

Compare Intercepts

$y = mx + c$ ← The value of **c** is the point at which the line crosses the y-axis. **Y intercept**



The coordinate of a y intercept will always be (0,c)

Lines with the **same** y-intercept cross in the **same** place

y = mx + c

The **coefficient** of x (the number in front of x) tells us the gradient of the line

$y = mx + c$ ← The value of **c** is the point at which the line crosses the y-axis. **Y intercept**

y and x are **coordinates**

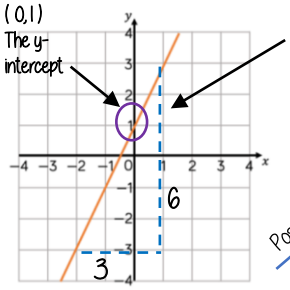
The equation of a line can be rearranged. E.g.

y = c + mx

c = y – mx

Identify which coefficient you are identifying or comparing

Find the equation from a graph



$y = 2x + 1$

The direction of the line indicates a positive gradient

Positive gradients

Negative gradients

Real life graphs

A plumber charges a £25 callout fee, and then £12.50 for every hour. Complete the table of values to show the cost of hiring the plumber.

Time (h)	0	1	2	3	8
Cost (£)	£25				£125

The y-intercept shows the minimum charge. The gradient represents the price per mile

In real life graphs like this values will always be positive because they measure distances or objects which cannot be negative.

Direct Proportion graphs To represent direct proportion the graph must start at the origin

When you have 0 pens this has 0 cost. The gradient shows the price per pen.

A box of pens costs £2.30
Complete the table of values to show the cost of buying boxes of pens.

Boxes	0	1	2	3	8
Cost (£)		£2.30			

YEAR 9 – CONSTRUCTING IN 2D/3D...

3D Shapes

@whisto_maths

What do I need to be able to do?

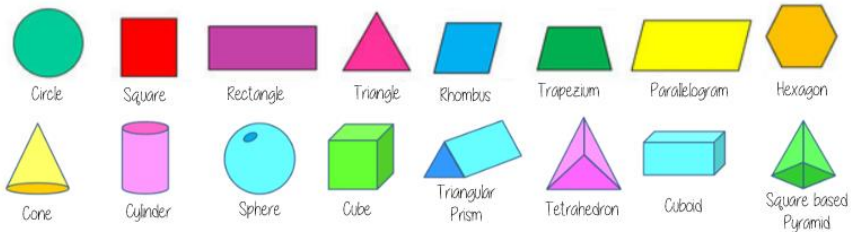
By the end of this unit you should be able to:

- Name 2D & 3D shapes
- Recognise Prisms
- Sketch and recognise nets
- Draw plans and elevations
- Find areas of 2D shapes
- Find Surface area for cubes, cuboids, triangular prisms and cylinders
- Find the volume of 3D shapes

Keywords

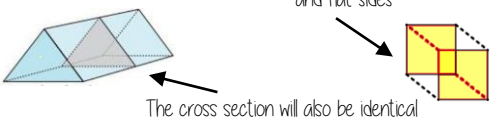
2D: two dimensions to the shape e.g. length and width
3D: three dimensions to the shape e.g. length, width and height
Vertex: a point where two or more line segments meet
Edge a line on the boundary joining two vertex
Face: a flat surface on a solid object
Cross-section: a view inside a solid shape made by cutting through it
Plan: a drawing of something when drawn from above (sometimes birds eye view)
Perspective: a way to give illustration of a 3D shape when drawn on a flat surface.

Name 2D & 3D shapes



Recognise prisms

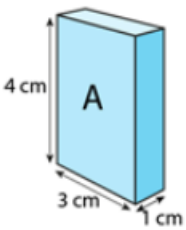
A solid object with two identical ends and flat sides

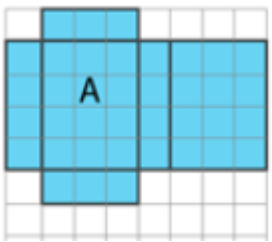


The cross section will also be identical to the end faces.

A cylinder although with very similar properties does not have flat faces so is not categorised as a prism

Nets of cuboids

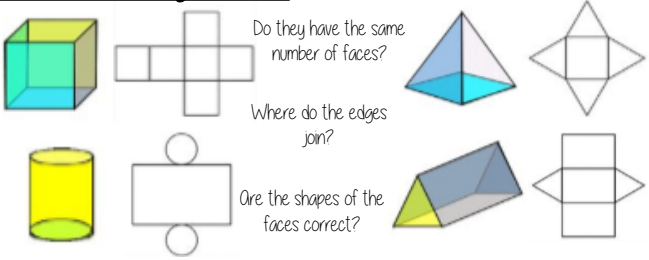




1cm grids help to draw accurately

Visualise the folding of the net
Will it make the cuboid with all sides touching

Sketch and recognise nets

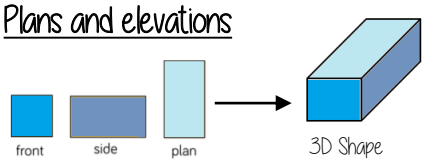


Do they have the same number of faces?

Where do the edges join?

Are the shapes of the faces correct?

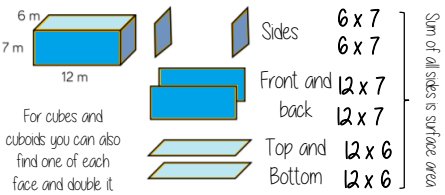
Plans and elevations



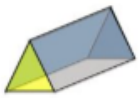
The direction you are considering the shape from determines the front and side views

Surface area

Sketching nets first helps you visualise all the sides that will form the overall surface area



For cubes and cuboids you can also find one of each face and double it



For other shapes - not all the sides are the same, so calculate the individually

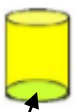
Volumes

Volume is the 3D space it takes up – also known as capacity if using liquids to fill the space

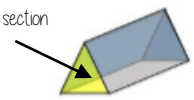
Counting cubes
Some 3D shape volumes can be calculated by counting the number of cubes that fit inside the shape.

Cubes/ Cuboids = base x width x height

Remember multiplication is commutative



Cross section



Cross section

Prisms and cylinders = area cross section x height

Height can also be described as depth

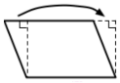
Area of 2D shapes

R

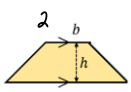
Rectangle
Base x Height

Triangle
½ x Base x Perpendicular height

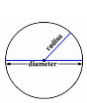
Parallelogram/ Rhombus
Base x Perpendicular height



Area of a trapezium
$\frac{(a+b)\times h}{2}$



Area of a circle
π x radius^2



Surface area - cylinders

The area of the circle
π x radius^2

The width of this face is the same as the circumference
π x diameter x height

$2 \times \pi \times \text{radius}^2 + \pi \times \text{diameter} \times \text{height}$

Areas – square units
Volumes – cube units

Areas and volumes can be left in terms of pi π

YEAR 10 – PROPORTION...

@whisto_maths

Ratios and fractions

What do I need to be able to do?

By the end of this unit you should be able to:

- Compare quantities using ratio
- Link ratios and fractions and make comparisons
- Share in a given ratio
- Link Ratio and scales and graphs
- Solve problems with currency conversions
- Solve 'best buy' problems
- Combine ratios

Keywords

Ratio: a statement of how two numbers compare
Equivalent: of equal value
Proportion: a statement that links two ratios
Integer: whole number, can be positive, negative or zero.
Fraction: represents how many parts of a whole.
Denominator: the number below the line on a fraction. The number represent the total number of parts..
Numerator: the number above the line on a fraction. The top number. Represents how many parts are taken
Origin: (0,0) on a graph. The point the two axes cross
Gradient: The steepness of a line

Compare with ratio (R)

"For every dog there are 2 cats"

Dogs: Cats

1:2

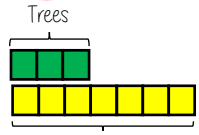
The ratio has to be written in the same order as the information is given.
e.g. 2:1 would represent 2 dogs for every 1 cat.

Units have the be of the same value to compare ratios

Ratios and fraction (R)

Trees: Flowers

3 : 7



Ratio

Fraction of trees

Number of parts of in group / Total number of parts

3/10

Fraction

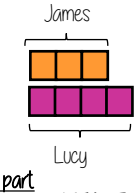
Sharing a whole into a given ratio (R)

James and Lucy share £350 in the ratio 3:4.
Work out how much each person earns

Model the Question

James: Lucy

3 : 4



Find the value of one part

Whole: £350
7 parts to share between (3 James, 4 Lucy)

£350 ÷ 7 = £50

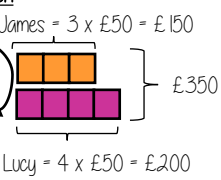
□ = one part = £50

Put back into the question

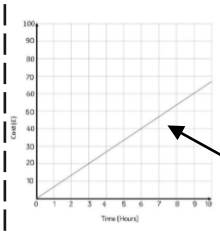
James: Lucy

x 50 3 : 4 x 50

£150:£200



Ratio and graphs (R)



Graphs with a constant ratio are directly proportional
- Form a straight line
- Pass through (0,0)

The gradient is the constant ratio

Ratio and scale (R)

A picture of a car is drawn with a scale of 1:30

The car image is 10cm

Image : Real life

1cm : 30cm

10cm : 300cm

(×10 / ×10)

Conversion between currencies (R)

£1 = 90 Rupees ← Currency is directly proportional

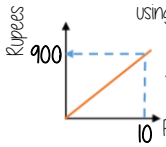
For every £1 I have 90 Rupees

£1 = 90 Rupees

(×10 / ×10)

£10 = 900 Rupees

Currency can be converted using a conversion graph



Convert 630 Rupees into Pounds

£1 = 90 Rupees (×7 / ×7)

630 ÷ 90 = 7

£7 = 630 Rupees

Ratios in 1:n and n:1

This is asking you to cancel down until the part indicated represents 1

Show the ratio 4:20 in the ratio of 1:n

The question states that **this part has to be 1 unit**. Therefore **Divide by 4**

4 : 20

1 : 5

This side has to be divided by 4 too – to keep in **proportion**

the n part does not have to be an integer for this type of question

Best buys

4 pens costs £2.60

10 pens costs £6.00

"1 pen costs..." £2.60 ÷ 4 = **£0.65** | £6.00 ÷ 10 = **£0.60**

"1-pound buys..." 4 ÷ 2.60 = **1.54 pens** | 10 ÷ 6 = **1.67 pens**

You could work out how much 40 pens are and then compare

Compare the solution in the context of the question

The best value has the lowest cost "per pen"

The best value means £1 buys you more pens

Combining ratios

B R G

The ratio of Blue counters to Red counters is 5:3

The ratio of Red counters to Green counters is 2:1

Ratio of Blue to Red to Green

10 : 6 : 3

Use equivalent ratios to allow comparison of the group that is common to both statements

Lowest common multiple of the ratio both statements share

YEAR 10 – USING NUMBER...

@whisto_maths

Indices & Roots

What do I need to be able to do?

By the end of this unit you should be able to:

- Identify square and cube numbers
- Calculate higher powers and roots
- Understand powers of 10 and standard form
- Know the addition and subtraction rule for indices
- Understand power zero and negative indices
- Calculate with numbers in standard form

Keywords

Standard (index) Form: A system of writing very big or very small numbers
Commutative: an operation is commutative if changing the order does not change the result.
Base: The number that gets multiplied by a power
Power: The exponent – or the number that tells you how many times to use the number in multiplication
Exponent: The power – or the number that tells you how many times to use the number in multiplication
Indices: The power or the exponent.
Negative: A value below zero.
Coefficient: The number used to multiply a variable

Square and cube numbers

R

Square numbers

1, 4, 9, 16...

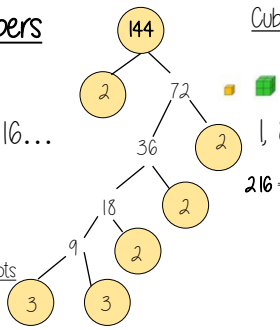
144 = 2 x 2 x 2 x 2 x 3 x 3

(2 x 2 x 3) x (2 x 2 x 3)

12 x 12

Prime factors can find square roots

$\sqrt{144} = 12$



Cube numbers

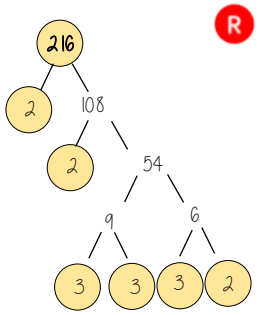
1, 8, 27, 64, 125...

216 = 2 x 2 x 2 x 3 x 3 x 3

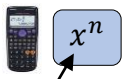
(2 x 3) x (2 x 3) x (2 x 3)

6 x 6 x 6

$\sqrt[3]{216} = 6$



Higher powers and roots



x^n ← n – power (number of times multiplied by itself)

x – the base number.

$\sqrt[n]{x}$ ← Finding the nth root of any value

Other mental strategies for square roots

$\sqrt{810000} = \sqrt{81} \times \sqrt{10000}$

$= 9 \times 100$

$= 900$

Standard form

R

Any integer

Any number between 1 and less than 10

$A \times 10^n$

0.001

$1 \times \frac{1}{1000}$

1×10^{-3}

10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
10^1	10^0	10^{-1}	10^{-2}	10^{-3}
10	1	0.1	0.01	0.001

Any value to the power 0 always = 1

Negative powers do not indicate negative solutions

Example

3.2 x 10^4

= 3.2 x 10 x 10 x 10 x 10

= 32000

Non-example

0.8×10^4

$5.3 \times 10^{0.7}$

Numbers in standard form with negative powers will be less than 1

$3.2 \times 10^{-4} = 3.2 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = 0.00032$

Addition/ Subtraction Laws

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

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

Zero and negative indices

$x^0 = 1$

Any number divided by itself = 1

$\frac{a^6}{a^6} = a^6 \div a^6$

$= a^{6-6} = a^0 = 1$

Negative indices do not indicate negative solutions

$2^2 = 4$
$2^1 = 2$
$2^0 = 1$
$2^{-1} = \frac{1}{2}$
$2^{-2} = \frac{1}{4}$

Looking at the sequence can help to understand negative powers

Powers of powers

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

$(2^3)^4 = 2^3 \times 2^3 \times 2^3 \times 2^3$

The same base and power is repeated. Use the addition law for indices

$(2^3)^4 = 2^{12}$ ← $a \times b = 3 \times 4 = 12$

NOTICE the difference

$(2x^3)^4 = 2x^3 \times 2x^3 \times 2x^3 \times 2x^3$

The addition law applies ONLY to the powers. The integers still need to be multiplied

$(2x^3)^4 = 16x^{12}$

Standard form calculations

R

Addition and Subtraction

Tip: Convert into ordinary numbers first and back to standard form at the end.

$6 \times 10^5 + 8 \times 10^5$

Method 1

= 600000 + 800000

= 1400000

= 1.4×10^5

Method 2

= (6 + 8) x 10^5

= 14 x 10^5

This is not the final answer

= $1.4 \times 10^1 \times 10^5$

= 1.4×10^5

Multiplication and division

$\frac{1.5 \times 10^5}{0.3 \times 10^3}$ ← Division questions can look like this

$(1.5 \times 10^5) \div (0.3 \times 10^3)$

$1.5 \div 0.3 \times 10^5 \div 10^3$

$= 5 \times 10^2$

For multiplication and division you can look at the values for A and the powers of 10 as two separate calculations

YEAR 7 – REASONING WITH NUMBER

@whisto_maths

Prime numbers and Proof

What do I need to be able to do?

By the end of this unit you should be able to:

- Find and use multiples
- Identify factors of numbers and expressions
- Recognise and identify prime numbers
- Recognise square and triangular numbers
- Find common factors including HCF
- Find common multiples including LCM

Keywords

Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number.
Prime: an integer with only 2 factors.
Conjecture: a statement that might be true (based on reasoning) but is not proven.
Counterexample: a special type of example that disproves a statement.
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)
HCF: highest common factor (biggest factor two or more numbers share)
LCM: lowest common multiple (the first time the times table of two or more numbers match)

Multiples

The "times table" of a given number

All the numbers in this lists below are multiples of 3.

3, 6, 9, 12, 15…

This list continues and doesn't end

$3x$, $6x$, $9x$ …

x could take any value and as the variable is a multiple of 3 the answer will also be a multiple of 3

Non example of a multiple

4.5 is not a multiple of 3 because it is 3 x 1.5

Not an integer

Factors

Arrays can help represent factors

5 x 2 or 2 x 5

Factors of 10
1, 2, 5, 10

10 x 1 or 1 x 10

The number itself is always a factor

Factors and expressions

x x x x x x

$6x \times 1$ OR $6 \times x$

Factors of $6x$
6, x, 1, $6x$, $2x$, 3, $3x$, 2

x x / x x — $2x \times 3$

x x x / x x x — $3x \times 2$

Prime numbers

- Integer
- Only has 2 factors
- and itself

2

The first prime number
The only even prime number

Learn or how-to quick recall…

2, 3, 5, 7, 11, 13, 17, 19, 23, 29…

Square and triangular numbers

Square numbers

odd even odd

Representations are useful to understand a square number n^2

1, 4, 9, 16, 25, 36, 49, 64 …

Triangular numbers

Representations are useful – an extra counter is added to each new row

Add two consecutive triangular numbers and get a square number

1, 3, 6, 10, 15, 21, 28, 36, 45…

Common factors and HCF

1 is a common factor of all numbers

Common factors are factors two or more numbers share

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18

30: 1, 2, 3, 5, 6, 10, 15, 30

Common factors (factors of both numbers)
1, 2, 3, 6

HCF = 6

6 is the biggest factor they share

Common multiples and LCM

Common multiples are multiples two or more numbers share

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54

12: 12, 24, 36, 48, 60

LCM = 36

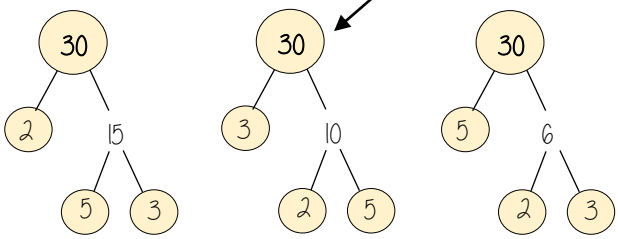
The first time their multiples match

Comparing fractions

$\frac{3}{5}$ and $\frac{7}{10}$ ← Compare fractions using a LCM denominator → $\frac{6}{10}$ and $\frac{7}{10}$

Product of prime factors

Multiplication part-whole models



All three prime factor trees represent the same decomposition

Multiplication is commutative

30 = 2 x 3 x 5 ← Multiplication of prime factors

Using prime factors for predictions

e.g. 60: 30 x 2, 2 x 3 x 5 **x 2**

150: 30 x 5, 2 x 3 x 5 **x 5**

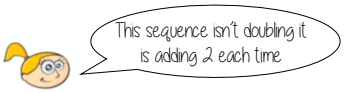
Conjectures and counterexamples

Conjecture

1, 2, 4, …
The numbers in the sequence are doubling each time.

A pattern that is noticed for many cases

Counterexamples



Only **one** counterexample is needed to disprove a conjecture

YEAR 8 - REASONING WITH DATA...

The data handling cycle

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Set up a statistical enquiry
- Design and criticise questionnaires
- Draw and interpret multiple bar charts
- Draw and interpret line graphs
- Represent and interpret grouped quantitative data
- Find and interpret the range
- Compare distributions

Keywords

Hypothesis: an idea or question you want to test
Sampling: the group of things you want to use to check your hypothesis
Primary Data: data you collect yourself
Secondary Data: data you source from elsewhere e.g. the internet/ newspapers/ local statistics
Discrete Data: numerical data that can only take set values
Continuous Data: numerical data that has an infinite number of values (often seen with height, distance, time)
Spread: the distance/ how spread out/ variation of data
Average: a measure of central tendency – or the typical value of all the data together
Proportion: numerical relationship that compares two things

Set up a statistical enquiry

Write a suitable hypothesis → Design a data collection sheet → Pros/ Cons of sampling → Pros/ Cons primary or secondary data → Discrete or continuous data?

Features of a data collection sheet

Grouped or ungrouped categories

Data Title	Tally	Frequency
	𝍸	

Total number of that group observed

Design and criticise a questionnaire

The Question - be clear with the question - don't be too leading/ judgemental

e.g. How much pocket money do you get a week?

Responses – do you want closed or open responses? – do any options overlap? – Have you an option for all responses?

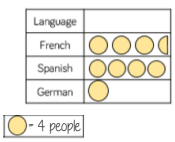
Zero option → ☐ £0 ☐ £0.01 - £2 ☐ £2.01 - £4 ☐ more than £4 ← More option

NOTE: For responses about continuous data include inequalities $< x \leq$

Pictograms, bar and line charts (R)

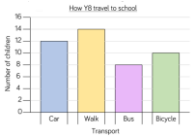
Represents quantitative data

Pictogram



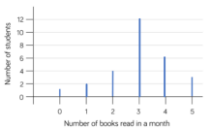
- Need to remember a key
- Visually able to identify mode

Bar Chart



- Gaps between the bars
- Clearly labelled axes
- Scale for the axes
- Title for the bar chart
- Discrete Data

Line Chart



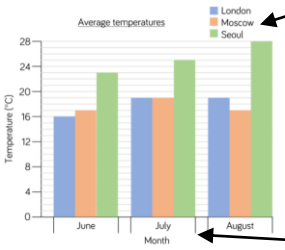
- Gaps between the lines
- Clearly labelled axes
- Scale for the axes
- Discrete Data

Multiple Bar chart

Compares multiple groups of data

- Clearly labelled axes
- Scale for axes
- Comparable data bars drawn next to each other

Key/ Colour code for separate groups of information



Gap between different categories of data

Draw and interpret Pie Charts (R)

Remember a circle has 360°

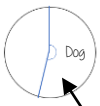
Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

There were 60 people asked in this survey (Total frequency)

$\frac{32}{60}$ "32 out of 60 people had a dog"

This fraction of the 360 degrees represents dogs

$\frac{32}{60} \times 360 = 192°$



Use a protractor to draw This is 192°

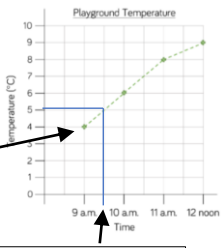
Multiple method
Os 60 goes into 360 – 6 times
Each frequency can be multiplied by 6 to find the degrees (proportion of 360)

Represents quantitative, discrete data

Draw and interpret line graphs

- Commonly used to show changing over time
- The points are the recorded information and the lines join the points

Line graphs do not need to start from 0



More than one piece of data can be plotted on the same graph to compare data

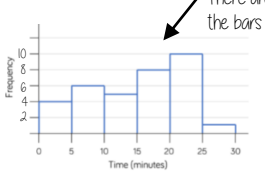
It is possible to make estimates from the line e.g. temperature at 9.30am is 5°C

Grouped quantitative data

Time (minutes)	Frequency
$0 \leq t < 5$	4
$5 \leq t < 10$	6
$10 \leq t < 15$	5
$15 \leq t < 20$	8
$20 \leq t < 25$	10
$25 \leq t < 30$	1

"More than or equal to 25 and less than 30 minutes"

This is a frequency diagram There are no gaps between the bars



The use of inequalities shows that this will be a frequency diagram

Grouping the data is useful if there is a large spread of data to begin with

Find and interpret the range

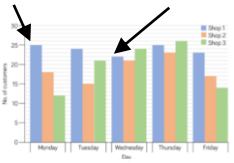
The range is a measure of **spread**

Difference between the biggest and smallest values

Shop 1 highest value – Shop 1 lowest value

A smaller range means there is less variation in the results – it is more consistent data

A range of 0 means all the data is the same value



Shop 1 has the smallest range – this indicates it has a more consistent flow of customers each week

Range of customers = 25 – 22 = 3 (Shop 1)

R185 | PERFORMANCE AND LEADERSHIP IN SPORTS ACTIVITIES

TOPIC AREA 1

Key components of performance

Skills and Techniques

Technique

The way in which a skill is performed.

Skills

Ability to use a combination of movements to produce a co-ordinated action.

Badminton techniques and skills:

The grip
Serving (backhand & forehand)
Footwork/Stance
Drop shot
Clearing (backhand & forehand)
Smash (backhand & forehand)

Stance

- Watch the shuttle
- Arm point to shuttle
- Knees slightly bent
- Racket up

Backhand serve

- Pinch shuttle
- Stand sideways
- Drop shuttle
- Flick racket

Creativity

Creativity

This is the ability to generate or react to a certain situation in a particular way. A performers creativity will depend on what physical activity or sport in being performed. For example:

Creativity in badminton

Within badminton a player could be creative in games by changing the speed or direction of specific moves including disguise shots such as an overhead clear disguised as a drop shot. This can also mean a performer doing something different or unexpected. For example, a badminton player changing a way a shot is played by playing it across the court by a slight flick of the wrist rather than hitting it down the line.

Disguise overhead clear to a drop shot

Tactics/Strategies

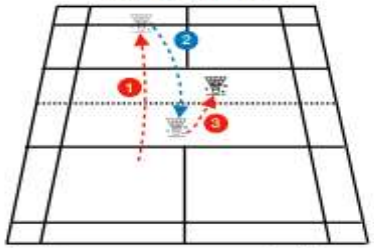
Tactic/Strategy

A tactic/strategy is an overall plan of how you'll win the game.

Movement pressure

This is a strategy that moves the player around the court to apply pressure in order for you to win the point.

For example:



1. Force your opponent to the back
2. They play a drop shot
3. You play a net shot to force them to the front

Other tactics in badminton

- Hitting the corners
- Deception
- Hitting an opponents weakness

Decision making

Decision making

This requires the performer to choose the correct skill for a chosen situation. For example, a badminton player may choose a to play a drop shot as they have seen the opponent at the back of the court.

Manage/Maintain

Ability to manage/maintain own performance

Performers will need to manage their emotions and anxiety levels during a performance as this will lead to poor performance. E.g. a badminton player losing a key point or a golfer missing an important putt. The player can get over anxious and angry during a performance.

Key Terms

- **Technique** - The way in which a skill is performed
- **Skills** - Ability to use a combination of movements to produce a co-ordinated action
- **Creativity** - This is the ability to generate or react to a certain situation in a particular way
- **Tactics/Strategy** - A tactic/strategy is an overall plan of how you'll win the game
- **Disguise** - Pretending to play one shot but then playing another
- **Decision Making** - The performer choosing the correct skill for a chosen situation
- **Maintaining/Managing performance** - The ability to control emotions throughout the game so that performance isn't affected

		SOURCES OF WISDOM AND AUTHORITY	
	Topic	**Quote/Reference**	**Source**
1	**Revelation**	It pleased God to reveal himself through Christ, the Word made flesh	Catechism
2	**Visions**	At the Transfiguration Jesus' face shone like the sun and his clothes appeared as white as light - Matthew 17	Bible
3	**Miracles**	By the power of his words Jesus calmed the storm - Mark 4	Bible
4	**Religious experience**	Religious experiences happen because people are created by God and God is always trying to contact humans	Catechism
5	**The design argument**	The existence of God can be known with certainty through his creation	Catechism
6	**The cosmological argument**	God is infinitely greater than his creation	Catechism
7	**The problem of evil and suffering**	God's very being is love	Catechism
8	**Catholic responses to the problem of evil and suffering**	Being afflicted by suffering leads to greater understanding of God - Psalm 119	Bible

REVELATION

God exists because he reveals himself through creation: **NATURAL revelation** or directly through people: **SPECIAL revelation**

The bible proves God's existence because (1) it was **inspired by the Holy Spirit** (2) the Church teaches that God **reveals his character and commandments** in the bible (3) **God's laws have his living authority** (4) the bible **brings people into a closer relationship with God**

God's **revelation reached its culmination in the INCARNATION of Jesus**. All the small revelations about God are summed up and made clear in Jesus. In Jesus, God reveals himself by becoming one of us. **Jesus is God**.

God's revelation in Jesus shows that God (1) is **LOVING** - he loves creation so much he becomes a part of it (2) is **FORGIVING** - he is prepared to die on the cross so that we can receive forgiveness for our sins (3) is **CARING** - he meets people wherever they are in life (4) **wants to HEAL people** - through his miracles he heals people in body, mind and spirit

VISIONS

Visions are something seen in a dream, trance or religious ecstasy, which give a religious message.

In the bible **ABRAHAM** had a vision and was told God would give him descendants as numerous as the **stars**. At the **TRANSFIGURATION** the apostles had a vision of **Jesus in glory** and were told, "This is my beloved Son, listen to him".

Visions have continued since Bible times—**ST JOAN OF ARC** saw the Archangel Michael and **ST BERNADETTE** had visions of Our Lady.

Visions are declared to be true only after careful investigation by the Church

Visions prove God exists because (1) if the vision **came from God** then God must exist (2) a change in a **person's behaviour** shows that their vision came from God (3) the **message given** in the vision comes from God (4) if **the person is honest** then they are telling the truth.

Atheists and Humanists say visions **do not** prove God exists because (1) the personal may be **stressed, mentally ill, hallucinating** (2) the **descriptions in the vision do not describe the person as they were** e.g. Mary did not have fair skin and hair (3) there is **no independent evidence** for visions

Catholics disagree because (1) visions are **investigated** by the Church (2) the visionary must be a **good person** (3) the message given must have a **positive effect**

MIRACLES

Miracles prove God exist - they **break the laws of science** and **can only be explained by God's existence**. Miracles **help people to believe in God**

The **bible is full of miracles** (Jesus' miracles include: Calming the Storm, Feeding the 5000, Healing the Centurion's servant, Driving our demons, Raising Lazarus)

Catholics believe that **God still performs miracles** (in **Lourdes** where St Bernadette had visions of Our Lady many **healing miracles** have occured)

Catholics believe miracles prove God exists because (1) miracles **can only be explained by God's existence** (2) **only God can perform miracles** which go beyond the laws of science (3) if **you cannot find a natural explanation** for an event it will lead people to believe God must exist

Atheists and Humanists **do not** believe miracles prove God exists because (1) miracles would break the **laws of nature which explain our whole experience of life** (2) people who claim to have seen or experienced a miracle may be **mistaken or lying** (3) miracles from the past **can now be explained** (4) God **could use miracles to end poverty and sickness but he doesn't**

Catholics disagree because (1) they can **rely on the Bible** which is inspired by God (2) miracles have been **authenticated by the Church** (3) **God does not choose to change the nature of life** for mankind as a whole

Religious Experience

A religious experience is an event that people feel gives them direct contact with God.

3 types of religious experience are **conversion**, a **numinous experience**, **prayer**

Religious people believe these experiences prove God exists because: (1) there must be a cause for a numinous experience—God (2) if a miracle occurs then God which science can't explain, the cause must be God (3) an event which totally changes a person's life must have a cause - God (4) if a prayer is answered God must be listening and therefore exists.

Non-religious people (**Atheists and Humanists**) do not believe religious experiences prove God's existence because (1) why doesn't everyone have a numinous experience? (2) miracles can be explained (3) why aren't all prayers answered if God exists? (4) religious experiences are matters of personal belief and cannot be proven

Catholics would disagree because everybody has a spiritual sense but they don't all have to have the same experiences. Religious experiences may not be provable but that doesn't mean that they are not real or that God does not exist.

GCSE Religious Studies Unit 3 Philosophy and Ethics 3.1 Arguments for the Existence of God (Key sources of wisdom & authority are included on the back of this sheet)

The Design Argument

If something shows evidence of design it must have a designer. The universe appears to be designed (DNA, gravity, magnetism)—it must have a designer: God.

(1) If you found a **watch** you would not say it came to exist by chance (2) the **complexity** of the watch makes you think it was designed (3) the **universe** is more complex than a watch (4) it must have a **designer** (5) only **God** could design the universe (6) this proves God **exists**.

This is important to Catholics because: you can see evidence of God's existence in creation; God gives us the power to think and understand the world; the universe works on fixed principles (e.g. gravity) that help us think scientifically; God is the creator and keeps it in existence

Atheists and Humanists do not believe Design proves God's existence because: there is no design in volcanoes, earthquakes etc.; science can explain creation; what happened to the design of dinosaurs?; if the universe was designed why does the designer have to be God?

The **Catholic Church** argues the universe is more likely to be designed than be a matter of chance; there is no absolute proof God exists it is a matter of faith

The Cosmological Argument

St Thomas Aquinas argued: (1) Nothing moves without being moved - **God is the prime mover** (2) Everything has a cause - **God is the first cause** (3) All material things are contingent - **God is the non-contingent being**

Modern form of the argument: (1) cause and effect is a feature of the world (2) Science shows every effect has a cause (3) the universe/humans must have a cause (4) God is the only logical cause of the universe (5) therefore God exists

This is important for Catholics because it shows God is the origin of all things; God is not a part of the universe. God is infinite and eternal; God is a mystery we cannot fully understand

Atheists and Humanists do not believe this proves God's existence because: if everything needs a cause who 'caused' God?; matter could be eternal; the universe could be eternal; if God existed why should it be the Christian God?

The **Catholic Church** responds, it is no more believable to say the universe 'just happened' than to say God created it.
The universe is too complex to have just come into existence by chance. Our immortal souls show that humans have a spiritual dimension, why shouldn't the universe be the same?

The Problem of Evil and Suffering

Moral suffering is caused by humans misusing the gift of free will (e.g. war, murder, theft) causing people to suffer. Christians call such acts sins because they go against God's will.

Natural suffering is not caused by humans but arises from nature e.g. earthquakes, floods, cancers etc.

The problem this causes for Catholic beliefs about God are that (1) if God is **omnipotent** (all-powerful) why doesn't he stop suffering (2) if God is **omni-benevolent** (all-loving) he must want to stop unhappiness so why doesn't he? (3) if God is **omniscient** (all-knowing) he must have known that suffering would happen so why didn't he create the universe so that evil and suffering were avoided?

So, either God is not omnipotent, omni-benevolent and omniscient <u>or</u> God does not exist.

Catholics who witness or experience evil and suffering may question whether God really exists.

Atheists and Humanists argue that the God Christians believe in cannot exist if there is evil and suffering in the world. It is easier to say that suffering is a matter of accident or human choice.

Solutions to the Problem of Evil and Suffering

Biblical responses: (1) the **book of Job**, where God allows Satan to test Job's faith through pain and suffering shows that God has reasons for allowing suffering we may not understand. (2) The **book of Psalms** says that suffering and joy go side by side in life but suffering can help us to understand God better (for instance to understand that Jesus was willing to suffer for us on the cross)

Theoretical responses: (1) God has given us **free-will** so he must give us the freedom to use it even though it can lead to evil and suffering (2) This life is a **preparation for eternal life**. By facing evil and suffering and being good, kind, loving and forgiving we improve our souls and will be rewarded with eternal life in heaven (3) **Good can arise out of evil** when people respond to suffering by trying to help people and create a better world

Practical responses: Christians respond to evil and suffering by following Jesus' example of helping people in practical ways (1) by **praying** for those who are suffering (2) giving **practical help** e.g. working as a doctor, nurse, social worker, aid worker or by supporting charities that help to relieve suffering

CAFOD Just one world

6.1 Energy Part 1

Energy stores and changes

Mechanical	Force acts upon an object
Electrical	Electric current flow
Heat	Temperature difference between objects
Radiation	Electromagnetic waves or sound

Kinetic energy	Energy stored by a moving object	½ X mass X (speed)^2 ½ mv^2
Elastic Potential energy	Energy stored in a stretched spring, elastic band	½ X spring constant X (extension)^2 ½ ke^2 (Assuming the limit of proportionality has not been exceeded)
Gravitational Potential energy	Energy gained by an object raised above the ground	Mass X gravitational field strength X height mgh

System	An object or group of objects that interact together	EG: Kettle boiling water.
Energy stores	Kinetic, chemical, internal (thermal), gravitational potential, elastic potential, magnetic, electrostatic, nuclear	Energy is gained or lost from the object or device.
Ways to transfer energy	Light, sound, electricity, thermal, kinetic are ways to transfer from one store to another store of energy.	EG: electrical energy transfers chemical energy into thermal energy to heat water up.
Unit	Joules (J)	

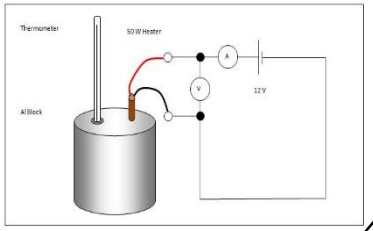
Work	Doing work transfers energy from one store to another	By applying a force to move an object the energy store is changed.	Work done = Force X distance moved W = Fs
Power	The rate of energy transfer	1 Joule of energy per second = 1 watt of power	Power = energy transfer ÷ time P = E ÷ t Power = work done ÷ time, P = W ÷ t

	Units
Specific Heat Capacity	Joules per Kilogram degree Celsius (J/Kg°C)
Temperature change	Degrees Celsius (°C)
Work done	Joules (J)
Force	Newton (N)
Distance moved	Metre (m)
Power	Watts (W)
Time	Seconds (s)

Change in thermal energy = mass **X** specific heat capacity **X** temperature change

ΔE= m **X c X** Δθ

Specific Heat Capacity	Energy needed to raise 1kg of substance by 1°C	Depends on: mass of substance, what the substance is and energy put into the system.



HIGHER: efficiency can be increased using machines.

Efficiency = Useful power output / Total power input

Efficiency = Useful output energy transfer / Total input energy transfer

Energy pathways

Efficiency

How much energy is usefully transferred

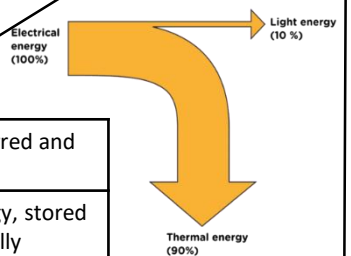
Dissipate	To scatter in all directions or to use wastefully	When energy is 'wasted', it dissipates into the surroundings as internal (thermal) energy.

Ways to reduce 'wasted' energy	Energy transferred usefully	Insulation, streamline design, lubrication of moving parts.

Energy Conservation and Dissipation

Principle of conservation of energy	The amount of energy always stays the same.	Energy cannot be created or destroyed, only changed from one store to another.	

Closed system	No change in total energy in system
Open system	Energy can dissipate



Useful energy	Energy transferred and used
Wasted energy	Dissipated energy, stored less usefully

Prefix	Multiple	Standard form
Kilo	1000	10^3
Mega	1000 000	10^6
Giga	100 000 000	10^9

HIGHER: When an object is moved, energy is transferred by doing work.

Work done = Force X distance moved

Frictional forces cause energy to be transferred as thermal energy. This is wasted.

Reducing friction - using wheels, applying lubrication. Reducing air resistance – travelling slowly, streamlining.

	Units
Energy (KE, EPE, GPE, thermal)	Joules (J)
Velocity	Metres per second (m/s)
Spring constant	Newton per metre (N/m)
Extension	Metres (m)
Mass	Kilogram (Kg)
Gravitational field strength	Newton per kilogram (N/Kg)
Height	Metres (m)

6.1 Energy Part 2

Global Energy Resources

Using renewable energy will need to increase to meet demand.

Renewable energy makes up about 20% of energy consumption.

Fossil fuel reserves are running out.

Energy demand is increasing as population increases.

Transport	Petrol, diesel, kerosene produced from oil	Used in cars, trains and planes.
Heating	Gas and electricity	Used in buildings.
Electricity	Most generated by fossil fuels	Used to power most devices.

Using fuels

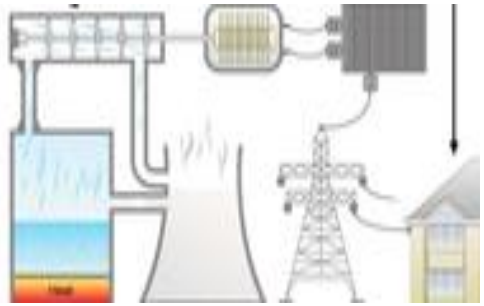
Energy resources

Non-renewable energy resource	These will run out. It is a finite reserve. It cannot be replenished.	e.g. Fossil fuels (coal, oil and gas) and nuclear fuels.
Renewable energy resource	These will never run out. It is an infinite reserve. It can be replenished.	e.g. Solar, Tides, Waves, Wind, Geothermal, Biomass, Hydroelectric

National Grid

Power station – NB: You need to understand the principle behind generating electricity. An energy resource is burnt to make steam to drive a turbine which drives the generator.

Power station	Generates electricity	Fuel burnt releasing thermal energy ⇨ Water boils into steam ⇨ Steam turns turbine ⇨ Turbine turns generator ⇨ Generator induces voltage
National Grid	Transports electricity across UK	Power station ⇨ Step-up transformer ⇨ Pylons ⇨ Step-down transformer ⇨ House, factory

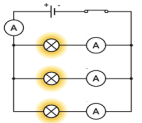


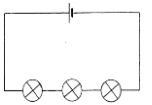
Energy resource	How it works	Uses	Positive	Negative
Fossil Fuels (coal, oil and gas)	Burnt to release thermal energy used to turn water into steam to turn turbines	Generating electricity, heating and transport	Provides most of the UK energy. Large reserves. Cheap to extract. Used in transport, heating and making electricity. Easy to transport.	Non-renewable. Burning coal and oil releases sulfur dioxide. When mixed with rain makes acid rain. Acid rain damages building and kills plants. Burning fossil fuels releases carbon dioxide which contributes to global warming. Serious environmental damage if oil spilt.
Nuclear	Nuclear fission process	Generating electricity	No greenhouse gases produced. Lots of energy produced from small amounts of fuel.	Non-renewable. Dangers of radioactive materials being released into air or water. Nuclear sites need high levels of security. Start up costs and decommission costs very expensive. Toxic waste needs careful storing.
Biofuel	Plant matter burnt to release thermal energy	Transport and generating electricity	Renewable. As plants grow, they remove carbon dioxide. They are 'carbon neutral'.	Large areas of land needed to grow fuel crops. Habitats destroyed and food not grown. Emits carbon dioxide when burnt thus adding to greenhouse gases and global warming.
Tides	Every day tides rise and fall, so generation of electricity can be predicted	Generating electricity	Renewable. Predictable due to consistency of tides. No greenhouse gases produced.	Expensive to set up. A dam like structure is built across an estuary, altering habitats and causing problems for ships and boats.
Waves	Up and down motion turns turbines	Generating electricity	Renewable. No waste products.	Can be unreliable depends on wave output as large waves can stop the pistons working.
Hydroelectric	Falling water spins a turbine	Generating electricity	Renewable. No waste products.	Habitats destroyed when dam is built.
Wind	Movement causes turbine to spin which turns a generator	Generating electricity	Renewable. No waste products.	Unreliable – wind varies. Visual and noise pollution. Dangerous to migrating birds.
Solar	Directly heats objects in solar panels or sunlight captured in photovoltaic cells	Generating electricity and some heating	Renewable. No waste products.	Making and installing solar panels expensive. Unreliable due to light intensity.
Geothermal	Hot rocks under the ground heats water to produce steam to turn turbine	Generating electricity and heating	Renewable. Clean. No greenhouse gases produced.	Limited to a small number of countries. Geothermal power stations can cause earthquake tremors.

6.2 Electricity

Electrons carry current. Electrons are free to move in metal.

Cell	Battery	Switch	Lamp	Ammeter	Volt meter	Diode	LED	LDR	Fuse	Resistor	Variable resistor	Thermistor
Store of chemical energy	Two or more cells in series	Breaks circuit, turning current off	Lights when current flows	Measures current	Measures potential difference	Current flows one way	Emits light when current flows	Resistance low in bright light	Melts when current is too high	Affects the size of current flowing	Allows current to be varied	Resistance low at high temp





Circuit symbols

Current and Charge

Current	Flow of electrical charge	Ampere (A)
Potential difference (p.d.)	How much electrical work is done by a cell	Volts (V)
Charge	Amount of electricity travelling in a circuit	Coulombs (C)

Charge = Current X time

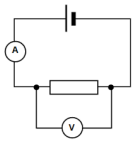
Q = I X t

Current, potential difference and resistance

Controlling current

Changing current	Change the p.d. of the cells
	Add more components

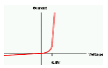
Ammeter	Set up in series with components
Voltmeter	Set up parallel to components



R = V ÷ I

Resistance = Potential difference ÷ Current

Resistance (Ω)	A measurement of how much current flow is reduced
The higher the resistance, the more difficult it is for current to flow.	
Increasing resistance, reduces current.	
Increasing voltage, increases current.	



Ohmic conductor	At a constant temperature, current is directly proportional to the p.d. across the resistor.
Filament lamp	As current increases, the resistance increases. The temperature increases as current flows.
Diode	Current flows when p.d. flows forward. Very high resistance in reverse.

Current: Potential difference graphs

Thermistor	LDR
Resistance varies with temperature	Resistance varies with light intensity
Resistance decreases as temperature increases.	Resistance decreases as light increases.

Series and parallel circuits

Series circuit	Current is the same in all components.	Total p.d. from battery is shared between all the components.	Total resistance is the sum of each component's resistance.
Parallel circuit	Total current is the sum of each component's current.	p.d. across all components is the same.	Total resistance is less than the resistance value of the smallest individual resistor.

Series	Parallel
A circuit with one loop	A circuit with two or more loops

Total p.d	If cells are joined in series, add up individual cell values

Energy transfers

Work is done when charge flowing.

Power = (current)^2 X resistance

$P = I^2 X R$

Power (W) = potential difference X current

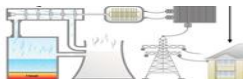
R = V X I

Energy transferred = Power X time

E = P X t

Domestic uses and safety

National Grid	Distributes electricity generated in power stations around UK



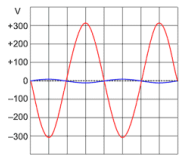
Step-up transformers	Step-down transformers
Increase voltage, decrease current	Decrease voltage, increase current
Increases efficiency, reduces heat loss.	Makes safer for houses.

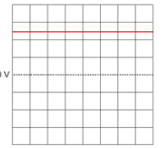
'Earthing' a safety device; Earth wire joins the metal case.

Mains supply
Frequency 50Hz, 230V

3 pin plug	Live - Brown	Carries p.d from mains supply.	p.d between live and earth = 230V
	Neutral - Blue	Completes the circuit.	p.d. = OV
	Earth – Green and Yellow stripes	Only carries current if there is a fault.	p.d. = 0V

Alternating current	Direct current
p.d. switches direction many times a second, current switches direction	p.d. remains in one direction, current flows the same direction
Generator.	Cell or battery.



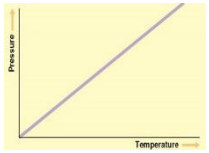


6.3 Particle model of matter

Particle model

State	Particle arrangement	Properties
Solid	Packed in a regular structure. Strong forces hold in place so cannot move.	Difficult to change shape.
Liquid	Close together, forces keep contact but can move about.	Can change shape but difficult to compress.
Gas	Separated by large distances. Weak forces so constantly randomly moving.	Can expand to fill a space, easy to compress.

Kinetic theory of gases



- Pressure of a fixed volume of gas increases as temperature increases (temperature increases, speed increases, collisions occur more frequently and with more force so pressure increases).
- Temperature of gas is linked to the average kinetic energy of the particles.
- If kinetic energy increases so does the temperature of gas.
- No kinetic energy is lost when gas particles collide with each other or the container.
- Gas particles are in a constant state of random motion.

Density

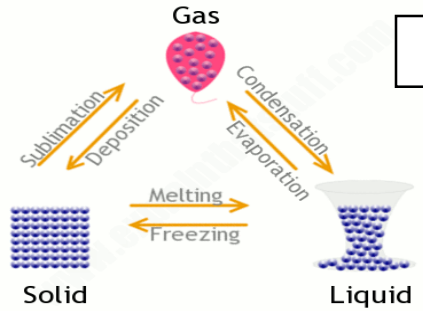
Density	Mass of a substance in a given volume

P = m ÷ V

Density = mass ÷ volume.

Change of state

Freezing	Liquid turns to a solid. Internal energy decreases.
Melting	Solid turns to a liquid. Internal energy increases.
Boiling / Evaporating	Liquid turns to a gas. Internal energy increases.
Condensation	Gas turns to a liquid. Internal energy decreases.
Sublimation	Solid turns directly into a gas. Internal energy increases.
Conservation of mass	When substances change state, mass is conserved.
Physical change	No new substance is made, process can be reversed.



Internal energy and energy transfers

Internal energy	Energy stored inside a system by particles	Internal energy is the total kinetic and potential energy of all the particles (atoms and molecules) in a system.
	Heating changes the energy stored within a system	Heating causes a change in state. As particles separate, potential energy stored increases. Heating increases the temperature of a system. Particles move faster so kinetic energy of particles increases.

Specific Heat Capacity	Energy needed to raise 1kg of substance by 1°C	Depends on: • Mass of substance • What the substance is • Energy put into the system.

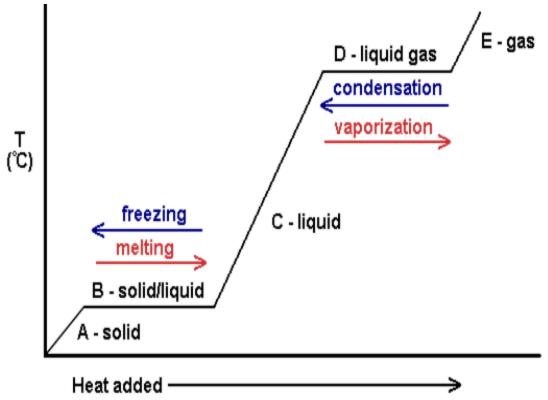
Change in thermal energy = mass **X** specific heat capacity **X** temperature change.

ΔE= m **X c X** Δθ

Specific Latent Heat	Energy needed to change 1kg of a substance's state
Specific Latent Heat of Fusion	Energy needed to change 1kg of solid into 1 kg of liquid at the same temperature
Specific Latent Heat of Vaporisation	Energy needed to change 1kg of liquid into 1 kg of gas at the same temperature

Energy needed = mass **X** specific latent heat.

ΔE= m X L

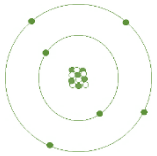


	Units
Density	Kilograms per metre cubed (kg/m³)
Mass	Kilograms (kg)
Volume	Metres cubed (m³)
Energy needed	Joules (J)
Specific latent heat	Joule per kilogram (J/kg)
Change in thermal energy	Joules (J)
Specific heat capacity	Joule per kilogram degrees Celsius (J/kg°C)
Temperature change	Degrees Celsius (°C)
Pressure	Pascals (Pa)

6.4 Atomic structure

Atoms and Isotopes

Radius of an atom 1 X 10^{-10}m



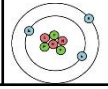
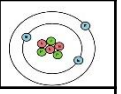
Electrons gained → Negative ion

Electrons lost → Positive ion

Atom	Same number of protons and electrons
Ion	Unequal number of electrons to protons
Mass number	Number of protons and neutrons
Atomic number	Number of protons

Atom structure

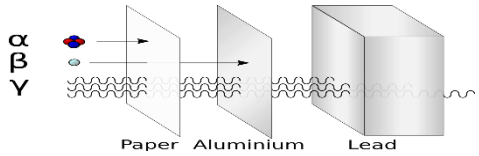
Particle	Charge	Size	Found
Neutron	None	1	In the nucleus
Proton	+	1	In the nucleus
Electron	-	Tiny	Orbits the nucleus

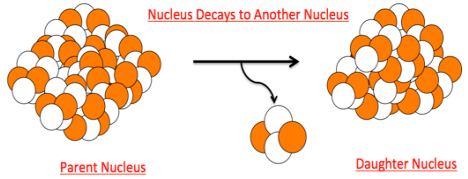
Isotope	$^{6}_{3}Li$		$^{7}_{3}Li$	
Different forms of an element with the same number of protons but different number of neutrons				

Discovery of the nucleus

Democritus	Suggested idea of atoms as small spheres that cannot be cut.
J J Thomson (1897)	Discovered electrons– emitted from surface of hot metal. Showed electrons are negatively charged and that they are much less massive than atoms.
Thomson (1904)	Proposed 'plum pudding' model – atoms are a ball of positive charge with negative electrons embedded in it.
Geiger and Marsden (1909)	Directed beam of alpha particles (He^{2+})at a thin sheet of gold foil. Found some travelled through, some were deflected, some bounced back.
Rutherford (1911)	Used above evidence to suggest alpha particles deflected due to electrostatic interaction between the very small charged nucleus, nucleus was massive. Proposed mass and positive charge contained in nucleus while electrons found outside the nucleus which cancel the positive charge exactly.
Bohr (1913)	Suggested modern model of atom – electrons in circular orbits around nucleus, electrons can change orbits by emitting or absorbing electromagnetic radiation. His research led to the idea of some particles within the nucleus having positive charge; these were named protons.
Chadwick (1932)	Discovered neutrons in nucleus – enabling other scientists to account for mass of atom.

Atoms and Nuclear Radiation





Decay	Range in air	Ionising power	Penetration power
Alpha	Few cm	Very strong	Stopped by paper
Beta	Few m	Medium	Stopped by Aluminium
Gamma	Great distances	Weak	Stopped by thick lead

Decay	Emitted from nucleus	Changes in mass number	Changes in atomic number
Alpha (α)	Helium nuclei ($^{4}_{2}He$)	-4	-2
Beta (β)	Electron ($^{0}_{-1}e$)	0	+1
Gamma (γ)	Electromagnetic wave	0	0
Neutron	Neutron	-1	0

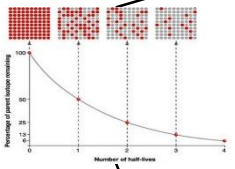
$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He$

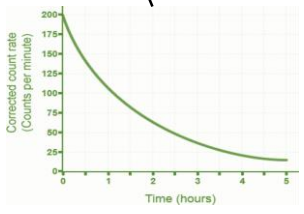
$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$

$^{99}_{43}Tc \rightarrow {}^{99}_{43}Tc + \gamma$

Contamination	Unwanted presence of radioactive atoms
Irradiation	Person is in exposed to radioactive source

Half life	The time taken to lose half of its initial radioactivity





Sievert	Unit measuring dose of radiation
Background	Constant low level environmental radiation, e.g. from nuclear testing, nuclear power, waste

Radioactive decay	Unstable atoms randomly emit radiation to become stable
Detecting	Use Geiger Muller tube
Unit	Becquerel
Ionisation	All radiation ionises