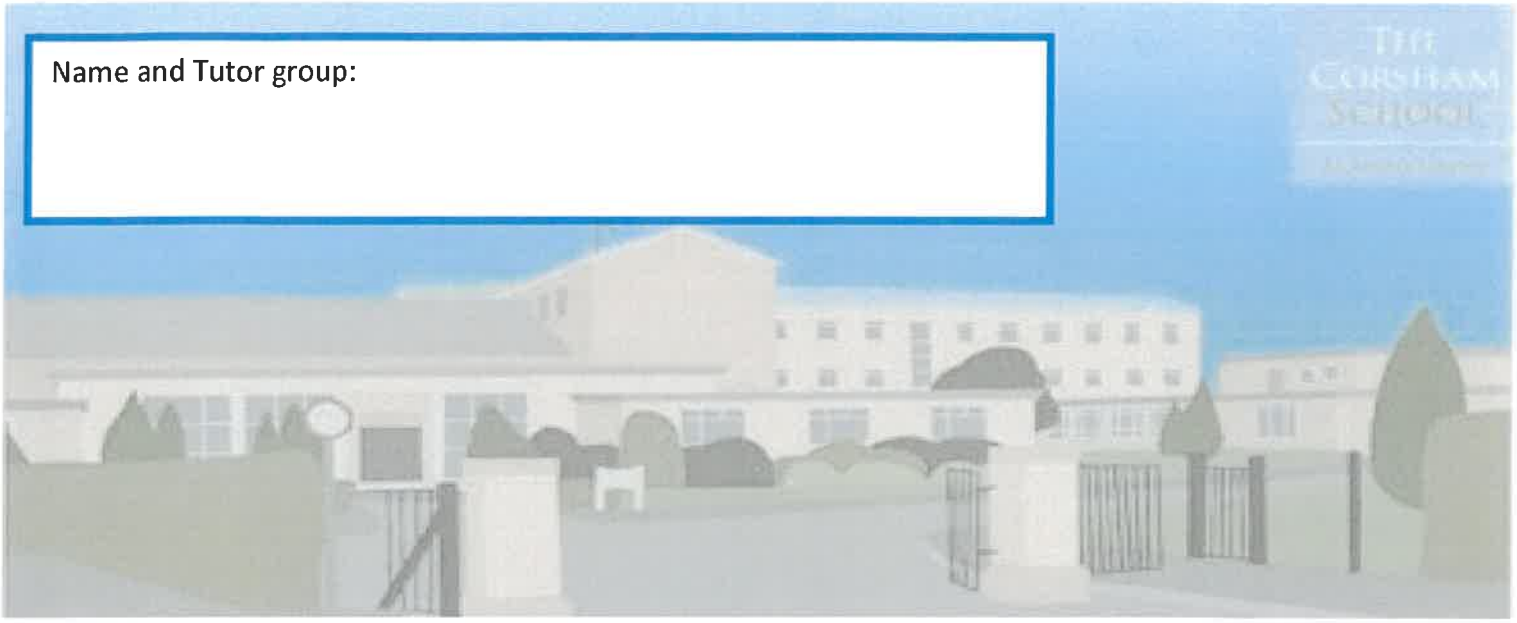
Name and Tutor group:



Year 9 Knowledge Organiser

Term 6

Contents

CORSHAM CHARACTER

INTELLECTUAL VALUES

The pursuit of truth, knowledge and understanding.

Be reflective. Be curious. Be open-minded. Be creative.

PERFORMANCE VALUES

Maximum effort, maximum focus.

Be resilient. Always Persevere. Contribute to Teamwork. Be ambitious.

DREAM BELIEVE ACHIEVE

Knowledge Organiser – Year 9 Art

"Transforming Reality" Surrealism Project

EXAMPLES OF FINAL OUTCOMES:

YOU WILL LEARN:

- What Surrealist Art is and its key concepts
- Famous Surrealist artists like Salvador Dal , Ren Magritte
- Concepts such as Metamorphosis, Distortion and Juxtaposition
- How to combine these new skills, more independently, to plan and create a personal response in a Surrealist portrait

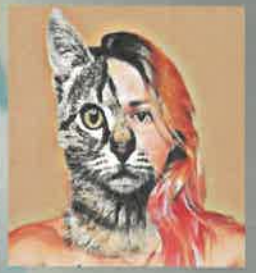
Why am I learning this?

- To understand the principles of Surrealism and apply them to portraiture
- To explore techniques such as metamorphosis, symbolism and unexpected juxtapositions
- To encourage creativity and self-expression

Homework Tasks:

Tick when complete ✓

1. Surrealist Eyes
2. Animal metamorphosis
3. Photomontage Portraits
4. Plans for own surreal composition



HOW WELL AM I DOING?

CONTEXTUAL KNOWLEDGE:

Salvador Dali

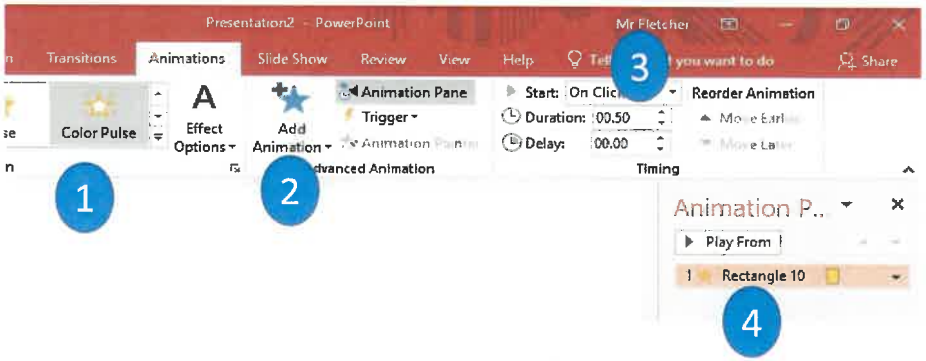
Ana Maria

- Ana Maria is a street artist who uses the metamorphosis theme of animal/human faces to produce her large-scale pieces
- Dali uses Symbolism and distortion to represent hidden depths to his paintings
- Magritte explores unexpected juxtapositions in his compositions to play with reality

Keywords

Surrealism	A style in art and literature in which ideas, images, and objects are combined in a strange way, like in a dream.
Portraits	A portrait is a painting, photograph, sculpture, or other artistic representation of a person
Metamorphosis	The transformation of something existing into something new
Distortion	A change, twist, or exaggeration that makes something appear different from the way it really is
Juxtaposition	The act or an instance of placing two or more things side by side often to compare or contrast or to create an interesting effect
Symbolism	The use of symbols or objects to represent deeper meanings or themes
Transform	To change completely the appearance or character of something or someone

Year 9 Computing - Interactive media



Animation in powerpoint

1. Use these to quickly add just one animation to a shape. They wont let you add more than one.
2. This button lets you add any animation to a shape. You can add more than one. Green means entrance effects, yellow is emphasis, red means exit effects and dotted lines are for movement
3. Choose when to start the animation
4. Shows all the animations on the slide in the order they will happen

Key vocabulary

Animation Visual effects used on objects such as text boxes or pictures. They allow these objects to be bought on and off the slide in a certain way

Audio Any type of sound, such as music or voiceover

Design Templates A variety of ready-made templates with custom formatting (font, colour scheme etc.) which gives a certain look and feel

Entrance Animation The animation used to bring an object (such as a picture or text box) onto the slide

Font A set of type which shows words and numbers in a particular style and size

Media Images, videos or sounds which can be added to a presentation

Presentation A visual way of displaying information to an audience that is clear and engaging. It can contain text, images and videos

Presentation Program A computer program, such as PowerPoint, which is used to create apresentation

Slide A single page within a presentation

Slideshow A collection of pages arranged in sequence that contains text and images to present to an audience. Often referred to as a PowerPoint presentation

Stock image Existing photos and images which are available and free to use

Text box A box in which text can be inputted and formatted

Text formatting When you change the format of text on a page, including the font, the size and whether it is bold, underlined or in italics

Transition The interesting effect used when one slide moves onto the next

WordArt A way to treat text as a graphic so that you can add special effects to text

'An Inspector Calls' by J.B. Priestley: A Knowledge Organiser

Characters

Inspector Goole	Priestley's mouthpiece; advocates social justice; serves as the Birlings' conscience	Socialist, moralistic, righteous, powerful, intimidating, unconventional, mysterious, imposing, sardonic, omnipotent
Mr. Arthur Birling	Businessman; capitalist; against social equality; a self-made man (new-money)	Capitalist, arrogant, foolish, Panglossian, emasculate, prejudice, ignorant, selfish, stubborn, vainglorious
Mrs. Sybil Birling	Husband's social superior; believes in personal responsibility	Arrogant, cold-hearted, insincere, prejudice, naïve, conformist, bitter, controlling, remorseless
Sheila Birling	Young girl; comes to change views and pities Eva; feels regret	Transformative, remorseful, socialist, pseudo-inspector, sensitive, astute, strong-minded, empowered
Eric Birling	Young man, drinks too much; forces himself on Eva Smith; regrets actions	Rebellious, reckless, immature, insubordinate, compulsive, desperate, disgraced, dualistic, irresponsible
Gerald Croft	Businessman; engaged to Sheila; politically closest to Birling	Aristocratic, evasive, secretive, dishonest, disingenuous, oleaginous, chivalric, privileged, pragmatic
Eva Smith	Unseen in play; comes to stand for victims of social injustice (changes her name to Daisy Renton	Suffragist, victim, emblematic, allegorical, vulnerable, desperate, socialist, moralistic, principled

Theatrical Stagecraft: Dramatic Devices

Dramatic irony	Birling's speeches, Mrs. Birling's witless implication of Eric
Stage directions	Instructions for the actors; often revealing – such as the lighting change when the Inspector arrives: "Pink and intimate then brighter and harder"
Setting	Constant throughout but subtle changes e.g. lighting; characters on/off stage
Tension	Builds up throughout the play ; interrogation of characters, personal relationships, secrecy
Cliff-hanger	Eric's reappearance in Act 3; the ending allows the audience to make up their minds
Foreshadowing	Symbolism (The Titanic), Mr. Birling's "knighthood", war
Time-lapse	Set in 1912, written in 1945; audience in a privileged position.
The 4th Wall	The Inspector's final speech addressed directly to audience.

Social, Historical and Literary Allusions

"the Titanic"	The Titanic sailed from Southampton and sank in the early hours of 15th April 1912. Priestley clearly wants his audience to see his drama play out against a background of real historical events and he has also chosen a moment in time when Birling's comments appear particularly ironic.
"Nobody wants war"	In reality, economic rivalry between the British Empire and the new German Empire was one of the many causes of the First World War.
"Russia"	The irony here suggests that Russia will have progressed further than other European countries by the 1940s.
"Bernard Shaws and H. G. Welles"	Both the noted Irish playwright George Bernard Shaw (1856-1950) and the father of science-fiction H. G. Wells (1866-1946) were well-known and outspoken socialists.

Plot

Act 1	Set in April 1912, Brumley, Midlands, UK. The Birling family and Gerald Croft are celebrating Sheila Birling's engagement to Gerald with a dinner. Mr Birling lectures his son, Eric Birling, and Gerald about the importance of every man looking out for himself if he wants to get on in life. Edna (the maid) announces that an inspector has arrived. Inspector Goole says that he is investigating the death of a young woman who committed suicide, Eva Smith. Mr Birling is shown a photograph of Eva, after initially denying recognising the woman in the photo, he remembers firing her in 1910 for organising a strike over workers pay. Sheila recalls also having Eva sacked about her manner when served by her in an upmarket department store. The Inspector reveals that Eva Smith changed her name to Daisy Renton. Gerald reveals to Sheila he had an affair with Daisy Renton.
Act 2	Gerald explains to The Inspector that he had an affair with Eva, but hasn't seen her since he ended their relationship back in Autumn 1911. Sheila gives her engagement ring back to Gerald. The Inspector turns his attention to Mrs Sybil Birling, she confesses that she also had contact with Eva, but Eva gave herself a different name to Mrs Birling. Eva approached a charity chaired by Mrs Birling to ask for help. Eva was desperate and pregnant but help was refused by Mrs Birling because she was offended by the girl calling herself 'Mrs Birling'. She tells Eva that the baby's father should be made entirely responsible. She also tells Inspector Goole that the father should be held entirely responsible and should be made an example of.
Act 3	

Key concepts and context: *Think about...*

1912	Set just before WWI and the sinking of the Titanic. A moment of rising international tensions and industrial expansion. End of Victorian era saw the demise of the rigid class system. Labour Party, founded in 1900, gaining momentum. The Russian Revolution began in 1917.
1945	People were recovering from six years of warfare, danger and uncertainty. Class distinctions greatly reduced as a result of two world wars. Women had a more valued place in society. Desire for social change. Following WW2, Labour Party won a landslide victory over Winston Churchill and the Conservatives.
Wealth, Power and Influence	The Birlings and the Crofts are representative of the wealthy upper-class. They all misuse their social influence to benefit themselves, their actions adversely affect the vulnerable people in society.
Blame and Responsibility	Who is to blame for Eva's death? Each of the Birlings contribute to a chain of events leading to the destruction of Eva Smith. What responsibilities do the characters have to each other? To society?
Public v Private	How do the public lives, the facades, of the Birlings juxtapose their private personas? What are their motivations for this? What are the repercussions, and for who?
Morality and Legality	What are the moral and legal laws of the society depicted in the play? How do they interweave? What actions do the characters undertake that are wrong, morally or legally?
Class Politics	How do the ideologies of capitalism and socialism collide in the play? Which characters are representative of which political allegiance? Is there a correlation between a character's political beliefs and their behaviours?
Prejudice	What are the prejudices held by the Birlings? What are their inherent views regarding class and status? How do they act on these prejudices, and what are the consequences?
Young v Old	What differences are evident between the younger and older generation? They react and behave differently throughout the play – why? What are their attitudes towards each other? What do they learn? Which characters change, and how?

Year 9 Food and Nutrition- Knowledge Organiser

Nutritional needs of people at different life stages	
Babies 0-1 year - Fast body growth and development. Energy needs increase with activity 	All nutrients, especially protein, vitamins and minerals Avoid adding sugar and salt to foods
Pre-school children 1-4 years - Fast body growth and development. A lot of energy is used in play.	All nutrients, especially protein, vitamins and minerals but Limit sugar & salt.
Children 5-12 years - Growth continues in spurts. Physical activity most of the time to prevent becoming overweight.	All nutrients, especially protein, vitamins and minerals Limit the number of free sugars and salt in foods and drinks
Teenagers - Fast body growth and development from child to adult. Minerals are put into the bones and teeth; Females start to have periods. Lack of sleep and pressures of school may lead to lack of energy and poor concentration	All nutrients, especially protein, vitamins and minerals Limit the number of free sugars and salt in foods and drinks 
Adults - Body stops growing at 21 years of age and needs to looked after to maintain health, prevent disease and be active Weight gain if the diet is unbalanced and not active	All nutrients, especially protein, vitamins and minerals 
Older adults The body needs to be looked after. Memory may become poor. Bones & teeth gradually start to lose minerals, and osteoporosis may develop.	All nutrients, especially protein, vitamins and minerals. Limit fatty and sugary foods to prevent weight gain.

Sustainable food – Sustainable food is food that is produced, processed, distributed, and disposed of in ways that are environmentally friendly and contribute to a healthy and nutritious food system. These food are unlikely to run out.




Nutrient	Functions - Why do we need it?	Sources
Carbs	Carbohydrates give us energy. Sugary ones give us quick release energy. Starchy ones give us slow release.	Bread, rice, pasta, potatoes
Protein	Needed for the growth and repair of our bodies and can also be used for energy.	Meat, fish, dairy products, tofu, soya, Quorn, nuts, sees, lentils
Fat	These keep us warm, protect us and provides our bodies with energy	Butter, oil, processed foods e.g. crisps, chips, chocolate, cake.
Water	Keeps us hydrated and keeps our body's working properly.	Fruit and vegetables, water, fruit juices, milk.
Vitamins	These are needed generally to keep us healthy. The allow all the chemical reactions in our body and protect us from diseases.	Fruit, vegetables, cereals, dairy products
Minerals	Helps build bones and teeth and allow muscles to work properly.	Green vegetables, dairy products and red meat
Fibre	These are needed to keep our digestive system working (help us go to the toilet) and helps to fill us up.	Wholegrain cereals, brown rice, pasta, bread, fruit, vegetables

Food Miles is the distance food travels from where it is grown to where it is purchased by the customer. The closer it is, the less damage to our environment.

Seasonality refers to the time of year when the food is at its peak, either in terms of harvest or flavour. This is usually when the product is cheapest and freshest.

Overfishing occurs when too many fish are caught at once, so the breeding population becomes too depleted to recover. It endangers ocean ecosystems and the billions of people who rely on seafood as a key source of protein. Buying fish with the blue **Marine Stewardship Council (MSC)** label, means the fish has been caught sustainably.

Fairtrade is a way of buying and selling products that ensure that the people who produce the goods receive a fair price. Fair trade brings a better standard of living for poor farmers in developing countries.

Keywords
Micronutrient, macro nutrient, sustainable food, seasonal food, food miles, fairtrade, overfishing, special diet.

Year 9 Electronics

DESIGN AND TECHNOLOGY

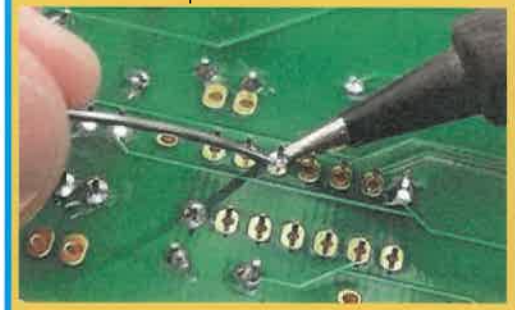
Tools and Equipment

Tools used for Soldering

Soldering iron, stand, sponge and heat mat		Electrically heated tip used to melt solder onto joint or PCB. Damp sponge used to clean the tip.
Side cutters		Cuts components or wire.
Helping hands tool		Holds wire, components or board whilst soldering.
Solder		Solder helps to connect components.
Wire Strippers		Used to remove the outer plastic layer of wires.

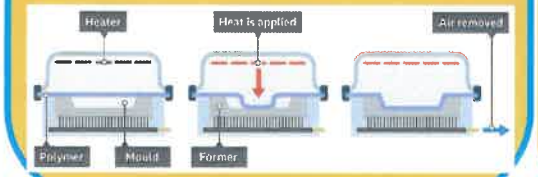
Soldering

Soldering is used to connect two or more contacts so that electricity can flow between components.



Vacuum Forming

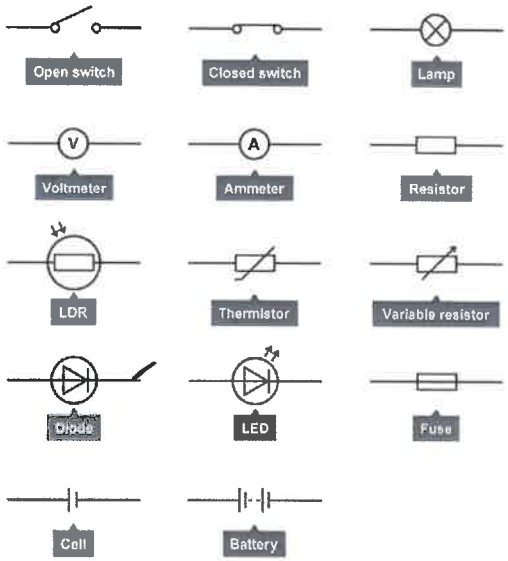
Vacuum forming is a polymer process. A sheet of thermoplastic is heated and pressed onto the former (mould) to create a shape.

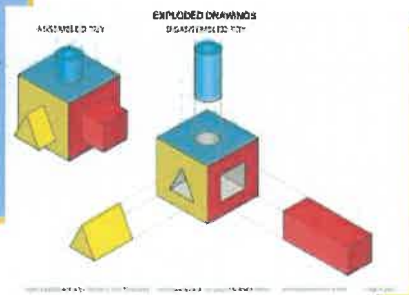


Keywords

- Cell
- Battery
- Resistor
- Lamp
- Circuit
- Buzzer
- Systems
- Input
- Output
- Switch
- Solder
- Wire Strippers
- Side Cutters
- Vacuum Former
- Mould
- Draft Angle
- HIPs

Circuit diagrams use simplified universal symbols to represent the electronic circuit and its components. These are some of the symbols used.





Memphis design movement

Established in the 1980s. Composed of designers based in Italy. Memphis designers, regarded aesthetics as the most important aspect of a product, not its function. Memphis designs/products can be regarded as pieces of art or exhibition pieces, not useable, practical items.

Ettore Sotsass

Maths in DT:

- Multiplication
- Divide
- Add / Subtract
- Measurement conversion
- Ratios
- Percentages
- Surface area

What is good design?

- Clear ideas
- Annotations
- Measurements
- Content
- Presentation
- Balance

Health and Safety in DT:

- Listen to your teacher's instructions
- Always wear an apron
- Long hair should be tied back
- Don't use equipment you are not trained on
- Always stand up during practical lessons
- When using machines, always wear safety glasses
- Only use the stop button in an emergency
- Work quietly and be sensible and careful at all times

KS3 Year 8/9 Design and Technology CAD CAM: Board Games

CAD: Computer Aided Design
CAM: Computer Aided Manufacture

Adobe Illustrator

Adobe Illustrator is the industry-leading graphic design tool that is a professional vector-based design and drawing program. Used as part of a larger design workflow, Illustrator allows for the creation of everything from single design elements to entire compositions.

TinkerCAD

Is a 3D modelling platform that has been launched by AutoDesk – a industry leading program. It allows you to create 3D models on the computer.

Key words

Vector	CAD/CAM	Automation
3D printing	Illustrator	Additive
Graphics	TinkerCAD	ACCESSFM

3D printing

3D printing is an additive technology used to manufacture parts. It is 'additive' in that it doesn't require a block of material or a mold to manufacture physical objects, it simply stacks and fuses layers of material. It's typically fast, with low fixed setup costs, and can create more complex geometries than 'traditional' technologies, with an ever-expanding list of materials. It is used extensively in the engineering industry, particularly for prototyping and creating lightweight geometries.

Tools and Equipment		
CAD CAM		
3D printer		3D printing or additive manufacturing is the construction of a three-dimensional object from a CAD model or a digital 3D model.
Template		A template is a tool used to mark out shapes repeatedly

Maths in DT:
Multiplication
Divide
Add / Subtract
Measurement conversion
Ratios
Percentages
Surface area

What is good design?
Clear ideas
Annotations
Measurements
Content
Presentation
Balance

Year 7 / 9 D&T RESISTANT MATERIALS

UCD &Modelling: Playgrounds

Tools and Equipment

Measuring and marking

Steel rule		An accurate tool for measuring and marking out.
Set square		A ruler to ensure you measure and mark accurate 45 / 90 degree angles.
Template		A template is a tool used to mark out shapes repeatedly

Card shaping and adhesives

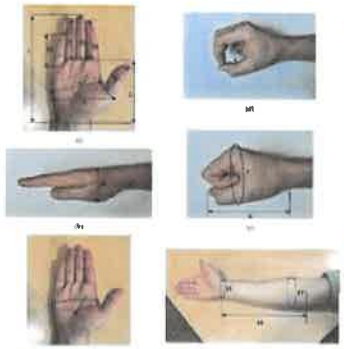
Slot		A joining technique to join card.
Curve cut		Kerf cutting (partial cuts) will ensure a smoother curve in the card.
Tabs		Tabs help to join the card components together.
Hot glue gun		An adhesive which joins card.
Masking tape		A temporary adhesive which joins card / paper.

Anthropometrics

Anthropometrics is the collection of maximum and minimum measurements of a target market. The data can be used to work out the dimensions of a product.

Ergonomics

Ergonomics Testing and analysing how a person interacts with the product can improve its ***functionality*** and how it fits into its surroundings.



Maths in DT:

Multiplication / Divide
Add / Subtract
Measurement conversion
Ratios /Percentages

Cutting

Craft knife		A tool for precision cutting. This tool is used for accurate cutting of paper and card. Can cut in a straight or curved line.
Paper scissors		A tool for cutting paper or board.

Materials

Single corrugated card		Corrugations make the card strong.
Card		A compliant material which comes in a variety of colours .

Keywords

Modelling Iterative designs UCD
User needs Reformulate Creativity
Functional Innovative Anthropometrics
Ergonomics Social Client Testing
Evaluation

We use **ACCESS FM** to help us write a **specification** - a list of requirements for a design - and to help us **analyse and describe** an already existing product.

ACCESS FM - Helpsh

- **A** is for **Aesthetics** — Aesthetics means what does the product look like? What is the: Colour? Shape? Texture? Pattern? Appearance? Feel? Weight? Style?
- **C** is for **Cost** — Cost means how much does the product cost to buy? How much does it: Cost to buy? Cost to make? How much do the different materials cost? Is it good value?
- **C** is for **Customer** — Customer means who will buy or use your product? Who will buy your product? Who will use your product? What is their: Age? Gender? What are their: Likes? Dislikes? Needs? Preferences?
- **E** is for **Environment** — Environment means will the product affect the environme Is the product: Recyclable? Reusable? Repairable? Sustainable? Environmentally friendly? Bad for the environment? **6R's of Design:** Recycle / Reuse / Repair / Refrain / Reduce / Re
- **S** is for **Size** — Size means how big or small is the product? What is the size of the product in millimeters (mm)? Is this the same size as similar products? Is it comfortable to use? Does it fit? Would it be improved if it was bigger or smaller?
- **S** is for **Safety** — Safety means how safe is the product when it is used? Will it be safe for the customer to use? Could they hurt themselves? What's the correct and safest way to use the product? What are the ri
- **F** is for **Function** — Function means how does the product work? What is the products job and role? What is it needed for? How well does it work? How could it be improved? Why is it used this way?
- **M** is for **Material** — Material means what is the product made out of? What materials is the product made from? Why were these materials used? Would a different material be better? How was the product made? What manufacturing techniques were used?

Health and Safety in DT:

- Listen to your teacher's instructions
- Always wear an apron
- Long hair should be tied back
- Don't use equipment you are not trained on
- Always stand up during practical lessons
- When using machines, always wear safety glasses
- Only use the stop button in an emergency
- Work quietly and be sensible and careful at all times

Using quotations and useful phrases

When quoting, remember to:

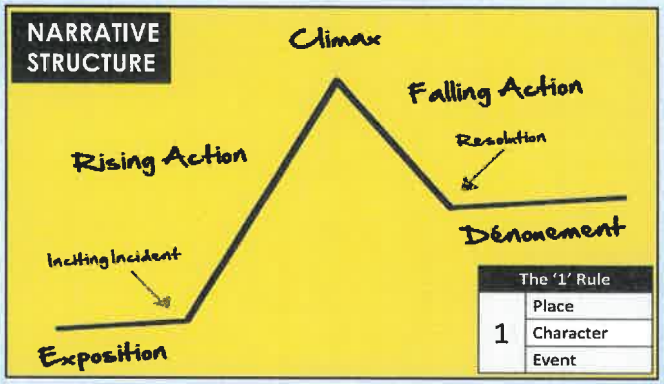
- use quotation marks
- quote accurately
- quotes of three words or fewer can be used in the sentence you are writing - for example, when the writer talks about the 'futility of life' he means...
- short, well-chosen quotations are better than long ones , so that you can give more precise analysis

If you are commenting on implicit meaning use some of these phrase to introduce analysis:

- this implies
- this suggests
- which gives the impression that
- possibly
- perhaps
- this indicates that
- this shows
- obviously

Use **connectives** to build your analysis:

- however
- therefore
- in contrast
- because
- but
- and
- furthermore
- also
- then
- at first



NARRATIVE VOICE

A story has to be 'told' to the reader and a 'narrator' is needed to do this. A narrator's voice can be first, second or third person.

First person: 'I' or 'we' to tell the story. In this case, the narrator is a character and you will read about events from their point of view. You are more likely to be able to relate to and sympathise with their feelings because of this.

Second person: 'you'. It is not often used in fiction texts and it's rare to find a story written entirely from this perspective (*try writing a piece in the second person to see how difficult it is*). However, some fiction texts, such as gamebooks (choose your own adventure) use this perspective.

Third person: 'he', 'she', 'it' or 'they'. The narrator of the story will usually be the writer. Some texts will give many different characters' viewpoints, but others will focus on one character, the hero or heroine, and the reader will usually relate to and sympathise with them more than others.

EXPLICIT V's IMPLICIT

Explicit meaning describes something that is very clear and without vagueness or ambiguity.

Implicit meaning often functions as the opposite, referring to something that is understood, but not described clearly or directly, and often using implication or assumption.

METHODS	DEFINITION
Allegory	Extended metaphor in which a symbolic story is told
Hyperbole	An exaggeration.
Imagery	Visually descriptive language
Motif	A recurring set of words/phrases or imagery for effect
Metaphor	a figure of speech that describes an object or action in a way that isn't literally true.
Onomatopoeia	A word that imitate the sound it represents.
Personification	A figure of speech in which an object is given human feelings, thoughts or attitudes.
Simile	A comparison that uses 'like' or 'as'.
Symbolism	Use of symbols to represent ideas or qualities

Enquiry: How significant are acts of terror?

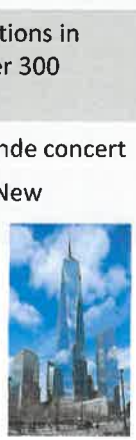
Outline: throughout history, some political groups have used desperate and radical methods to gain attention and achieve their aims. Groups like the PLO, the IRA and al-Qaeda have committed acts of terror for a wide range of reasons.

Date	Event	Summary
1972	Munich Olympics	Israeli athletes kidnapped by a PLO group called Black September. 11 were killed.
1984	Brighton bomb	The IRA attacked the Conservative Party conference, killing five. The prime minister, Margaret Thatcher was nearly one of the victims.
1998	Good Friday Agreement	Peace agreement involving the IRA and the British government that brought peace to N. Ireland.
2001	9/11	Al-Qaeda organised attack on major sites in the USA, including the World trade Centre in New York and the Pentagon. Nearly 3,000 died and 6,000 were injured.
2005	7/7	Al-Qaeda inspired attack on four locations in London where 52 were killed and over 300 injured.
2017	Manchester	An extremist attack on an Ariana Grande concert
2019	Christchurch attack	An extremist attack on mosques in New Zealand where 51 were killed.

Furthering learning

Want to find out more about 20th century Terrorism?

Prior learning:
Radicalisation
Nationalism
Ideology
Empire



History – Year 9
Knowledge Organiser
Topic 5

Key individuals

Tom Burnett. On board UA Flight 93, he realised that the plane had been hijacked in 9/11. He led a group of passengers who stormed the cockpit and stopped the plane being used in the terror attack.

Yitzhak Rabin. Leader of Israel who tried to bring peace to Israel by working with the PLO. He signed the Oslo Accords for peace in 1994. In 1995 he was assassinated by someone who disagreed with the peace.

John Hume. Dedicated his life to achieving peace in N. Ireland. He was crucial to the Good Friday Agreement which officially ended "The Troubles" and he won three major peace awards.

Jacinda Ardern. Prime minister of New Zealand whose response to the Christchurch terror attack of 2019 was held as a positive example of how to support those affected and condemn the perpetrator; she refused to name him.

Key vocabulary:

Al-Qaeda: an international terror organisation whose aim is to reduce western (especially American) influence around the world.
Cold War: when the USA and the USSR competed to be the top superpower in the world.
Conspiracy theory: a belief that there has been a cover-up over an extremely shocking or unexplained event.
Extremist: someone who uses radical tactics and has radical ideas about world politics.
IRA: Irish terrorist organisation who fought for a united Ireland and greater rights for nationalists in Northern Ireland.
ISIS: often called Islamic State. A terrorist organisation whose main aim is to end western influence internationally.
Loyalist: in Irish politics, someone who wants to keep N. Ireland within the UK and will use violence to achieve this.
Paramilitary: a group who uses violence and military tactics to achieve its aims.
PLO: Palestinian organisation who fought for the rights of the Palestine people in Israel, using terror tactics to gain attention.
Radicalisation: when an individual is influenced, often through propaganda, to join a terror group and use methods of terror.
Republican: in Irish politics, someone who wants a united Ireland and will use force to achieve this.
Right-wing terrorism: aim to overthrow democracy and set up dictatorships. Often want to harm the rights of minorities.
Terrorism: violent actions which hurt and scare people; often the aim is to achieve political goals.
Terrorist: someone who uses terror tactics to try and achieve their aims.
UDF: one of the loyalist paramilitary groups in N. Ireland who fought to keep N Ireland as part of the UK.

Enquiry: How significant are acts of terror?

History – Year 9
Knowledge Organiser
Topic 5

Historical skill focus: significance

- What makes a person/event significant?
- How can we judge significance?

Section A: Can you explain significance?

Answer the following question. You could **write one or two paragraphs** to explain.

⑩ How significant have the actions of terrorist groups been?

What to focus on:	Starting sentences
One or two reasons why an event was significant. Think about what makes it important; what happened? Who did it impact? Think about the impact on them and the impact on others.	One reason why this were significant was... This makes it significant because...

Developing	Secure	Exceeding
I can explain more than one reason for the significance of individuals in a PEE paragraph. I am beginning to compare different types of significance.	I can explain and compare several reasons for significance in a PEEL paragraph I am beginning to categorise for short and long term significance. I am beginning to judge on which is most significant area.	I can explain and compare several reasons for significance in a PEEL paragraph I can categorise for short and long term significance. I can accurately judge which is most significant area.

Point = One reason for the significance of terrorist groups is...
Evidence = This is shown by when they...
Explain = This is significant because...

YEAR 9 — REPRESENTATIONS...

Probability

@whisto_maths

What do I need to be able to do?

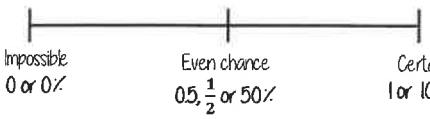
By the end of this unit you should be able to:

- Find single event probability
- Find relative frequency
- Find expected outcomes
- Find independent events
- Use diagrams to work out probabilities

Keywords

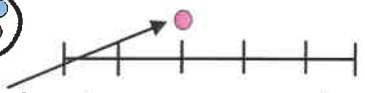
Probability: the chance that something will happen
Relative Frequency: how often something happens divided by the outcomes
Independent: an event that is not effected by any other events.
Chance: the likelihood of a particular outcome.
Event: the outcome of a probability — a set of possible outcomes.
Biased: a built in error that makes all values wrong by a certain amount.

The probability scale



The more likely an event the further up the probability it will be in comparison to another event (It will have a probability closer to 1)

There are 2 pink and 2 yellow balls, so they have the same probability



There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

Single event probability

Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{1}{5}$
∴The probability of NOT getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is **1**

The table shows the probability of selecting a type of chocolate

Dark	Milk	White
0.15	0.35	

P(White chocolate) = 1 – 0.15 – 0.35
= 0.5

Relative Frequency

$$\frac{\text{Frequency of event}}{\text{Total number of outcomes}}$$

Remember to calculate or identify the overall number of outcomes!

Colour	Frequency	Relative Frequency
Green	6	0.3
Yellow	12	0.6
Blue	2	0.1
	20	

Relative frequency can be used to find expected outcomes

e.g. Use the relative probability to find the expected outcome for green if there are 100 selections.

Relative frequency x Number of times
$0.3 \times 100 = 30$

Expected outcomes

Expected outcomes are estimations. It is a long term average rather than a prediction.

Dark	Milk	White
0.15	0.35	0.5

The sum of the probabilities is 1

An experiment is carried out **400** times.
Show that dark chocolate is expected to be selected **60** times

$0.15 \times 400 = 60$

Independent events

The rolling of one dice has no impact on the rolling of the other. The individual probabilities should be calculated separately

Probability of event 1 × Probability of event 2

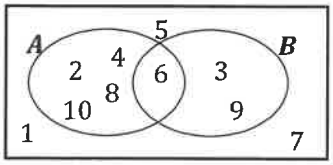
$P(5) = \frac{1}{6}$ $P(R) = \frac{1}{4}$

Find the probability of getting a 5 and a red

$P(5 \text{ and } R) = \frac{1}{6} \times \frac{1}{4} = \frac{1}{24}$

Using diagrams

Recap Venn diagrams, Sample space diagrams and Two-way tables



	Car	Bus	Walk	Total
Boys	15	24	14	53
Girls	6	20	21	47
Total	21	44	35	100

The possible outcomes from rolling a dice

The possible outcomes from tossing a coin

	1	2	3	4	5	6
H	1,H	2,H	3,H	4,H	5,H	6,H
T	1,T	2,T	3,T	4,T	5,T	6,T

YEAR 9 — REPRESENTATIONS...

Algebraic Representation

@whisto_maths

What do I need to be able to do?

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

- Draw quadratic graphs
- Interpret quadratic graphs
- Interpret other graphs including reciprocals
- Represent inequalities

Keywords

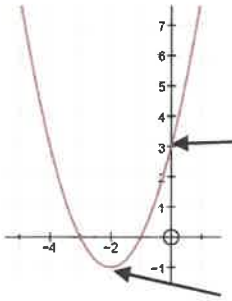
Quadratic: a curved graph with the highest power being 2. Square power.
Inequality: makes a non equal comparison between two numbers
Reciprocal: a reciprocal is 1 divided by the number
Cubic: a curved graph with the highest power being 3. Cubic power.
Origin: the coordinate (0, 0)
Parabola: a 'u' shaped curve that has mirror symmetry

Quadratic Graphs

$y = x^2 + 4x + 3$

If x^2 is the highest power in your equation then you have a quadratic graph

It will have a parabola shape



Intersection with the y axis

Substitute the x values into the equation of your line to find the y coordinates

x	-4	-3	-2	-1	0	1
y	3	0	-1	0	3	8

Coordinate pairs for plotting $(-3, 0)$

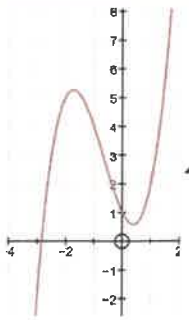
Plot all of the coordinate pairs and join the points with a curve (freehand)

Quadratic graphs are always symmetrical with the turning point in the middle

Interpret other graphs

Cubic Graphs

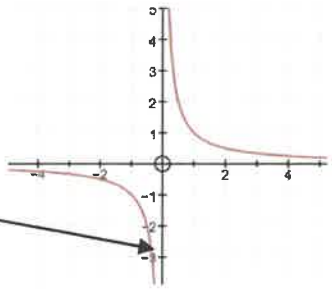
$y = x^3 + 2x^2 - 2x + 1$



If x^3 is the highest power in your equation then you have a cubic graph

Reciprocal Graphs

$y = \frac{1}{x}$

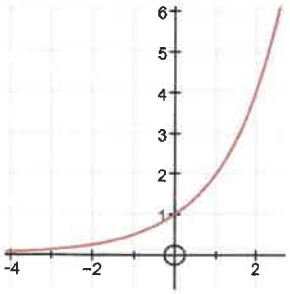


Reciprocal graphs never touch the y axis.
This is because x cannot be 0
This is an asymptote

Exponential Graphs

$y = 2^x$

Exponential graphs have a power of x

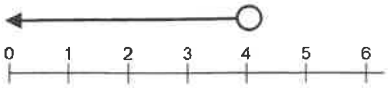


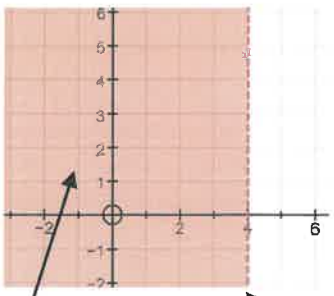
Represent Inequalities

Multiple methods of representing inequalities

$x < 4$

All values are less than 4



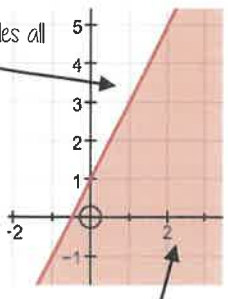


The shaded area indicates all possible values of x

The dotted line shows that the inequality does not include these points

The solid line shows that the inequality includes all the points on this line

$y \geq 2x + 1$

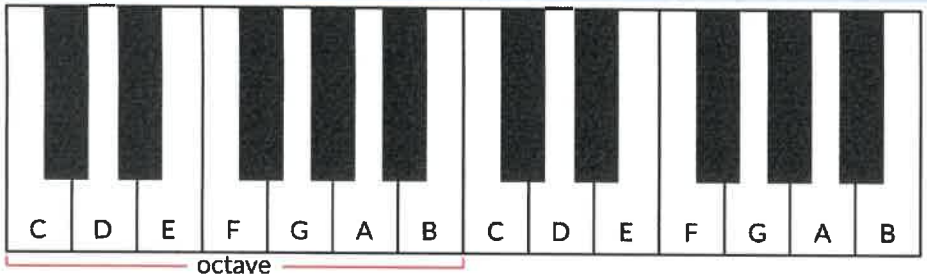


The shaded area indicates all possible solutions to this inequality

KEYBOARD SKILLS

Exploring Treble Clef Reading and Notation

A. Layout of a Keyboard/Piano



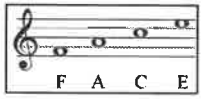
A piano or keyboard is laid out with **WHITE KEYS** and Black Keys (see section G). C is to the left of the two Black Keys and the notes continue to G then they go back to A again. Notes with the same letter name/pitch are said to be an **OCTAVE** apart. **MIDDLE C** is normally in the centre of a piano keyboard.

B. Treble Clef & Treble Clef Notation

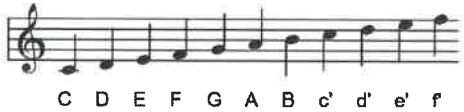
A **STAVE** or **STAFF** is the name given to the five lines where musical notes are written. The position of notes on the stave or staff shows their **PITCH** (how high or low a note is). The **TREBLE CLEF** is a symbol used to show high-pitched notes on the stave and is *usually* used for the right hand on a piano or keyboard to play the **MELODY** and also used by high pitched instruments such as the flute and violin. The stave or staff is made up of 5 **LINES** and 4 **SPACES**.

Every Green Bus Drives Fast.

Notes in the **SPACES** spell **"FACE"**

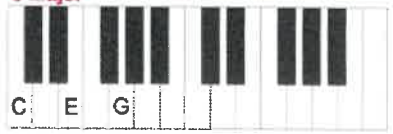


Notes from **MIDDLE C** going up in pitch (all of the white notes) are called a **SCALE**.

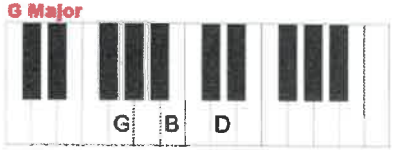


C. Keyboard Chords

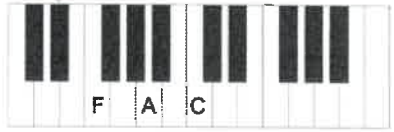
C Major



G Major



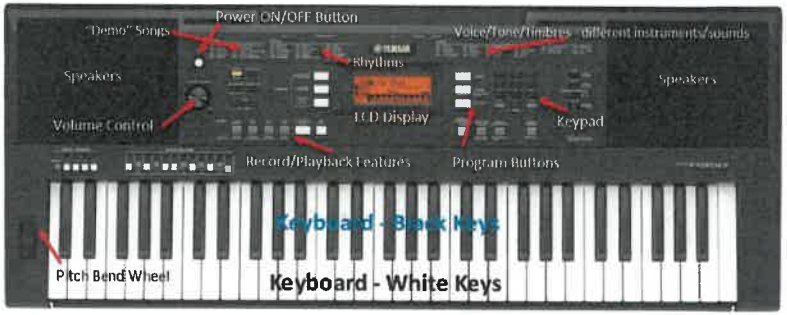
F Major



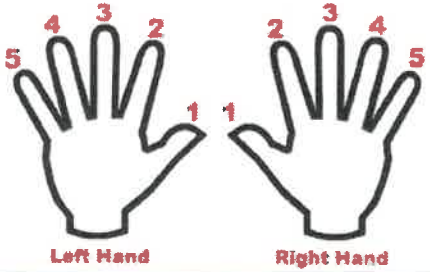
A Minor

Play one – Miss one – play one – miss one – play one

D. Keyboard Functions

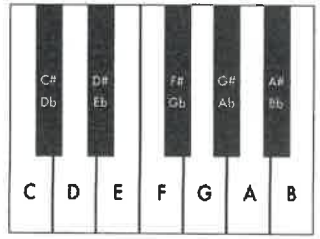


E. Left Hand/Right Hand (1-5)



F. Black Keys and Sharps and Flats

There are five different black notes or keys on a piano or keyboard. They occur in groups of two and three right up the keyboard in different pitches. Each one can be a **SHARP** or a **FLAT**. The # symbol means a **SHARP** which raises the pitch by a semitone *(e.g. C# is higher in pitch (to the right) than C)*. The *b* symbol means a **FLAT** which lowers the pitch by a semitone *(e.g. Bb is lower in pitch (to the left) than B)*. Each black key has 2 names – C# is the same as D*b* – there's just two different ways of looking at it! Remember, black notes or keys that are to the RIGHT of a white note are called SHARPS and black notes to the LEFT of a white note are called FLATS.



Year 9 Terms 5 and 6: What does it mean to be human?

Building on the previous two Y9 modules as well as prior learning in other years on religious attitudes, this module looks to lead you into what will be the culmination of your KS3 Philosophy and Beliefs education. It specifically focuses on humanity both from the position of both an individual and a collective, comparing and contrasting different philosophical and religious views in order to explore the value and nature life, contrasting the prior module which viewed life from view of death. This will be done by exploring notions of 'free will', understanding differing religious views to the meaning for life while also analysing the uniqueness of humanity amongst other things. As with all modules, the aim is not only to ensure learners have a strong theoretical understanding of the different views, but are able to explore and rationalise their own views in an articulate and academic manner.

Personal Learning checklist:

○ What makes you, you? ○ How much is a human worth? ○ Are humans special? ○ What is the meaning of life?	○ How free are we really? ○ What does the future hold for humanity?

Assessment: To create a piece of art entitled 'Person' based on everything you have learnt in this topic and from previous topics i.e. Buddhism, Christianity, worship, belief and actions, suffering, evil, existence of God, morality and life after death

Keywords for this unit:

Materialist View*	The only things that exists in the world is the physical stuff	*Utopia/Dystopia*	An imagined place or state of things in which everything is perfect or far from perfect.
Personhood	What makes a person, a person?	*Existentialism**	The philosophical belief we are each responsible for creating purpose or meaning in our own lives (not God)
Uniqueness of Humanity	A socially learned and culturally-specific sense of humanness involving qualities that distinguish humans from other animals	*Absurdism*	e belief that the universe is irrational and meaningless and that the search for order brings the individual into conflict
Purpose of Life	The central motivating aims of your life	*Utilitarianism**	An action is right in so far as it promotes happiness, and that the greatest happiness of the greatest number should be the guiding principle.
*Determinism**	The thesis that all events in the universe, including human decisions and actions, are causally inevitable.	Eudamonia*	Human Flourishing. he highest good humans could strive toward – or a life 'well lived
*Free Will**	voluntary choice or decision	*Evolution**	differential survival of organisms following their naturally occurring variation—a process Darwin termed "natural selection"
*Sanctity of Life**	Human life is sacred and is a gift from God	*Ātman**	The personal soul or self (Hinduism)

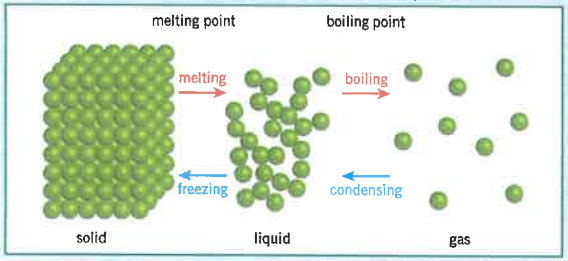
*Asterixed words are word that you have already encountered in K33

Chapter 3: Bonding 1

Knowledge organiser

Particle model

The three states of matter can be represented in the particle model.



(HT only) This model assumes that:

- there are no forces between the particles
- that all particles in a substance are spherical
- that the spheres are solid.

The amount of energy needed to change the state of a substance depends on the forces between the particles. The stronger the forces between the particles, the higher the melting or boiling point of the substance.

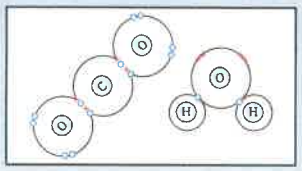
Covalent bonding

Atoms can share or transfer electrons to form strong chemical bonds.

A **covalent bond** is when electrons are *shared* between **non-metal** atoms.

The number of electrons shared depends on how many extra electrons an atom needs to make a full outer shell.

If you include electrons that are shared between atoms, each atom has a full outer shell.
Single bond = each atom shares one pair of electrons.
Double bond = each atom shares two pairs of electrons.



Covalent structures

There are three main types of covalent structure:

Structure and bonding

Giant covalent

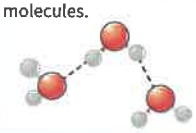
Many billions of atoms, each one with a strong covalent bond to a number of others.

An example of a giant covalent structure is diamond.

Small molecules

Each molecule contains only a few atoms with strong covalent bonds between these atoms. Different molecules are held together by weak **intermolecular forces**.

For example, water is made of small molecules.



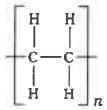
Large molecules

Many repeating units joined by covalent bonds to form a chain.

The small section is bonded to many identical sections to the left and right. The 'n' represents a large number.

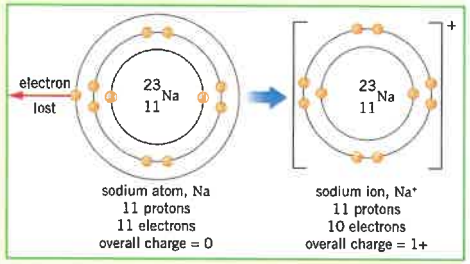
Separate chains are held together by intermolecular forces that are stronger than in small molecules.

Polymers are examples of long molecules.



Ions

Atoms can gain or lose electrons to give them a full outer shell. The number of protons is then different from the number of electrons. The resulting particle has a charge and is called an **ion**.



Conductivity

Solid ionic substances do not conduct electricity because the ions are fixed in position and not free to carry charge.

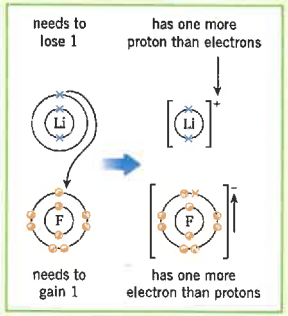
When melted or dissolved in water, ionic substances do conduct electricity because the ions are free to move and carry charge.

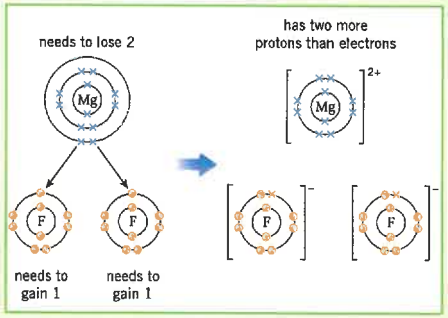
Melting points

Ionic substances have high melting points because the electrostatic force of attraction between oppositely charged ions is strong and so requires lots of energy to break.

Ionic bonding

When metal atoms react with non-metal atoms they **transfer** electrons to the non-metal atom.

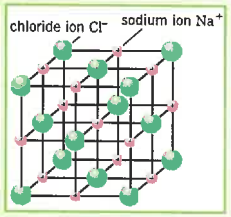




Metal atoms lose electrons to become positive ions. Non-metal atoms gain electrons to become negative ions.

Giant ionic lattice

When metal atoms transfer electrons to non-metal atoms you end up with positive and negative ions. These are attracted to each other by the strong **electrostatic force of attraction**. This is called ionic bonding.

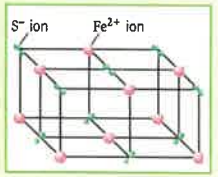


The electrostatic force of attraction works in all directions, so many billions of ions can be bonded together in a 3D structure.

Formulae

The formula of an ionic substance can be worked out

1. from its bonding diagram:
   for every one magnesium ion there are two fluoride ions – so the formula for magnesium fluoride is MgF_2
2. from a lattice diagram:
   there are nine Fe^{2+} ions and 18 S^- ions – simplifying this ratio gives a formula of FeS_2



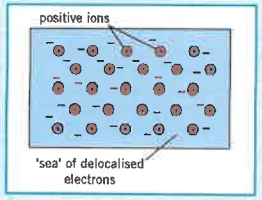
Metals: structure and properties

The atoms that make up metals form layers. The electrons in the outer shells of the atoms are **delocalised** – this means they are free to move through the whole structure.

The positive metal ions are then attracted to these delocalised electrons by the electrostatic force of attraction.

Some important properties of metals are:

- pure metals are **malleable** because the layers can slide over each other
- they are good **conductors** of electricity and of thermal energy because delocalised electrons are free to move through the whole structure
- they have high melting and boiling points because the electrostatic force of attraction between metal ions and delocalised electrons is strong so lots of energy is needed to break it.



Chapter 3: Bonding 2

Knowledge organiser

Properties

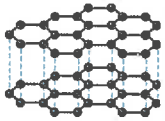
High melting and boiling points because the strong covalent bonds between the atoms must be broken to melt or boil the substances. This requires a lot of energy. Solid at room temperature.	Low melting and boiling points because only the intermolecular forces need to be overcome to melt or boil the substances, not the bonds between the atoms. This does not require a lot of energy as the intermolecular forces are weak. Normally gaseous or liquid at room temperature.	Melting and boiling points are low compared to giant covalent substances but higher than for small molecules. Large molecules have stronger intermolecular forces than small molecules, which require more energy to overcome. Normally solid at room temperature.

Most covalent structures do not conduct electricity because they do not have **delocalised electrons** or ions that are free to move to carry charge.

Graphite

Graphite is a giant covalent structure, but is different to other giant covalent substances.

Structure



Made only of carbon – each carbon atom bonds to three others, and forms hexagonal rings in layers. Each carbon atom has one spare electron, which is delocalised and therefore free to move around the structure.

Hardness

The layers can slide over each other because they are not covalently bonded. Graphite is therefore softer than diamond, even though both are made only of carbon, as each atom in diamond has four strong covalent bonds.

Conductivity

The delocalised electrons are free to move through graphite, so can carry charges and allow an electrical current to flow. Graphite is therefore a conductor of electricity.

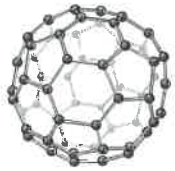
Graphene

Graphene consists of only a single layer of graphite. Its strong covalent bonds make it a strong material that can also conduct electricity. It could be used in composites and high-tech electronics.

Fullerenes

- hollow cages of carbon atoms bonded together in one molecule
- can be arranged as a sphere or a tube (called a **nanotube**)
- molecules held together by weak intermolecular forces, so can slide over each other
- conduct electricity

Spheres

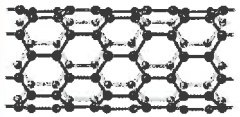


Buckminsterfullerene was the first fullerene to be discovered, and has 60 carbon atoms.

Other fullerenes exist with different numbers of carbon atoms arranged in rings that form hollow shapes.

Fullerenes like this can be used as lubricants and in drug delivery.

Nanotubes

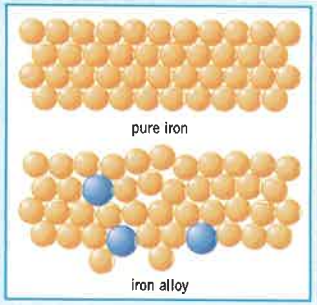


The carbon atoms in nanotubes are arranged in cylindrical tubes.
Their high **tensile strength** (they are difficult to break when pulled) makes them useful in electronics.

Alloys

Pure metals are often too soft to use as they are. Adding atoms of a different element can make the resulting mixture harder because the new atoms will be a different size to the pure metal's atoms. This will disturb the regular arrangement of the layers, preventing them from sliding over each other.

The harder mixture is called an **alloy**.



Measuring particles

We use different units and scales to measure the size of particles.

Particle	Particulate matter	Size	Standard form	Full form
grain of sand	N/A	0.1 mm	1×10^{-4} m	0.0001 m
coarse particles (e.g., dust)	PM_{10}	10 µm	1×10^{-5} m	0.00001 m
fine particles	$PM_{2.5}$	100 nm	1×10^{-7} m	0.0000001 m
nanoparticles	< $PM_{2.5}$	1 to 100 nm	1×10^{-9} to 1×10^{-7} m	0.000000001 m to 0.0000001 m

PM stands for **particulate matter** and is another way of measuring very small particles.

Uses of nanoparticles

Nanoparticles often have very different properties to bulk materials of the same substance, caused by their high surface area-to-volume-ratio.

Nanoparticles have many uses and are an important area of research. They are used in healthcare, electronics, cosmetics, and as catalysts.

However, nanoparticles have the potential to be hazardous to health and to ecosystems, so it is important that they are researched further.

Key terms

Make sure you can write a definition for these key terms.

conductivity conductor delocalised electron electrostatic force of attraction ion lattice layer malleable nanoparticle particulate matter surface area to volume ratio transfer

Chapter 3: Bonding

Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

C3 questions	Answers
1 How are covalent bonds formed?	by atoms sharing electrons
2 Which type of atoms form covalent bonds between them?	non-metals
3 Describe the structure and bonding of a giant covalent substance.	billions of atoms bonded together by strong covalent bonds
4 Describe the structure and bonding of small molecules.	small numbers of atoms group together into molecules with strong covalent bonds between the atoms and weak intermolecular forces between the molecules
5 Describe the structure and bonding of polymers.	many identical molecules joined together by strong covalent bonds in a long chain, with weak intermolecular forces between the chains
6 Why do giant covalent substances have high melting points?	it takes a lot of energy to break the strong covalent bonds between the atoms
7 Why do small molecules have low melting points?	only a small amount of energy is needed to break the weak intermolecular forces
8 Why do large molecules have higher melting and boiling points than small molecules?	the intermolecular forces are stronger in large molecules
9 Why do most covalent substances not conduct electricity?	do not have delocalised electrons or ions
10 Describe the structure and bonding in graphite.	each carbon atom is bonded to three others in hexagonal rings arranged in layers – it has delocalised electrons and weak forces between the layers
11 Why can graphite conduct electricity?	the delocalised electrons can move through the graphite
12 Explain why graphite is soft.	layers are not bonded so can slide over each other
13 What is graphene?	one layer of graphite
14 Give two properties of graphene.	strong, conducts electricity
15 What is a fullerene?	hollow cage of carbon atoms arranged as a sphere or a tube
16 What is a nanotube?	hollow cylinder of carbon atoms
17 Give two properties of nanotubes.	high tensile strength, conduct electricity
18 Give three uses of fullerenes.	lubricants, drug delivery (spheres), high-tech electronics
19 What is an ion?	atom that has lost or gained electrons
20 Which kinds of elements form ionic bonds?	metals and non-metals
21 What charges do ions from Groups 1 and 2 form?	Group 1 forms 1+, Group 2 forms 2+
22 What charges do ions from Groups 6 and 7 form?	Group 6 forms 2−, Group 7 forms 1−
23 Name the force that holds oppositely charged ions together.	electrostatic force of attraction
24 Describe the structure of a giant ionic lattice.	regular structure of alternating positive and negative ions, held together by the electrostatic force of attraction
25 Why do ionic substances have high melting points?	electrostatic force of attraction between positive and negative ions is strong and requires lots of energy to break
26 Why don't ionic substances conduct electricity when solid?	ions are fixed in position so cannot move, and there are no delocalised electrons
27 When can ionic substances conduct electricity?	when melted or dissolved
28 Why do ionic substances conduct electricity when melted or dissolved?	ions are free to move and carry charge
29 Describe the structure of a pure metal.	layers of positive metal ions surrounded by delocalised electrons
30 Describe the bonding in a pure metal.	strong electrostatic forces of attraction between metal ions and delocalised electrons
31 What are four properties of pure metals?	malleable, high melting/boiling points, good conductors of electricity, good conductors of thermal energy
32 Explain why pure metals are malleable.	layers can slide over each other easily
33 Explain why metals have high melting and boiling points.	electrostatic force of attraction between positive metal ions and delocalised electrons is strong and requires a lot of energy to break
34 Why are metals good conductors of electricity and of thermal energy?	delocalised electrons are free to move through the metal
35 What is an alloy?	mixture of a metal with atoms of another element
36 Explain why alloys are harder than pure metals.	different sized atoms disturb the layers, preventing them from sliding over each other
37 How big are nanoparticles?	1–100 nm
38 How are nanomaterials different from bulk materials?	nanomaterials have a much higher surface area-to-volume ratio
39 What is the relationship between side length and surface area-to-volume ratio?	as side length decreases by a factor of ten, the surface-area-to-volume ratio increases by a factor of ten
40 What are nanoparticles used for?	used in healthcare, electronics, cosmetics, and catalysts

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Chapter 13: Electromagnetic waves

Knowledge organiser

The electromagnetic spectrum

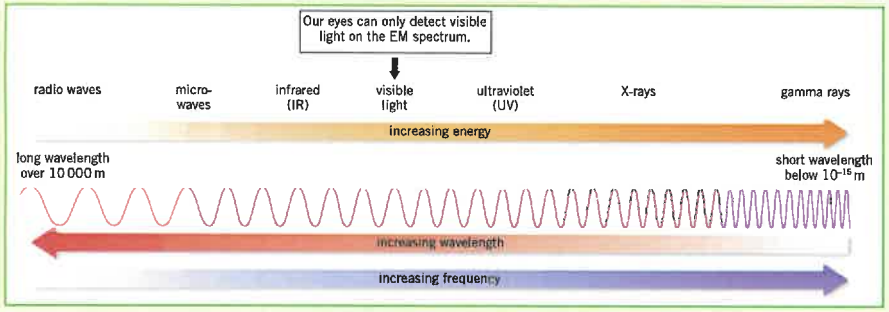
Electromagnetic (EM) waves are **transverse** waves that transfer energy from their source to an absorber. For example, infrared waves emitted from a hot object transfer thermal energy.

EM waves form a continuous **spectrum**, and are grouped by their wavelengths and frequencies.

EM waves all travel at the same velocity through air or a vacuum. They travel all at a speed of 3×10^8 m/s through a vacuum.

(HT only) Different substances may absorb, transmit, **refract**, or **reflect** EM waves in ways that vary with their wavelength.

Refraction occurs when there is a difference in the velocity of an EM wave in different substances.



Infrared radiation (required practical)

This practical investigates the rates of absorption and radiation of infrared radiation from different surfaces.

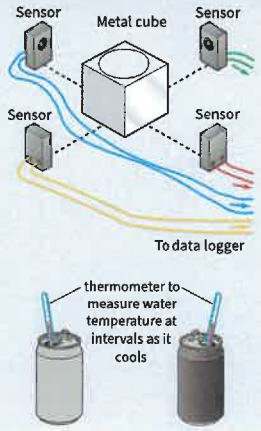
You should be able to plan a method to determine the rate of cooling due to emission of infrared radiation and evaluate your method.

Using infrared detectors to measure the radiation emitted by different surfaces

Monitoring the rate of cooling in cans with different surfaces

To be accurate and precise in your investigation you need to:

- use an infrared detector with a suitable meter, where possible
- ensure that you always put the detector the same distance from the surface
- repeat measurements and calculate an average.



Properties of EM waves

EM waves of a wide range of frequencies can be absorbed or produced by changes inside an atom or nucleus. For example, gamma rays are produced by changes in the nucleus of an atom.

When electrons in an atom move down between energy levels, they emit EM waves.

Properties of radio waves (HT only)

Radio waves can be produced by **oscillations** in an electrical circuit.

When radio waves are absorbed by a receiver aerial, they may create an **alternating current** with the same frequency as the radio waves.

Uses of EM waves

EM waves have many practical applications, but exposure to some EM waves (such as those that are forms of ionising radiation) can have hazardous effects.

Radiation dose (in sieverts) is the risk of harm from exposure of the body to a particular radiation.

Type of EM wave	Use	Why is it suitable for this use? (HT only)	Hazards
radio waves	television and radio signals	• can travel long distances through air • longer wavelengths can bend around obstructions to allow detection of signals when not in line of sight	can penetrate the body and cause internal heating
microwaves	satellite communications and cooking food	• can pass through Earth's atmosphere to reach satellites • can penetrate into food and are absorbed by water molecules in food, heating it	
infrared	electrical heaters, cooking food, and infrared cameras	• all hot objects emit infrared waves – sensors can detect these to turn them into an image • can transfer energy quickly to heat rooms and food	can damage or kill skin cells due to heating
visible light	fibre optic communications	• short wavelength means visible light carries more information	can damage the retina
ultraviolet (UV)	energy efficient lights and artificial sun tanning	• carries more energy than visible light • some chemicals used inside light bulbs can absorb UV and emit visible light	can damage skin cells, causing skin to age prematurely and increasing the risk of skin cancer, and can cause blindness
X-rays	medical imaging and treatments	• pass easily through flesh, but not denser materials like bone • high doses kill living cells, so can be used to kill cancer cells – gamma rays can also be used to kill harmful bacteria	form of ionising radiation – can damage or kill cells, cause mutation of genes, and lead to cancers
gamma rays			

Key terms

Make sure you can write a definition for these key terms.

alternating current, electromagnetic wave, electromagnetic spectrum, oscillation, radiation dose, reflection, refraction, transverse

Chapter 13: Electromagnetic waves

Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

	P13 questions	Answers
1	Are electromagnetic (EM) waves longitudinal or transverse waves?	transverse
2	Explain why EM waves are not mechanical waves.	they can travel through a vacuum (don't need a substance to travel through)
3	What do EM waves transfer from their source to an absorber?	energy
4	List the different types of waves in the EM spectrum in order of decreasing wavelength (increasing frequency).	radio, microwave, infrared, visible, ultraviolet, X-rays, gamma
5	Which part of the EM spectrum can humans see?	visible light
6	How can electromagnetic waves be produced?	changes inside an atom/atomic nucleus
7	How are gamma rays produced?	changes in the nucleus of an atom, for example during radioactive decay
8	How can radio waves be produced?	oscillations in an electrical circuit
9	How can we detect radio waves?	waves are absorbed and create an alternating current with the same frequency as the radio wave
10	What are radio waves used for?	transmitting television, mobile phone, and Bluetooth signals
11	What are microwaves used for?	satellite communications, cooking food
12	What is infrared radiation used for?	heating, remote controls, infrared cameras, cooking food
13	Which types of EM waves are harmful to the human body?	ultraviolet, X-rays, gamma rays
14	What are the hazards of being exposed to ultraviolet radiation?	damage skin cells, sunburn, increase risk of skin cancer, age skin prematurely, blindness
15	Why are X-rays used for medical imaging?	they pass through flesh but not bone
16	Why are gamma rays used for treating cancer and sterilising medical equipment?	high doses kill cells and bacteria

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Chapter 16: Adaptations and interdependence

Knowledge organiser

Ecosystem organisation

Individual organisms

↓

Population
the total number of organisms of the same species that live in one specific geographical area

↓

Community
group of two or more populations of different species living in one specific geographical area

↓

Ecosystem
the interaction of a community of living organisms with the non-living parts of their environment

A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant.

An example of this is the interaction between predator and prey species, which rise and fall in a constant cycle so that each remains within a stable range.

Competition

To survive and reproduce, organisms require a supply of resources from their surroundings and from the other living organisms there.

This can create competition, where organisms within a community compete for resources.

There are two types of competition – **interspecific competition** is between organisms of different species and **intraspecific competition** is between organisms of the same species.

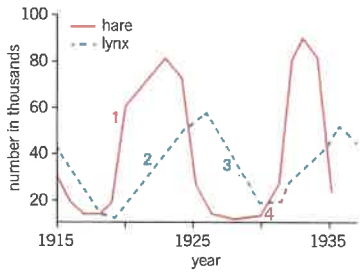
Animals often compete for:
- food
- mates
- territory.

Plants often compete for:
- light
- space
- water and mineral ions from the soil.

Interdependence

Within a community each species **interacts** with many others and may depend on other species for things like food, shelter, pollination, and seed dispersal.

If one species is removed it can affect the whole community – this is called **interdependence**.



1 If the population of hares increases there is a larger food supply for the lynx.

2 This can therefore support more lynx, so more offspring survive.

3 The growing numbers of lynx eventually reduce the food supply. The number of predators starts to decrease.

4 The prey population starts to increase once more – the cycle then begins again.

Abiotic factors

Abiotic factors are non-living factors in the ecosystem that can affect a community.

Too much or too little of the following abiotic factors can negatively affect the community in an ecosystem:
- carbon dioxide levels for plants
- light intensity
- moisture levels
- oxygen levels for animals that live in water
- soil pH and mineral content
- temperature
- wind intensity and direction.

Biotic factors

Biotic factors are living factors in the ecosystem that can affect a community.

For example, the following biotic factors would all negatively affect populations in a community:
- decreased availability of food
- new predators arriving
- new pathogens
- competition between species, for example, one species outcompeting another for food or shelter, causing a decline in the other species' population.

Adaptations of organisms

Organisms have features – **adaptations** – that enable them to survive in the conditions in which they live. The adaptations of an organism may allow it to outcompete others, and provide it with an evolutionary advantage.

Structural adaptations

The physical features that allow an organism to successfully compete:
- sharp teeth to hunt prey
- colouring that may provide camouflage to hide from predators or hunt prey
- a large or small body-surface-area-to-volume ratio.

Behavioural adaptations

The behaviour of an organism that gives it an advantage:
- making nests to attract a mate
- courtship dances to attract a mate
- use of tools to obtain food
- working together in packs.

Functional adaptations

Adaptations related to processes that allow an organism to survive:
- photosynthesis in plants
- production of poisons or venom to deter predators and kill prey
- changes in reproduction timings.

You can work out how an organism is adapted to where it lives when given information on its environment and what it looks like.

For example, without the following adaptations the organisms below would be at a disadvantage in their environment.

Organism	Example adaptations
	• white fur for camouflage when hunting prey • feet with large surface area to distribute weight on snow • small ears to reduce heat loss • thick fur for insulation
	• feet with large surface area to distribute weight on sand • hump stores fat to provide energy when food is scarce • tough mouth and tongue to allow camel to eat cacti • long eyelashes to keep sand out of eyes
	• spines instead of leaves to reduce surface area and therefore water loss, and to deter predators • long roots to reach water underground • large, fleshy stem to store water

Some organisms are **extremophiles**, which means they live in environments that are very extreme where most other organisms could not survive. For example, areas with:
- very high or low temperatures
- extreme pressures
- high salt concentrations
- highly acidic or alkaline conditions
- low levels of oxygen or water.

Bacteria that live in deep sea vents are extremophiles.

Deep sea vents are formed when seawater circulates through hot volcanic rocks on the seafloor. These environments have very high pressures and temperatures, no sunlight, and are strongly acidic.

Key terms

Make sure you can write a definition for these key terms.

abiotic factor *adaptation* *biotic factor* *community* *ecosystem* *extremophile* *interaction* *interdependence* *interspecific competition* *intraspecific competition* *population*

Chapter 16: Adaptations and interdependence

Retrieval questions

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many as you can. Check and repeat.

B16 questions	Answers
1 What is a population?	total number of organisms of the same species that live in a specific geographical area
2 What is a community?	group of two or more populations of different species living in a specific geographical area
3 What is an ecosystem?	the interaction of a community of living organisms with the non-living parts of their environment
4 What is competition?	contest between organisms within a community for resources
5 What is interdependence?	when species in a community depend on others for resources and shelter
6 What do animals often compete for?	food, mates, and territory
7 What do plants often compete for?	light, space, water, and mineral ions
8 What is an abiotic factor?	non-living factor that can affect a community
9 List the abiotic factors that can affect a community.	• carbon dioxide levels for plants • light intensity • moisture levels • oxygen levels for animals that live in water • soil pH and mineral content • temperature • wind intensity and direction
10 What is a biotic factor?	living factor that can affect a community
11 List the biotic factors that can affect a community.	• availability of food • new predators • new pathogens • competition between species
12 What is a stable community?	when all species and environmental factors are in balance, so population sizes remain fairly constant
13 How do adaptations help an organism?	they enable the organism to survive in the conditions in which it lives
14 What are the three types of adaptations?	structural, behavioural, and functional
15 What is an extremophile?	an organism that lives in a very extreme environment
16 What makes an environment extreme?	• very high or low temperatures • extreme pressures • high salt concentrations • highly acidic or alkaline conditions • lack of oxygen or water

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