Name and Tutor group:

Year 9 Knowledge Organiser

Term 3

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.

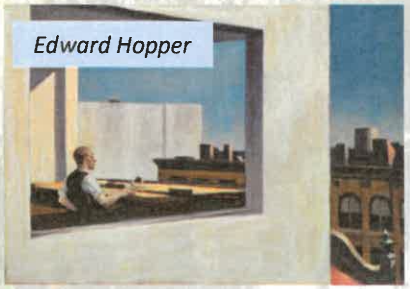
Be resilient. Always Persevere. Contribute to Teamwork. Be ambitious.

DREAM BELIEVE ACHIEVE

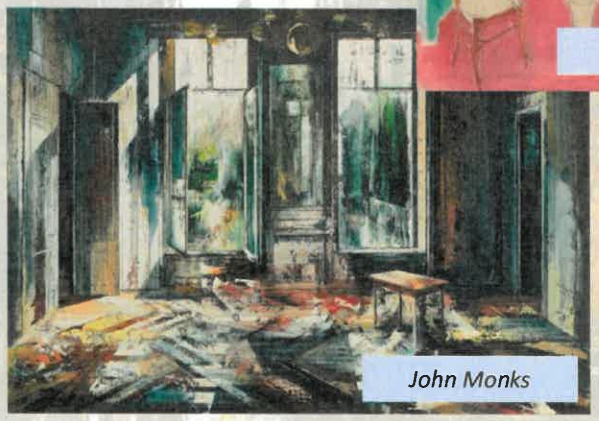
Knowledge Organiser – Year 9 Art
ARCHITECTURAL OPENINGS

INSPIRATIONAL ARTISTS


Rosemary Pocock


Edward Hopper


Henri Matisse


John Monks

YOU WILL LEARN:

How to draw in one-point perspective that will help you to produce an architectural drawing. You will look at artist's such as John Monks and Patrick Caulfield. You will create your architectural opening painting taking inspiration from your own photographs.

Why am I learning this?

The foundation skills in this project will enable you to tackle the varied concepts, artists, techniques and processes throughout Year 9.
You will build on your knowledge and skills with each project as they increase in difficulty, enabling you to express yourself in a confident way.

CONTEXTUAL KNOWLEDGE:

Perspective

John Monks

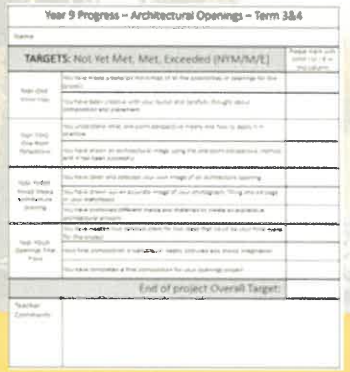
One-Point Perspective Art is a drawing method that shows how things appear to get smaller as they get further away, converging towards a single "vanishing point" on the horizon line.

John Monks studied at Liverpool School of Art and the RCA between 1977-80 and has since assumed the status of one of Britain's most significant figurative painters.

Homework Tasks:
Tick when complete ✓

1. Architectural openings photographs
2. Artist research
3. Layered Sketch-book home learning project

HOW WELL AM I DOING?


Year 9 Progress – Architectural Openings – Term 3&4

Name

TARGETS: Not Yet Met, Met, Exceeded (NYM/M/E)

End of project Overall Target:

Teacher Comments

Keywords

Perspective	The art of representing three-dimensional objects on a two-dimensional surface so as to give the right impression of their height, width, depth, and position in relation to each other.
Architecture	The art and science of designing buildings and (some) nonbuilding structures. The style of design and method of construction of buildings and other physical structures.
Opening	A space or gap that allows passage or access.
Vanishing Point	A vanishing point is a point on the image plane of a perspective rendering where the two-dimensional perspective projections of mutually parallel lines in three-dimensional space appear to converge.

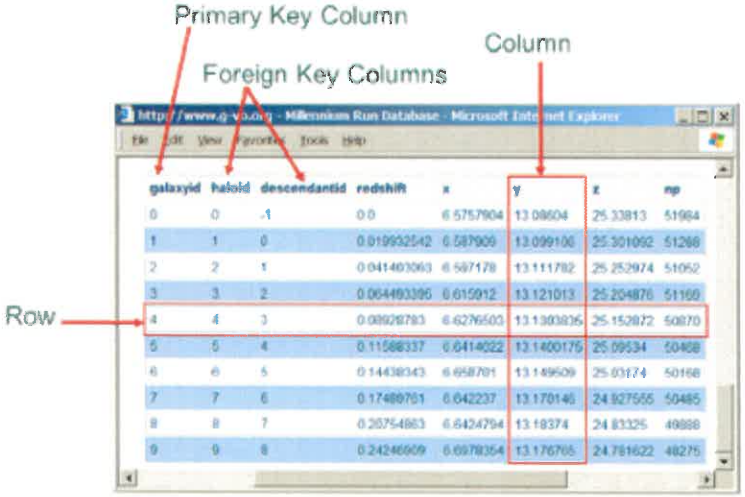
Information about John Monks
Long and Ryle - John Monks Mirror Image

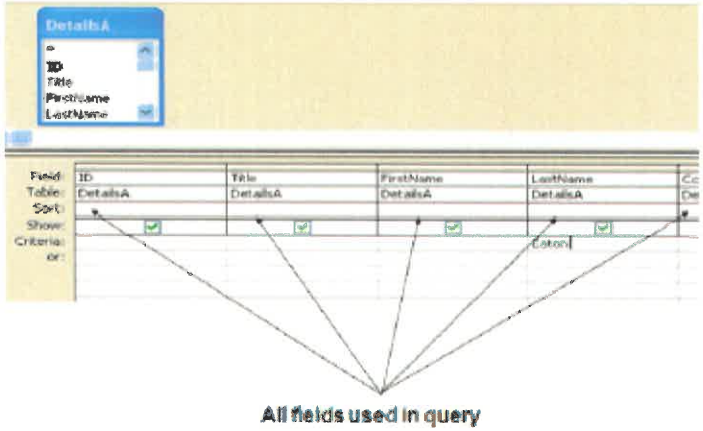
Year 9 Database Knowledge Organiser

COMPUTING CORSHAM

Keywords

Word	Meaning/Description
Database	A **Database** is a collection of data.
Form	A **form** is used to make the database more user friendly.
Table	A **table** is a collection of rows.
Data Type	A **data type** is a data storage format that can contain a specific type or range of values.
Integers	**Integers** are whole numbers. For example: 4, 27, 65535.
Boolean	**Boolean** values are either 'True' or 'False' or 1 or 0.
Primary Key	A **primary key** is a unique number for an entity.
Row	A **row** is a collection of column values.
Field Size	The **field size** is the maximum size of characters allowed for each entry field.





Data types

Projects

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dueDate	Date/Time
deliveryDate	Date/Time
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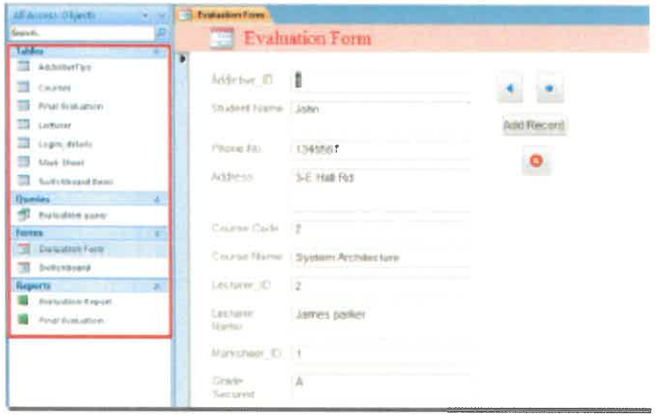
cost	Currency
projectTypeID	Number
lines	Number
pages	Number
words	Short Text
settled	Yes/No
projectComment	Long Text



Drama – Year 9 Term 3

"Dare to be dull."

"Make a connection with the other player."

"Just make a choice."

THE CORSHAM SCHOOL

Improvisation

improvising is inventing and creating content spontaneously. It's a great way to generate new ideas and for creating and developing characters, using a variety of useful techniques.

Links to Comp 1 and 2

Spontaneous improvisation which is completely unplanned can generate dialogue or scenarios that you feel work for the piece you are creating. This can then be refined, rehearsed and included in your finished **devised** piece

A **constraint** is a condition that you must apply to a scene, so that you're improvising within a set of rules. Here are some ideas for working with constraints when improvising.

Space

A very small space, such as a lift. Characters must behave as they would normally but within a tiny playing area.

A vast space, such as across a giant mountain range. Consider how changing **proximity** affects body language, vocal tone and volume and interaction, between characters. There may be something that works and could be included in your devised piece.

This improvisational exercise is excellent for creating entirely new and unplanned characters and scenarios.

Where, who, what?

Choose a location, eg a supermarket or a roller coaster.
Select characters, eg an astronaut or an I.T. manager.
Finally, choose a motivation for the character, eg they are looking for a partner or want to be famous at any cost.
Each piece of information should be randomly selected, so that they don't necessarily match up. This can make for interesting and very humorous drama.

- **Improvisational Theater (improv):** is a form of theater where most or all of what is performed is created at the moment it is performed.
- In its purest form, the dialogue, the action, the story and the characters are created collaboratively by the players as the improvisation unfolds.
- Improv exists in performance as a range of styles of improvisational comedy as well as some non-comedic theatrical performances.
- It is sometimes used in film and television, both to develop characters and scripts and occasionally as part of the final product.

Tips for success

-Listen to your partner.
A scene will often 'go stale' if the people involved are not responding genuinely to each other. Improv is all about **teamwork** and the relationship you have with each other. The better the relationship, the better the scene will be to the audience.

-Use 'yes, and...".
When your partner tells you something in an improv scene, accept it and then add something to the conversation. If you're partner starts by asking you why you've come to a party dressed as a pineapple, don't tell them that you think they're seeing things. Ask them why they're the only one who hasn't come dressed as a giant piece of fruit and that you have a spare costume in your car if they need it. Scenes where actors deny what their partners are saying often go dry very quickly and offer nothing for the audience. It's also a good way to annoy your partners.

- Don't necessarily try to be funny.
Sure, comedy is great, but one person trying to make the audience laugh often alienates the others on stage.

-Accept your mistakes.
Like any learning process, you will make mistakes. It's how you learn. Don't beat yourself up if you forgot a key rule of improv or your scene wasn't particularly good. Make some general notes for yourself and put it behind you. Next time you get up to improvise, treat it like a fresh start and be positive.

Examples – Mock the Week, Whose Line Is it Anyway? Outnumbered. The Office.

"Be more brave than impressive."

"It doesn't matter what you're doing on stage, as long as you sell it."

"Never expect a certain answer or reaction. Just listen and react to what was *actually* said."

Year 9 Food Knowledge Organiser.

Key Practical Skills

- **Flaky Pastry – Lamination**. The dough is rolled and folded to produce layers. Fat is placed in between the layers and this melts, leaving a space that is filled with steam from the water and fat added to the pastry. Trapped expand between the causing light crisp layers of pastry to develop. **(Sausage rolls)**
- **Short Crust pastry – Shortening**. The fat is rubbed into the flour with fingertips. It coats flour to prevent the long gluten strands from forming. This is called shortening. **(Cheese and Onion Pasties)**
- **Whisking Method – Mechanical Raising Agents.** When the eggs and sugar are whisked together this traps air bubbles as the protein from the egg stretches and surrounds the air bubbles to form an air-in-liquid foam. This is a mechanical raising agent. **(Swiss Roll)**
- **Fruit and Vegetable preparation** – Water soluble vitamins (B group &C) are easily damaged or lost during preparation and cooking. Correct preparation and cooking will minimise these losses. **(Thai Curry, Bolognaise/chilli, Carrot Cake)**
- **Presentation skills** – presenting and styling food is very important at GCSE. Decorations on savoury food are called garnish and decoration on sweet foods. (Samosas, Cheesecake)

Key Topics

Food and the environment :

Food waste – Manufacturers, retailers and consumers waste millions of tonnes of food a year for a variety of reasons

food poverty -defined as the inability to acquire or consume an adequate or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so

Food provenance – food that is grown, food that is caught, food that is reared. E.g. organic

Food miles – how far food has travelled from farm to fork

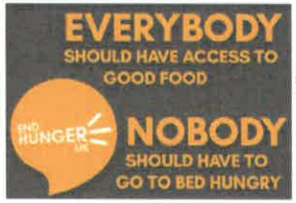
Food and Nutrition:

Nutrition – main nutrients , functions and sources

Food Choices – There are many reasons why we choose the food we eat, but they can often be related to religion and culture, ethical and moral beliefs, medical conditions or personal preference. This affects the diets they eat

Food intolerance – a reaction to a specific food

Allergen – A substance in food that may cause an allergic reaction



Personal Skills

- Confidence
- Organisation
- Teamwork
- Time management

Nutrient	Functions	Examples
Carbohydrates & Fibre	• Energy • Aids Digestion • Fills us up	• Pasta, Rice, Bread, Cereals, potatoes
Vitamins & Minerals	• Keeps us healthy • Protect from illness • Each vitamin and mineral has a specific job	• Most foods we eat contain at least one vitamin and/ a mineral. • Such as - Meat, fish, alternatives, fruit, vegetables, dairy, cereals, bread pasta
Proteins	• Repairs and replaces worn and old cells and tissues. • Builds muscle and makes us strong • growth	• **Meat** – lamb, pork, beef • **Fish** – cod, tuna, sardines • **Pulses and beans** – lentils, chick peas, beans, peas • **Alternatives** – soya, tofu, Quorn • **Dairy products** – milk, cheese, yoghurt
Fats	• Give us energy • Protect our bodies • Insulate • Needed to use fat soluble vitamins	Saturated fats –meat, lard, cheese, cream, eggs Unsaturated – oily fish, avocado's, oils such as sunflower, olive, rapeseed vegetable.

Nutritional Analysis

Evaluate the nutritional content of some of our practical outcomes using explore food which is an online nutritional analysis tool. Adapt recipes and compare.

Keywords

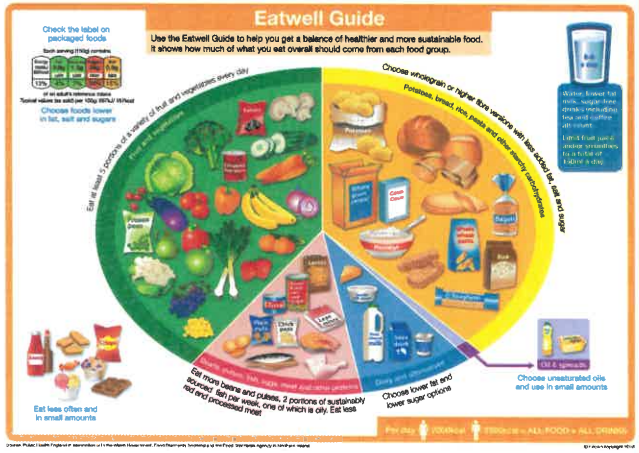
- Nutrients
- Carbohydrate
- Protein
- Lamination
- Shortening
- Garnish
- Food miles
- Food Provenance
- Saturated and unsaturated fats
- vegetarian

KS3 YEAR 9

Tools and Equipment

Measuring and marking

Steel rule		An accurate tool for measuring and marking out
Template		A template is a tool used to mark out shapes repeatedly



What is good design?

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

Maths in DT:

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

Vegetarian sources of iron?

Vegetarians are more likely to have lower iron stores than people who eat meat.

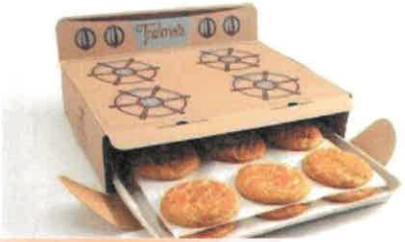
Good sources of iron for vegetarians include:

- pulses, such as kidney beans, chickpeas and lentils
- dried fruit, such as apricots
- dark green vegetables, such as watercress, broccoli and spring greens
- wholemeal bread and flour
- fortified cereals (with added iron)
- nuts

Food labels

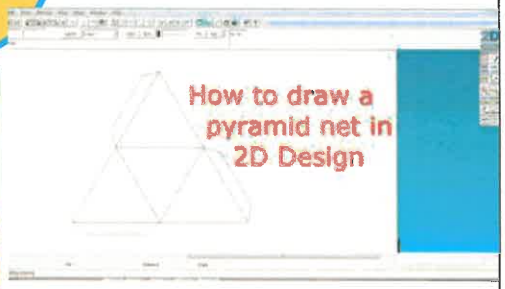
- **Nutrition information labels can help you choose between products and keep a check on the amount of foods you're eating that are high in fat, salt and added sugars.**
- Most pre-packed foods have a nutrition information label on the back or side of the packaging.
- You can use nutrition information labels to help you eat a balanced diet.
- If you're choosing foods and drinks that are high in fat, salt and sugar, have these less often and in small amounts.
- Most people in the UK eat and drink too many calories, too much fat, sugar and salt, and not enough fruit, vegetables, oily fish or fibre.

D&T CAD AND CAM



Keywords

- Design
- Product analysis
- Research
- Evaluation
- Food Packaging
- Paper
- Board
- Corrugated board
- Duplex board
- Foil lined board
- Pulp
- Sizing
- Die-cutting
- Colour printing
- Offset lithography
- Bar code
- Nutritional information
- Printing
- Lamination



Year 9 Electronics

DESIGN AND TECHNOLOGY

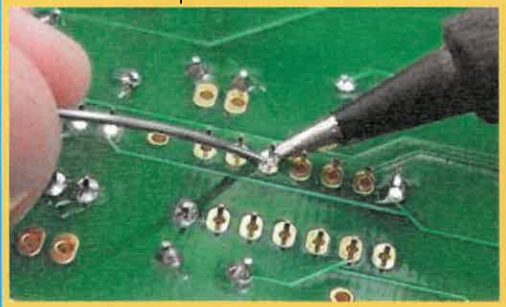
Tools and Equipment

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.

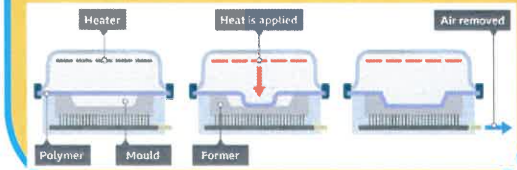
Soldering

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.

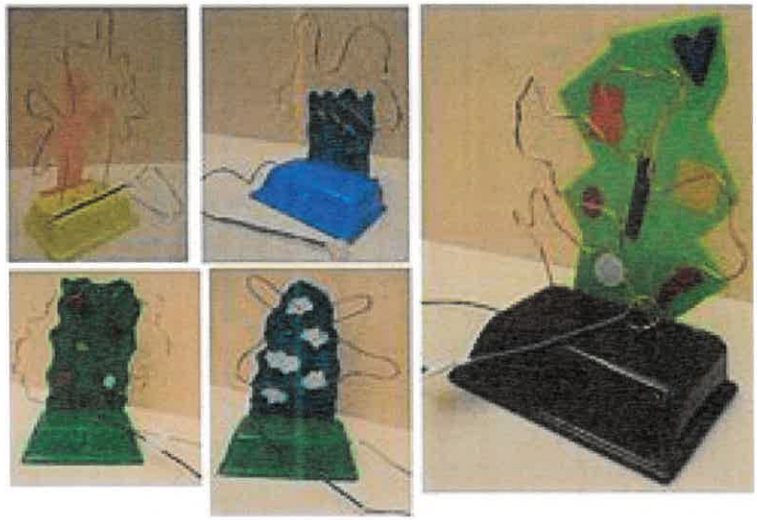


Keywords

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.

 Cell	 Battery	Push-to-make (PTM) switch	 Push-to-break (PTB) switch	 Diode	 Light-emitting diode (LED)
 Buzzer	 Loudspeaker	 Lamp	 Single pole single throw (SPST) switch	 Single pole double throw (SPDT) switch	 Thyristor
 Resistor	 Variable resistor	 Thermistor	 Light dependent resistor (LDR)	 Motor	 9v 0v Voltage rails



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 9 D&T RESISTANT MATERIALS

Tools and Equipment

Measuring and marking

Steel rule		An accurate tool for measuring and marking out
Try square		A tool used to check right angles on wood or plastic
Template		A template is a tool used to mark out shapes repeatedly

Shaping and finishing

Metal file		Used to shape or smooth wood, metal or plastic
Wet and Dry Paper		An abrasive paper used to smooth the surface or edges of plastic
Disc sander		A machine used to smooth the edges of materials

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Polymers

Thermoform Polymer

A polymer which can be reheated and moulded.

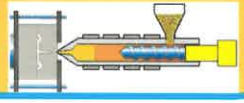
Acrylic
High impact polystyrene (HIPS)
Polypropylene (PP)

Thermosetting Polymer

A polymer which cannot be re moulded.

Epoxy resin (ER)
Melamine Formaldehyde (MF)
Urea Formaldehyde (UF)

Polymer processes



Injection moulded
Extrusion
Vacuum formed

Cutting

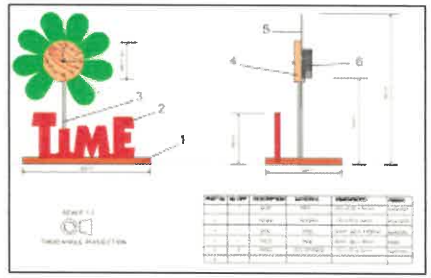
Coping saw		A hand saw used to cut complex shapes in wood and plastic
Scroll saw		A machine saw used to cut complex shapes in wood and plastic
Vice		Supports work whilst cutting or finishing
Pillar drill		A machine used to make holes in materials
Laser cutter		CAM: Laser cutting is the use of a high-powered laser to cut, etch and engrave your material

Memphis Design Movement

Ettore Sottsass

POLYMERS

Orthographic Drawing



Keywords

Template
Polymer
Tensol Cement
Modelling
Acrylic
Specification
Research
Design
Evaluation
6Rs
Sustainable
Manufacture

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KS3 YEAR 9

DT TEXTILES

Tools and Equipment

Measuring and marking

Measuring Tape		Fabric tape measure used to measure
Tailor's chalk		A temporary mark on fabric
Template / Pattern		A template / pattern is a tool used to mark out shapes repeatedly

Constructing

Sewing needle		Helps to sew fabric together
Embroidery needle		A needle with a larger eye to accommodate embroidery thread
Sewing machine		Machine sews fabric together
Pins		A temporary method to hold fabric in place
Tacking stitch		A temporary stitch to hold fabric together

Stencils

What?

- A stencil is a template used to transfer patterns
- It can be used multiple times
- It is one way of adding decoration to fabric

How?

- You can create a stencil by hand or using CAD
- You can use card, paper or thin, sturdy plastic to make it
- You can use a craft knife to cut by hand or CAM; laser cutter
- You need to think about islands/bridges
- Gently dab the paint using a sponge – too much paint might bleed under the stencil.
- Gently remove and wait to dry.

Keywords

Design
Product analysis
Research
Evaluation
Stitch
Scissors
Sewing machine
Customer
Environment
Function
Material
Seam allowance
UCD
Fastener
Stencil

Cutting

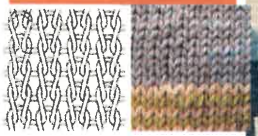
Fabric shears		Scissors used for cutting fabric
Thread scissors		Scissors used for cutting thread
Stitch ripper		Used for removing sewn stitches from fabric
Pinking shears		Creates a zig zag cut edge for decoration to prevent fraying

Fasteners

Buttons		Decorative fasteners used in conjunction with a button hole
Zip		Tape with zipper teeth which interlock
Poppers / press studs		A pair of interlocking disks, usually made from metal or plastic

Woven Fabric

Knitted Fabric



Types of Seams:

Plain
French
Flat felled
Bound
Lapped

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:

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A is for **Aesthetics**
C is for **Cost**
C is for **Customer**
E is for **Environment**
S is for **Size**
S is for **Safety**
F is for **Function**
M is for **Material**

Romeo + Juliet

Context – The play was written by William Shakespeare, and was first performed around 1594.

Shakespeare's Time – Shakespeare wrote his plays at the time of two monarchs: Queen Elizabeth I and James I. *Romeo and Juliet* was written relatively early in Shakespeare's career (the bulk of his tragedies were written in the 17th century) yet was extremely popular in his lifetime, as it is now. Shakespeare borrowed heavily from two texts: *The Tragical History of Romeo and Juliet* (1562) and *Palace of Pleasure (1567)*

Elizabethan England and Italy –Shakespeare frequently engaged with Italy in his plays, leading many to believe that he travelled there between the late 1580s and early 1590s. Italy was a place that Shakespeare's contemporaries would have had a keen interest in; it was already an advanced and beautiful place for travel. Shakespeare's depictions of many areas of Italian life at the time are deemed largely accurate.

Religion – The heavy religious presence is evident across several parts of *Romeo and Juliet*. This is reflective of a society across Europe that was deeply religious (predominantly catholic or protestant). Several characters demonstrate their commitment to the church, such as Romeo and Juliet who choose to marry rather than fornicate, and the Capulets, who are quick to contemplate that Juliet is in a better place (heaven) after she is found 'dead.'

Patriarchal Society –Society throughout the Middle Age and at Shakespeare's time was patriarchal – women were considered inferior to men. This was also the case in much of Europe, including Italy. Women belonged to their fathers (or brothers if their fathers had died) and then their husbands, so Juliet would be expected to obey her father. Women were not permitted to own land or enter most professions. They were instead expected to bear children, be gentle and womanly.

Astrology the Supernatural – At the time of Shakespeare, the belief in both astronomy and the supernatural was far more preeminent than in society today. The reference to 'star-cross'd lovers demonstrates the large role of horoscopes and planet positions in being used to predict fate. Also, Romeo and Juliet make reference to the fact that they feel they are being guided by a supernatural force (e.g. 'fortune's fool).

Healthcare and Medicine – Healthcare and medicine were not as advanced in Shakespeare's age as they are today – there were numerous ailments and diseases that were not yet understood. This makes it much more believable for both the Capulets and Romeo that Juliet could have died so suddenly and so young. The high death count in the play would seem slightly more common in those days!

Themes – A theme is an idea or message that runs throughout a text.

Love – In Romeo and Juliet, love is an extremely overpowering force that supersedes all other values, emotions, and loyalties. Through their love, Romeo and Juliet conspire to go against the forces of their entire social world. Romeo returns to visit Juliet at points, even though he is well aware of the threat of death. At times, love is presented as fickle (Mercutio's speeches, Romeo + Rosaline).

Individual vs Society – Romeo and Juliet are forced to undermine the oppressive rules of society at the time. For example, rules of the patriarchal family force Juliet to be subservient to her parents, rules of religion mean that they must marry in haste, and rules of masculinity force Romeo into conflict with Tybalt.

Violence – Extreme violence takes place sporadically throughout the play. The feud between the two families is so bitter that the mere sight of each other can be the cause of a fight to the death. Unchecked violence is personified through the character of Tybalt. The violence culminates in Act 3 Scene 1, in which both Mercutio and Tybalt are murdered.

Fate – In the first address to the audience, the Chorus states that Romeo and Juliet are 'star-cross'd' lovers, meaning that fate had intended for their paths to cross, and that fate controls their actions. A series of unfortunate accidents towards the end of the play thwart Friar Laurence's plan and eventually manifest in both Romeo and Juliet committing suicide, thus adding to the sense of fate.

CONTEXT

The role of women in a patriarchal society: Elizabethan England was a society controlled by men. Women were seen as the weaker sex and were expected to be ruled over by men. Women needed to be meek and mild, and most importantly, obedient to their fathers and later their husbands.

Courtly Love: a medieval tradition of love between a knight and an unattainable noblewoman common in European literature of the time. The love of the knight for his lady was regarded as an overwhelming passion and the relationship was typically one sided.

Dueling and the concept of honour: Honour was hugely important at the time, and maintaining the honour of your family name was crucial. If you were challenged to a duel and you refused, you would be deemed a coward, thus damaging your honour and the status of your family.

Arranged marriages: Marriages amongst the wealthy were arranged by parents, and were not about love. Mostly the marriages were arranged for the purposes of status and power, and improving the social standings of families.

The Catholic setting of the play: The play is set in Italy, which is a Catholic country. Religion was extremely important: marriage vows were sacred – once made, they could not be broken, and suicide was considered a sin.

Tier 3 vocabulary:

- **BLANK VERSE:** verse without rhyme but in iambic pentameter.
- **CHRONOLOGICAL ORDER:** the events are shown in the order they occur.
- **DRAMATIC IRONY:** a literary technique, originally used in Greek tragedy, by which the full significance of a character's words or actions is clear to the audience or reader although unknown to the character. This is particularly apparent once the lovers are married as the majority of the characters have no idea that this has happened.
- **IAMBIC PENTAMETER:** a line of verse with five metrical feet, each consisting of one short (or unstressed) syllable followed by one long (or stressed) syllable. Therefore the line has ten syllables and the rhythm mimics a heartbeat.
- **MONOLOGUE:** a long, uninterrupted speech by one actor in a play, although there can be other characters present on stage.
- **OXYMORON:** a combination of words that have opposite or very different meanings. Shows emotional turmoil or confusion.
- **PROLOGUE:** a separate introductory section. In R&J, it summarises the events of the play, informing the audience that the protagonists 'take their lives at the end. This then colours the audience's view from the start, as they know that the play is a tragedy.
- **SOLILOQUY:** an act of speaking one's deepest thoughts, feelings or secrets aloud (to an audience) often when on stage alone.
- **SONNET:** composed of three quatrains (4 line stanzas) and a final couplet in iambic pentameter with the rhyme pattern *ABAB CDCD EFEF GG*. Traditionally associated with romance and love poetry.
- **TRAGEDY:** a play dealing with tragic events and having an unhappy ending, especially one concerning the downfall of the main character.

Point de départ (pages 102–103)

Dans ma ville, on peut ...	*In my town, you can ...*
Dans mon village, on peut ...	*In my village, you can ...*
jouer au basket.	*play basketball.*
jouer au billard.	*play snooker.*
jouer au foot(ball).	*play football.*
jouer au handball.	*play handball.*
jouer au rugby.	*play rugby.*
jouer au tennis.	*play tennis.*
jouer au tennis de table.	*play table tennis.*
jouer au volleyball.	*play volleyball.*
faire du footing.	*go jogging.*
faire du judo.	*do judo.*
faire du ski.	*go skiing.*
faire du vélo.	*go cycling.*
faire de la gymnastique.	*do gymnastics.*
faire de la musculation.	*do weight training.*
faire de la natation.	*go swimming.*
faire de la voile.	*go sailing.*
faire de l'athlétisme.	*do athletics.*
faire de l'équitation.	*go horse riding.*
Tu es sportif/sportive?	*Are you sporty?*
Je suis (assez) sportif/sportive.	*I am (quite) sporty.*
Je ne suis pas (très) sportif/sportive.	*I am not (very) sporty.*
Tu fais quels sports?	*What sports do you do?*
Je joue au rugby.	*I play rugby.*
Je fais du judo.	*I do judo.*

Unité 1 (pages 104–105) *C'est plus amusant!*

Quelle est ton opinion sur ... ?	*What is your opinion of ... ?*
Je trouve le tennis ...	*I find tennis ...*
Je trouve la voile ...	*I find sailing ...*
amusant(e).	*fun.*
compliqué(e).	*complicated.*
fatigant(e).	*tiring.*
intéressant(e).	*interesting.*
passionnant(e).	*exciting.*
relaxant(e).	*relaxing.*
facile.	*easy.*
difficile.	*difficult.*
ennuyeux/ennuyeuse.	*boring.*
Je trouve le ski plus difficile que le cyclisme.	*I find skiing more difficult than cycling.*
Je trouve la gymnastique plus facile que le footing.	*I find gymnastics easier than jogging.*

Unité 2 (pages 106–107) *Pour aller au stade?*

Pour aller au bureau d'information?	*How do I get to the information office?*
Pour aller au lac?	*How do I get to the lake?*
Pour aller au restaurant?	*How do I get to the restaurant?*
Pour aller au stade?	*How do I get to the stadium?*
Pour aller au vélodrome?	*How do I get to the velodrome?*
Pour aller à la piscine?	*How do I get to the swimming pool?*
Pour aller à la gare?	*How do I get to the station?*
Pour aller à la piste d'athlétisme?	*How do I get to the athletics track?*
Pour aller à l'hôtel?	*How do I get to the hotel?*
Pour aller aux courts de tennis?	*How do I get to the tennis courts?*
Pour aller aux toilettes?	*How do I get to the toilet?*
Allez tout droit.	*Go straight on.*
Tournez à droite.	*Turn right.*
Tournez à gauche.	*Turn left.*
Prenez la première rue à gauche.	*Take the first road on the left.*
Prenez la deuxième rue à droite.	*Take the second road on the right.*
Prenez la troisième rue à gauche.	*Take the third road on the left*

Unité 3 (pages 108–109) *Qu'est-ce qu'il faut faire?*

Qu'est-ce qu'il faut faire?	Il faut travailler dur.
Il faut manger des fruits et des légumes.	Il faut aller à la salle de fitness.
	Il faut être déterminé(e).

Il faut boire beaucoup d'eau.	*What must you do?*
Il faut dormir huit heures par nuit.	*You must eat fruit and vegetables.*
Il ne faut pas consommer de drogue.	*You must work hard.*
Il ne faut pas fumer.	*You must go to the gym.*
Sur la photo, il y a ...	*You must be determined.*
un(e) athlète.	*You must drink lots of water.*
un joueur de basket.	*You must sleep eight hours a night.*
Il est sur une piste d'athlétisme.	*You must not take drugs.*
Elle est sur un terrain de basket.	*You must not smoke.*
Il porte ...	*In the photo there is ...*
un short.	*an athlete.*
un maillot de course.	*a basketball player.*
un maillot de basket.	*He is on an athletics track.*
Il y a des spectateurs.	*She is on a basketball court.*
	He is wearing ...
	shorts.
	a running top.
	a basketball top.
	There are spectators.

Unité 4 (pages 110–111) *Vous allez bien?*

le bras	*arm*
le dos	*back*
le pied	*foot*
le ventre	*stomach*
la jambe	*leg*
la tête	*head*
l'oreille	*ear*
l'œil / les yeux	*eye / eyes*
Vous allez bien?	*Are you well?*
J'ai mal au bras.	*I have a sore arm.*
J'ail mal au dos.	*I have a sore back.*
J'ai mal au pied.	*I have a sore foot.*
J'ai mal au ventre.	*I have a sore stomach.*
J'ai mal à la jambe.	*I have a sore leg.*
J'ai mal à la tête.	*I have a sore head.*
J'ai mal à l'oreille.	*I have a sore ear.*
J'ai mal à l'œil.	*I have a sore eye.*
J'ai mal aux yeux.	*I have sore eyes.*
J'ai un rhume.	*I have a cold.*
J'ai de la fièvre.	*I have a temperature.*
Il faut rester au lit.	*You must stay in bed.*
Il faut utiliser une crème.	*You must use a cream.*
Il faut prendre des antidouleurs.	*You must take painkillers.*
Il faut boire beaucoup d'eau.	*You must drink lots of water.*

Unité 5 (pages 112–113) *Allez les futurs champions!*

Tu fais quel sport?	*What sport do you do?*
Je joue au foot.	*I play football.*
Je joue un match.	*I play a match.*
Je travaille dur.	*I work hard.*
Je suis membre d'une équipe locale.	*I am a member of a local team.*
Je suis membre d'un club local.	*I am a member of a local club.*
Je marque beaucoup de buts.	*I score lots of goals.*
Je gagne un match.	*I win a match.*
Qu'est-ce que tu fais tous les jours?	*What do you do every day?*
Je vais à la salle de fitness.	*I go to the gym.*
Je fais de la musculation.	*I do weight training.*
Qu'est-ce que tu as fait récemment?	*What did you do recently?*
J'ai joué en compétition.	*I played in a competition.*
J'ai marqué beaucoup de points.	*I scored lots of points.*
J'ai gagné une médaille aux J.O.	*I won a medal at the Olympic Games.*
Qu'est-ce que tu vas faire à l'avenir?	*What are you going to do in the future?*
Je vais marquer beaucoup d'essais.	*I am going to score lots of tries.*
Je vais jouer pour la France.	*I am going to play for France.*
Je vais être membre de l'équipe nationale.	*I am going to be a member of the national team.*
Je vais gagner la Coupe du Monde.	*I am going to win the World Cup.*

Point de départ (pages 104–105)

Dans ma ville / mon village,	*In my town / my village,*
il y a …	*there are …*
beaucoup de	*lots of*
possibilités sportives.	*sporting opportunities.*
peu de	*few / not many*
possibilités sportives.	*sporting opportunities.*
une salle de fitness	*a gym*
On peut jouer au / à la / à l' / aux …	*You can play …*
On peut faire du / de la / de l' / des …	*You can do …*
le basket / le billard	*basketball / snooker*
le cyclisme / le vélo	*cycling*
le foot(ball) / le footing	*football / jogging*
le handball / le hockey	*handball / hockey*
le judo / le patin à glace	*judo / ice skating*
le rugby / le ski / le tennis	*rugby / skiing / tennis*
le tennis de table	*table tennis*
le ping-pong	*table tennis*
le volleyball	*volleyball*
la danse / la gymnastique	*dance / gymnastics*
la musculation	*weight training*
la pétanque / les boules	*boules*
la voile / la planche à voile	*sailing / windsurfing*
l'athlétisme / l'équitation	*athletics / horse riding*
les arts martiaux	*martial arts*
Je suis membre d'un club.	*I am a member of a club.*
Je m'entraîne deux fois par semaine.	*I train twice a week.*
Mon héros sportif …	*My sporting hero is …*
Mon héroïne sportive est …	*My sporting heroine is …*
Il/Elle a gagné.	*He/She won.*
Il/Elle a marqué un but.	*He/She scored a goal.*

Unité 1 (pages 106–107) *Plus ou moins?*

Je trouve le tennis /	
la gymnastique …	*fun.*
amusant(e).	compliqué(e).
I find tennis / gymnastics …	divertissant(e).
fatigant(e).	*complicated.*
intéressant(e).	*entertaining.*
passionnant(e).	*tiring.*
relaxant(e).	*interesting.*
violent(e).	*exciting.*
ennuyeux / ennuyeuse.	*relaxing.*
difficile.	*violent.*
facile.	*boring.*
À mon avis / Pour moi …	*difficult.*
le footing est plus facile que	*easy.*
la natation.	*In my opinion / For me …*
la voile est moins amusante	*jogging is easier than*
que le ski.	*swimming.*
	sailing is less fun than
	skiing.

Unité 2 (pages 108–109) *Pour aller au stade?*

Pour aller …	*How do I get to …*
au stade? / au lac?	*the stadium / the lake?*
au centre aquatique?	*the aquatic centre?*
au vélodrome?	*the velodrome?*
au parking?	*the car park?*
au bureau d'information?	*the information office?*
au restaurant self-service?	*the self-service restaurant?*
à la piste d'athlétisme?	*the athletics track?*
à la salle de gymnastique?	*the gymnastics hall?*
à la gare SNCF?	*the train station?*
à la gare routière?	*the bus station?*
à l'hôtel?	*the hotel?*
aux courts de tennis?	*the tennis courts?*
aux magasins?	*the shops?*
aux toilettes?	*the toilets?*
Va / Allez tout droit.	*Go straight on.*
Tourne / Tournez à droite.	*Turn right.*
Tourne / Tournez à gauche.	*Turn left.*
Prends / Prenez la première rue	*Take the first road on*
à droite.	*the right.*

Prends / Prenez la deuxième rue à gauche.	*Take the second road on the left.*
s'il te plaît / s'il vous plaît	*please*
merci	*thank you*

Unité 3 (pages 110–111) *Qu'est-ce qu'il faut faire?*

Il faut ...	*It is necessary ...*
travailler dur.	*to work hard.*
manger équilibré.	*to eat healthily.*
boire beaucoup d'eau.	*to drink lots of water.*
avoir de l'assurance.	*to be confident.*
être motivé(e) et déterminé(e).	*to be motivated and determined.*
aller à la salle de fitness.	*to go to the gym.*
dormir huit heures par nuit.	*to sleep for 8 hours a night.*
faire d'autres activités aussi.	*to also do other activities.*
Il ne faut pas ...	*You must not ...*
fumer de cigarettes.	*smoke cigarettes.*
consommer de drogue.	*take drugs.*
Sur la photo il y a ...	*In the photo there is / are ...*
des athlètes.	*some athletes.*
des joueurs.	*some players.*
Ils/Elles ...	*They ...*
participent à	*are taking part in*
jouent	*are playing*
portent	*are wearing*
une course	*a race*
un maillot de course	*a running vest*
un maillot de basket	*a basketball shirt*
Il/Elle marque un panier.	*He/She is scoring a basket.*

Unité 4 (page 112–113) *Ça va?*

le bras / la jambe	*arm / leg*
le cou	*neck*
le dos	*back*
le genou	*knee*
le nez	*nose*
le pied / la main	*foot / hand*
le ventre / l'estomac	*stomach*
la bouche	*mouth*
la gorge	*throat*
la tête	*head*
l'épaule	*shoulder*
l'œil / les yeux	*eye / eyes*
l'oreille	*ear*
J'ai mal au bras.	*I have a sore arm.*
J'ai mal à la gorge.	*I have a sore throat.*
J'ai mal à l'œil.	*I have a sore eye.*
J'ai mal aux yeux.	*I have sore eyes.*
J'ai de la fièvre.	*I have a temperature.*
Je me suis blessé au pied / à la tête / à l'épaule.	*I've hurt my foot / head / shoulder.*
Je me suis blessé(e) aux jambes.	*I've hurt my legs.*
J'ai la grippe.	*I have the 'flu.*
J'ai un rhume.	*I have a cold.*
Il faut ...	*You must ...*
rester au lit.	*stay in bed.*
utiliser une crème.	*use a cream.*
mettre un pansement.	*put on a bandage.*
pratiquer des exercices modérés.	*do some gentle exercises.*
prendre des antidouleurs.	*take painkillers.*
Vous allez bien?	*Are you well?*
Ça ne va pas.	*I'm not well.*
Depuis quand?	*Since when?*
depuis trois jours	*for three days*
depuis hier	*since yesterday*

Unité 5 (page 114–115) *Allez, les champions!*

Qu'est-ce que tu fais comme sport?	*What sport do you do?*
Est-ce que tu as commencé ton sport à un très jeune âge?	*Did you start your sport at a very young age?*
J'ai commencé le foot ...	*I started football ...*
Qu'est-ce qu'il faut faire pour être champion(ne)?	*What must you do to be a champion?*
Il faut ...	*You must ...*

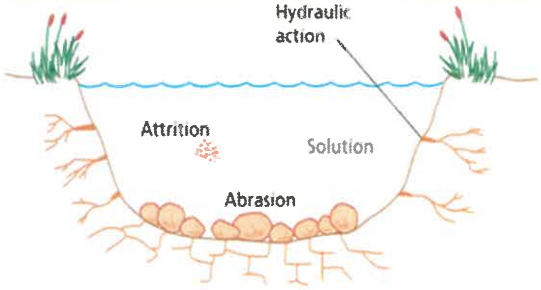
Est-ce que tu as participé à une compétition récemment?	*Have you taken part in a competition recently?*
J'ai participé à ...	*I took part in ...*
Qu'est-ce que tu vas faire à l'avenir?	*What are you going to do in the future?*
Je vais m'entraîner tous les jours.	*I am going to train every day.*
Est-ce que tu as un héros sportif ou une héroïne sportive?	*Do you have a sporting hero or heroine?*
J'admire ...	*I admire ...*

Geography: How the Sea shapes and attacks our land?

Erosion

Erosion attacks and wears away the cliff. There are four types.

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



Weathering

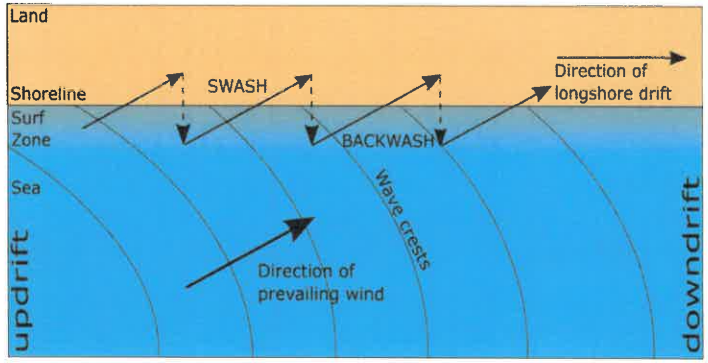
Weathering weakens rocks and helps mass movement occur. There are 3 types.

Chemical weathering	All rain is slightly acidic. Consequently the acid in the rain can dissolve the calcium carbonate in the rocks.
Physical weathering (freeze thaw)	In winter, water can enter cracks in rocks, when it freezes, the ice expands and weaken the cracks further.
Biological weathering	Plants can weaken the rocks due to their roots. Animals can also weather rocks.

Types of waves

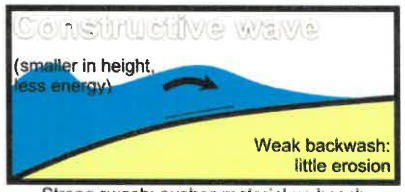
The swash is the wave going onto the beach and the backwash is the wave coming off the beach

Longshore drift



Swash hits the beach at an angle due to the prevailing wind, depositing sand on the beach.
Backwash goes straight back because of gravity and removes the swash.
This zig zag pattern continues along the beach.
AS a result, long shore drift removes material from one side of the beach and deposits it at the other, changing the shape of the beach.

Types of waves



Strong swash: pushes material up beach

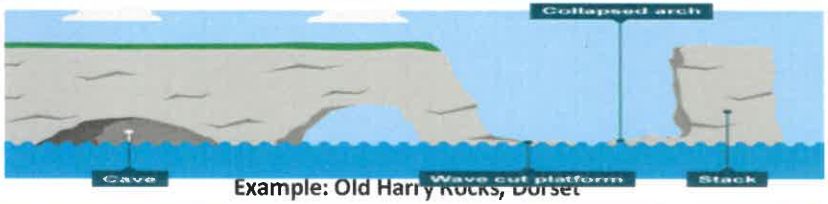
Destructive waves
These are tall waves that crash onto the beach.
They have a string backwash which results in the wave removing sand from the beach.

Weak swash: little beach building

Constructive waves
These are smaller waves that push onto the beach.
They have a weaker backwash and so can deposit sand on the beach.

Geography: How the Sea shapes and attacks our land?

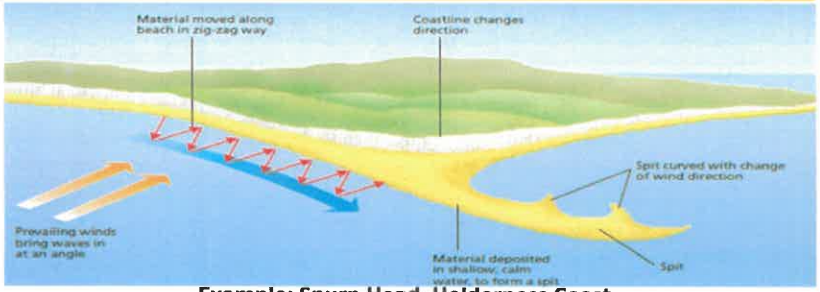
Formation of Coastal Stack



Example: Old Harry Rocks, Dorset

1) **Hydraulic action widens cracks in the cliff face over time.**
2) **Further abrasion widens the crack to from a cave.**
3) **Caves from both sides of the headland break through to form an arch.**
4) **Weathering weakens the arch and it collapses as mass movement leaving a stack.**
5) **Further weathering and erosion eaves a stump.**

Formation of Coastal Spits - Deposition



Example: Spurn Head, Holderness Coast

1) Longshore drift moves sediment along a beach.
2) When the land changes direction (at an estuary) deposition causes the beach to extend into the sea.
3) A spit is eventually formed, then a change in wind direction forms a hook.
4) Sheltered area behind spit encourages deposition, salt marsh forms.

Management: Hard engineering

Hard engineering strategies are artificial (man made) structures designed to reduce coastal erosion or long shore drift.

Groynes	Groynes can be made of wood or rocks. They stick out into the sea at right angles and are designed to reduce long shore drift. This keeps sand on the beach so the beach can act as a natural barrier.
Rip Rap	Rip Rap are large boulders placed in front of cliffs or human structures. They are designed to absorb the power of the waves, reducing erosion.
Sea wall	Sea walls are placed where coastal towns are right on the beach. They reduce the chance of flooding and reduce erosion. However they do not look in keeping with the natural environment
Gabions	Gabions are rocks in cages. The both absorb the energy of the waves and support cliffs to stop them collapsing.

Formation of Bays and Headlands

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

Management: soft engineering

Soft engineering strategies are designed to be more natural and less artificial but still reduce beach or cliff erosion.

Beach replenishment	After long shore drift has moved material along a beach, beach replenishment can put it back. This can be done via boats pumping sand onto the beach or bu trucks moving the sand back to where it came from. This means the beach can act as a natural barrier.
Managed retreat	Managed retreat is where people allow the sea to flood inland areas that are not of use. This reduces costs of defence and can also create valuable wetlands for ecosystems.
Do nothing	This decision to do nothing is based on the fact that the sea will always erode so should we pay for defences to be constantly replaced or just let nature take its toll?

Enquiry: How did the Holocaust happen?

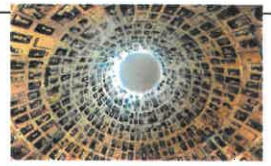
Outline: When the Nazi Party came to power in Germany in 1933, they targeted many different groups and made life for them increasingly difficult. The main group targeted were Jewish people and the Nazis began a gradual policy of persecution which led to the genocide that we call the Holocaust today.

Date	Event	Description
1933	Targeting of Jewish people begins	Nazi party began banning Jewish people from places and jobs.
1935	Nuremberg Laws	Greater persecution with laws on who Jewish people could marry.
1938	Kristallnacht	Attack on Jewish people in Germany where shops and synagogues were targeted.
1941	First use of Auschwitz as a death camp	First murder of people at Jewish people. 1.1 million were killed there.
1941	Holocaust by bullets began	Targeting of mainly Jewish people in eastern Europe by mobile killing squads.
1942	Wannsee Conference	Meeting to decide on the Final Solution to the Jewish question = mass murder of Jewish people
1945	Liberation of Auschwitz	Soviet soldiers helped to close the camp.

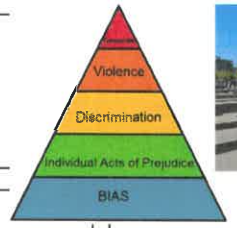
Furthering learning

Want to find out more about the Holocaust?

Recent genocides:
1994 Rwanda
1995 Bosnia
2003 – Darfur
2014 – Uyghur
2017 - Rohingya



History – Year 9
Knowledge Organiser
Topic 2



Key individuals

Oskar Schindler. Used Jewish people as slave labour in his factory but then saved over 1,000 workers from death in the Holocaust.

Anne Frank. Jewish teenager who kept a diary whilst hiding from the Nazis in Amsterdam. Her family were betrayed and only her father survived.

Dina Pronicheva. One of Few survivors of the Massacre of Jewish people at Babi Yar in Kiev in 1941 where 33,771 were murdered In a day.

Leon Greenman. A Holocaust survivor who dedicated his life to educating people about the Holocaust. He lost his wife and child in the Holocaust.

Key vocabulary:

Auschwitz-Birkenau: largest death camp where 1.1 million died. Located in Poland.
Concentration camp: where prisoners were kept as slave labour.
Dachau: first concentration camp near Munich, Germany.
Death camp: camp with the aim of killing as many as possible
Einsatzgruppen: Nazi units sent out to round up and kill people, mainly Jewish people in eastern Europe.
Final Solution: the name of the project to kill as many Jewish people as possible.
Genocide: mass murder of a group of people which is organised.
Ghetto: areas of cities were Jewish people were forced to live in overcrowded and dirty conditions.
Holocaust: when over 11 million people were murdered by the Nazis in Europe, including 6 million Jewish people. The word means "burned sacrifice"
Holocaust by bullets: murder of groups of people by the Einsatzgruppen in eastern Europe.
Indoctrinate: brainwash people into believing certain ideas using media, education and propaganda.
Kristallnacht: pogrom of Jewish people in Germany in 1938.
Persecution: unfair treatment of people which is relentless.
Pogrom: massacre of Jewish people.
"Resettlement": a Nazi term which referred to the deportation of Jewish people to the east. Really it meant their murder.
Scapegoat: when someone is blamed for an event even though it isn't their fault.
Shoah: the Jewish word for the events of the Holocaust. It means "catastrophe"
Wannsee: where the final solution was decided, near to Berlin.

Enquiry: How did the Holocaust happen?

History – Year 9
Knowledge Organiser
Topic 2

A drawing made by Holocaust survivor David Friedman in 1967. Friedman was sent to Auschwitz-Birkenau and his wife and child died there.

Historical skill focus: using evidence

- What is the nature, origin and purpose of a source?
- What makes a source useful?

What to focus on	Starting sentences
What is the NATURE of the source? Does this make it useful?	Source A is useful because...
What is the ORIGIN of the source? Does this make it useful?	This is shown by...
What is the PURPOSE of the source? Does this make it useful?	The source is also useful due to its purpose which was to...

Using evidence

Write at least two paragraphs to answer this question:
How useful is this source to a historian investigating the Holocaust?

Developing	Secure	Exceeding
I can explain how a source can be useful/not useful in a PEE paragraph. I am starting to think about the nature, origin and purpose of the source and its impact.	I can explain how useful a source is and then make a judgement based on this information. I can write this in a PEEL paragraph. I can accurately comment on the purpose of a source	I can make a complex judgement on the purpose of a source – linking this to the date of the source. I can begin to think about the conscious and subconscious bias of a source.

Nature = type of source like a painting or letter
Origin = date made and who made it
Purpose = why it was made = motivate/justify/persuade

Point = One way the source is useful is...
Evidence = This is shown by the nature of the source...
Explain = This is useful because...

YEAR 9 – REASONING WITH NUMBER...

Numbers

@whisto_maths

What do I need to be able to do?

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

- Identify integers, real and rational numbers
- Work with directed number
- Solve problems with number
- Find HCF/ LCM
- Add/ Subtract fractions
- Multiply/ Divide fractions
- Write numbers in standard form

Keywords

Integer: a whole number that is positive or negative
Rational: a number that can be made by dividing two integers
Irrational: a number that cannot be made by dividing two integers
Inverse operation: the operation that reverses the action
Quotient: the result of a division
Product: the result of a multiplication
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number

Integers, real and rational numbers

Rational – root word: ratio

Real numbers: $\frac{2}{3}$ stems from 2 ! ($\frac{2}{3}$ of the whole)

Irrational numbers: $\sqrt{2}$ the solution is a decimal that never ends and does not repeat

The square root of a negative is not a real number and cannot be found

HCF/LCM R

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

HCF = 6

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

Standard form R

Any number between 1 and less than 10 × 10^{n} ← Any integer

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

$= 600000 + 800000$
$= 1400000$
$= 1.4 \times 10^5$

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

$1.5 \div 0.3 \times 10^5 \div 10^3$
$= 5 \times 10^2$

Directed number R

Addition

$2 + -4 = -2$

Zero pair ($-1 + 1 = 0$)

Two "−1" left $= -2$

Generalisation: $+ - = -$

Subtraction

$= 2$

Representation for calculation

"Subtract" – means take away or remove

Generalisation: $- - = +$

$2 - -1 = 3$

Take away one

Start with the representation of 2

$= 3$

Multiplication

= −1
= 1

The act of making counters into their negative is turning them over

$-2 \times -3 = 6$

Divisions are the inverse operations

a = 5 b = −4

Brackets around negative substitutions helps remove calculation errors

$2a - b = 2 \times 5 - (-4) = 10 + 4 = 14$

Addition/ Subtraction of fractions R

$\frac{4}{5} - \frac{2}{3}$

$\frac{12}{15} - \frac{10}{15} = \frac{2}{15}$

Use equivalent fractions to find a common multiple for both denominators

Multiplication/ Division of fractions R

$\frac{3}{4} \times \frac{2}{3}$

Shade in 3 parts

Repeat it on this many rows

This many columns

This many rows

$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$ ← Parts shaded

Total number of parts in the diagram

Modelled:

3

4

Remember to use reciprocals

$\frac{2}{5} \div \frac{3}{4}$

$\frac{2}{5} \times \frac{4}{3}$

Multiplying by a reciprocal gives the same outcome

Represented

$= \frac{8}{15}$

YEAR 9 — REASONING WITH NUMBER...

Using Percentages

@whisto_maths

What do I need to be able to do?

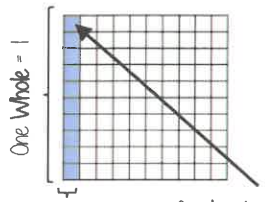
By the end of this unit you should be able to:

- Use FDP equivalence
- Calculate percentage increase and decrease
- Express percentage change
- Solve reverse percentage problems
- Solve percentage problems (calculator and non calculator problems)

Keywords

Percent: parts per 100 — written using the % symbol
Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.
Fraction: a fraction represents how many parts of a whole value you have.
Equivalent: of equal value.
Reduce: to make smaller in value.
Growth: to increase/ to grow.
Integer: whole number, can be positive, negative or zero.
Invest: use money with the goal of it increasing in value over time (usually in a bank).
Multiplier: the number you are multiplying by.
Profit: the income take away any expenses/ costs.

FDP Equivalence (R)



$\frac{10}{100} = \frac{1}{10} = 0.10$

One **hundredth** (one whole split into 100 equal parts)

Percentage

100% = a whole = 100 hundredths

10 hundredths
10 out of 100
10%

ones	tenths	hundredths
•	•	

Converting FDP (R)

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares → **70 "hundredths"** = **7 "tenths"** = **0.7** →  → 70 hundredths = 70%

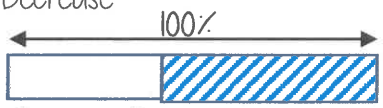
Using a calculator: $\frac{\square}{\square}$ → S⇌D Convert to a decimal

× 100 converts to a percentage

Be careful of recurring decimals
e.g. $\frac{1}{3} = 0.3333333 = 0.\dot{3}$
The dot above the 3

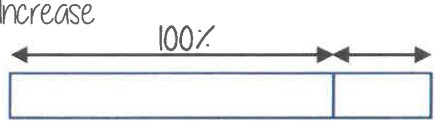
Percentage Increase/ Decrease (R)

Decrease



100 − 0.58 = 0.42 ← **Multiplier** Less than 1

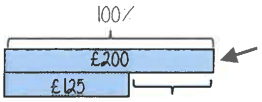
Increase



100% + 12% = 112%
1.00 + 0.12 = 1.12 ← **Multiplier** More than 1

Percentage change (R)

I bought a phone for £200
A year later sold it for £125



All values of change compare to the ORIGINAL value

Percentage loss

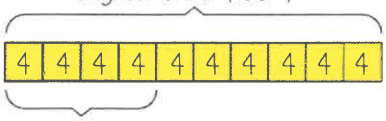
$\frac{75}{200} \times 100 = 37.5\%$

$$\frac{\text{Difference in values}}{\text{Original value}} \times 100$$

Reverse Percentages

40% of my number is 16
What am I thinking of?

Original Number (100%)

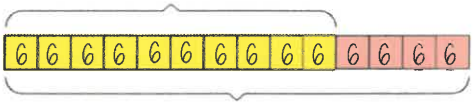


16

40% = 16
10% = 4
100% = 40

140% of my number is 84. What is the original number?

Original Number (100%)

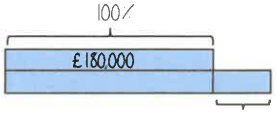


84

140% = 84
10% = 6
100% = 60

Try to scale down to 10% or 1% and then scale back up to 100%

I bought a house for £180,000, I later sold it for £216,000



Percentage profit

Money made (profit value) → $\frac{36000}{180000} \times 100 = 20\%$

YEAR 9 — REASONING WITH NUMBER...

Maths & Money

@whisto_maths

What do I need to be able to do?

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

- Solve problems with bills and bank statements
- Calculate simple interest
- Calculate compound interest
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems

Keywords

Credit: money being placed into a bank account
Debit: money that leaves a bank account
Balance: the amount of money in a bank account
Expense: a cost/ outgoing
Deposit: an initial payment (often a way of securing an item you will later pay for)
Multiplier: a number you are multiplying by. (Multiplier more than 1 = increasing, less than 1 = decreasing)
Per Annum: each year
Currency: the type of money a country uses.
Unitary: one — the cost of one.

Bills and Bank Statements

Bills — tell you the amount items cost and can show how much money you need to pay

Some can include a total

Look for different units (Is it in pence or pounds)

Menu	Price
Milk	89p
Tea	£1.50

Bank Statements

Bank statement can have negative balances if the money spent is higher than the money coming into the account

Date	Description	Credit	Debit	Balance
19th Sept	Salary	£1500		£1500
19th Sept	Mortgage		£600	£900
25th Sept	Bday Money	£15		£915

Simple Interest

For each year of investment the interest remains the same

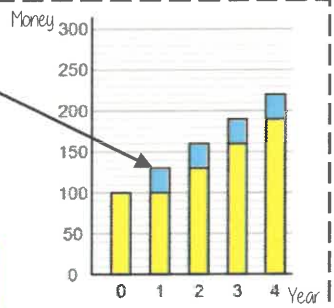
$$\frac{\text{Principal amount} \times \text{Interest Rate} \times \text{Years}}{100}$$

Principal amount is the amount invested in the account.

e.g. Invest £100 at 30% simple interest for 4 years

$\frac{100 \times 30 \times 4}{100} = £120$

This account earned **£120** interest
At the end of year 4 they have **£220**



Compound Interest

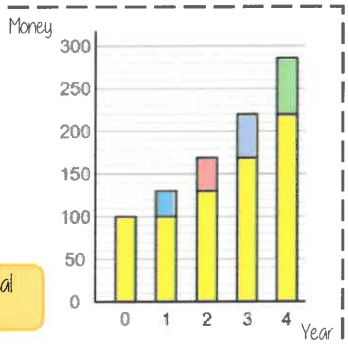
Interest is added to the current value of investment at the end of each year so the next year's interest is greater.

$$\text{Principal amount} \times \text{Multiplier}^{\text{Years}}$$

e.g. Invest £100 at 30% compound interest for 4 years

$100 \times 1.3^4 = £285.61$

This account has **£285.61** in total at the end of the 4 years.



Value Added Tax (VAT)

VAT is payable to the government by a business. In the UK VAT is 20% and added to items that are bought.

Essential items such as food do not include VAT.

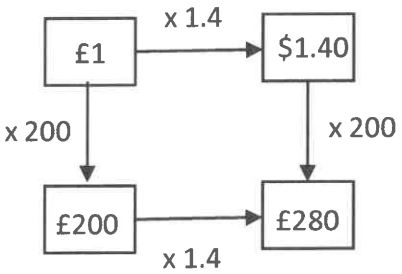
Wages and Taxes

Salaries fall into tax brackets — which means they pay this much each month from their salary.

Taxable Income	Tax Rate
£12 501 to £50 000	20%
£50 001 to £150 000	40%
over £150 000	45%

Over time:
Time and a half — means 1.5 times their hourly rate
Double — 2 times their hourly rate

Exchange Rates



When making estimates it is also useful to use estimates to check if our solution is reasonable.

Use inverse operations to reverse the exchange process

Common Currencies

United Kingdom	£	Pounds
United States of America	$	Dollars
Europe	€	Euros

Unit Pricing

4 Oranges £1	5 cupcakes £1.20

$4 = £1.00 \div 2$
$2 = £0.50 \div 2$
$1 = £0.25$

$5 = £1.20 \div 5$
$1 = £0.20$

Cost per Unit

To calculate unit per cost you divide by the cost

Cupcakes are the best value as one item has the cheapest value

There is a directly proportional relationship between the cost and number of units.

Beckfoot

Music	BTEC Music- Component 1- Exploring music products and styles	Year group- 10/11

enjoy learn succeed

Genres

1	60's to 70's	Folk revival, Psychedelic, Heavy Metal, Soul, Motown, Disco, Punk, Reggae
2	80's to 90's	Synth pop, Post punk, Thrash Metal, Grunge, Britpop, Hip hop, House, Rave
3	00's to present day	Pop Punk, EDM, Dubstep, K-pop, Reggaeton, Grime, Trap
4	World music and Fusion	African drum music, Indian Raga, Afrobeat, Jazz fusion
5	Music for Media	Film, TV, Computer games, Ambient music, Foley
6	Western Classical	Romantic, Orchestral, Minimalism
7	Jazz and Blues	Bebop, Big band, Blue note, Country blues, Delta blues

Industry Products

1	Live Performance	Performing to a live audience (video)
2	Audio recording	Audio recording of your piece
3	Composition for media	Own composition for TV, Film or game
4	DAW Project	Project using sequencing, synthesis and sampling
5	Original song	Own song / composition idea

Music Technology Terms

1	Multi-tracking	Recording several parts one at a time and layering them using a DAW
2	Overdubbing	Doubling up the recording of a part to make it sound bigger / Thicker in texture
3	Sampling	Taking a small section of an existing audio recording and using it in own work
4	Synthesiser	Computer created instrument or sound
5	Sequencing	Composing music using MIDI
6	MIDI	Musical notation for DAW
7	Looping	Continuous playback of musical phrase / sound
8	Turntablism	Manipulating sounds and beats using DJ equipment
9	Phasing and distortion	Guitar effects used to manipulate audio
10	DAW	Digital Audio Workstation. Software used to create music
11	Quantise	Aautomated movement of performed notes
12	Analogue	Recording onto a physical format. Before digital age

Key terms for analysing music

1	Dynamics	How loud or quiet the music is. Does it change in certain sections and why?
2	Rhythm	The pattern of notes used. Does the instrument play a repetitive rhythm or a complex one?
3	Structure	The sections of the music. Into, Verse, Chorus, Bridge, Outro. How the music is put together
4	Melody	The main tune. Think about if it moves in steps or leaps.
5	Instrumentation	The instruments used
6	Texture	The layers of instruments / Sound
7	Timbre	Describes the characteristics of the sound. Eg. Bright or Gritty.
8	Harmony	The Key the music is written in. Major or Minor.
9	Syncopation	A rhythm the used the off beat (beats 2 and 4)
10	BPM	Beats per minute, used to measure the tempo (speed)

BUDDHISM KNOWLEDGE ORGANISER

Overview

Buddhism is one of the world's major religions. It is the **world's 4th largest religion**, with about 520 million followers.

Buddhists are the people who follow Buddhism. They follow the teachings of a man named **Siddhartha Gautama,** who became known as **the Buddha.**

The religion began when Gautama, a prince who had lived a life of luxury, realised that there was **suffering in the world**, and committed himself to understanding why.

This happened in **India** around 2,500 years ago.

The holy book in Buddhism is called **Tipitaka. Buddhist Temples** are buildings designed for Buddhist worship.

Image of the Buddha, known in life as Siddhartha Gautama, whose teachings founded Buddhism.

Buddhist Beliefs

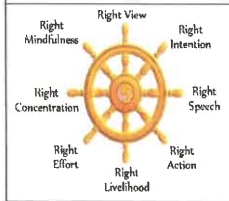
Siddhartha Gautama's Story

-Siddhartha was a rich prince of an area north of India. His mother and father treated him well, and protected him from the suffering in the world.

-As a young man, Siddhartha left the palace for the first time, and was upset by the things that he saw: old age, sickness and death. He decided to leave his comfortable life to see if he could find an answer to the suffering.
-After many years of trying, he sat under a tree (the Bodhi tree) by a full moon and started meditating. In doing this he became Enlightened – he saw the meaning in all things. He was then known as the Buddha.

The Four Noble Truths

-The Buddhist teachings are known as Dharma. They include the Four Noble Truths and the Eightfold-Path. Buddhism's Noble Truths are:
1.Life always involves suffering (dukkha).
2. Suffering happens because people are greedy and never satisfied with what they have.
3. Greed and selfishness can be overcome.
4. The way to overcome them is to follow the Eightfold Path.



The Eightfold Path

- Siddhartha created a way of life which ensured that his basic needs were covered, but didn't require any extra comforts. Buddhists try to live following the Eightfold Path:

1. Right viewpoint
2. Right values/ thought
3. Right speech
4. Right actions
5. Right livelihood
6. Right effort
7. Right concentration
8. Right mindfulness

Answers to Important Questions and Key Vocabulary

Where and how do Buddhists worship? Why?		-Buddhists worship either in temples or at home, often sitting or kneeling facing a shrine of Buddha. -They may listen to monks reciting religious texts, take part in chanting, or meditate. -Buddhists hope to achieve Enlightenment. They believe that there is a cycle of birth, life, death and rebirth. If a person gains Enlightenment (like the Buddha) they can break out of this cycle, to a place of eternal peace that is known as 'Nirvana.'
What is the Tipitaka?		-The Tipitaka is believed to be Buddha's teachings. It is written in an ancient Indian language known as Pali. It is a very large book, that takes up about forty volumes when translated into English! The Tipitaka is made up of three sections of wisdom.
Where do most Buddhists live in the world?		-About 7% of the world's population are Buddhists. -China has the most Buddhists – about 250 million Buddhists live there. -However, Cambodia has the highest proportion of Buddhists – about 97% of its population are Buddhists. There are also lots of Buddhists in Thailand, Sri Lanka, and Japan. -Many Buddhists in the far east devote their lives to Buddhism, living in isolation in temples.
How many different types of Buddhists are there?		-Buddha's teachings spread far across the Asian continent. As it spread, different peoples formed their own approaches of Buddhism. -The three main types are called Theravada, Mahayana and Tibetan Buddhists. -Although they differ slightly, they all still keep the basic features of Buddhism.

Key Vocabulary

Buddha
Buddhist
Siddhartha Gautama
Tipitaka
Temple
Wesak
4 Noble Truths
Eightfold Path
Lotus Flower
Theravada
Mahayana
Tibetan

Top 10 Facts!

1. Buddhists don't believe in a God who made the world and everything in it.
2. Siddhartha's family were Hindu.
3. The lotus flower is an important symbol in Buddhism. It is a symbol of enlightenment.
4. The name 'Buddha' means 'the enlightened one' or 'the one who knows.'
5. Some Buddhists have shrines at home where they are able to worship.
6. The teachings of Siddhartha Gautama were not written down until about 400 years after his death.
7. Siddhartha Gautama died around age 80.
8. 'Puja' is the name for worship in Buddhism. People often light candles as they worship.
9. In images of Buddha, faces are always made to look calm and serene, to show that he has a peaceful mind.
10. Wesak is an important festival in Buddhism.

Buddhism Timeline

- **490BCE:** Siddhartha Gautama is born.
- **461 BCE:** Gautama leaves home to find an end for suffering.
- **455 BCE:** Gautama is enlightened – becomes the Buddha.
- **454 BCE:** People begin to follow the teachings of the Buddha.
- **410 BCE:** Gautama dies.
- **386 BCE:** Buddhism separates into two different lines.
- **269 BCE:** Emperor Asoka begins to spread Buddhism across India.
- **200 BCE – 1200CE:** Buddhism spreads along trade routes, reaching many other countries, including Sri Lanka, China, and Indonesia.

Chapter 5: Communicable diseases

Knowledge organiser

Communicable diseases

Communicable diseases can be spread from one organism to another.

Viruses live and reproduce rapidly inside an organism's cells. This can damage or destroy the cells.

Viruses

	Spread by	Symptoms
measles	inhalation of droplets produced by infected people when sneezing and coughing	• fever • red skin rash • complications can be fatal – young children are vaccinated to immunise them against measles
HIV (human immunodeficiency virus)	• sexual contact • exchange of body fluids (e.g., blood when drug users share needles)	• flu-like symptoms at first • virus attacks the body's immune cells, which can lead to AIDS – where the immune system is so damaged that it cannot fight off infections or cancers
TMV (tobacco mosaic virus – plants)	• direct contact of plants with infected plant material • animal and plant vectors • soil: the pathogen can remain in soil for decades	• mosaic pattern of discolouration on the leaves – where chlorophyll is destroyed • reduces plant's ability to photosynthesise, affecting growth

Bacteria reproduce rapidly inside organisms and may produce **toxins** that damage tissues and cause illness.

Bacteria

	Spread by	Symptoms	Prevention and treatment
Salmonella	bacteria in or on food that is being ingested	*Salmonella* bacteria and the toxins they produce cause • fever • abdominal cramps • vomiting • diarrhoea	poultry are vaccinated against *Salmonella* bacteria to control spread
gonorrhoea	direct sexual contact – gonorrhoea is a **sexually transmitted disease** (STD)	• thick yellow or green discharge from the vagina or penis • pain when urinating	• treatment with antibiotics (many antibiotic-resistant strains have appeared) • barrier methods of contraception, such as condoms

Fungi

	Spread by	Symptoms	Prevention and treatment
rose black spot	water and wind	• purple or black spots on leaves, which turn yellow and drop early • reduces plant's ability to photosynthesise, affecting growth	• **fungicides** • affected leaves removed and destroyed

Protists

	Spread by	Symptoms	Prevention and treatment
malaria	mosquitos feed on the blood of infected people and spread the protist pathogen when they feed on another person – organisms that spread disease by carrying pathogens between people are called **vectors**	• recurrent episodes of fever • can be fatal	• prevent mosquito vectors breeding • mosquito nets to prevent bites • anti-malarial medicine

Detection and identification of plant diseases

Signs that a plant is diseased

- stunted growth
- spots on leaves
- areas of rot or decay
- growths
- malformed stems or leaves
- discolouration
- pest infestation

Ways of identifying plant diseases

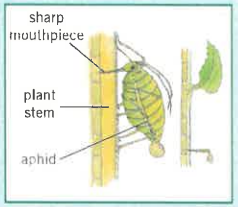
- gardening manuals and websites
- laboratory testing of infected plants
- testing kits containing monoclonal antibodies (Chapter 9 *Monoclonal antibodies*)

Plant diseases and insects

Plant diseases can also be directly caused by insects.

Aphids are insects that suck sap from the stems of plants. This results in

- reduced rate of growth
- wilting
- discolouration of leaves.



Ladybirds can be used to control aphid infestations as ladybird larvae eat aphids.

Plant defences

Physical barriers

- cellulose cell walls – provide a barrier to infection
- tough waxy cuticle on leaves
- bark on trees – a layer of dead cells that can fall off

Chemical barriers

- many plants produce antibacterial chemicals
- poison production stops animals eating plants

Mechanical adaptations

- thorns and hairs stop animals eating plants
- leaves that droop or curl when touched to scare herbivores or dislodge insects
- some plants **mimic** the appearance of unhealthy or poisonous plants to deter insects or herbivores

Controlling the spread of communicable disease

There are a number of ways to help prevent the spread of communicable diseases from one organism to another.

Hygiene

Hand washing, disinfecting surfaces and machinery, keeping raw meat separate, covering mouth when coughing/sneezing, etc.

Isolation

Isolation of infected individuals – people, animals, and plants can be isolated to stop the spread of disease.

Controlling vectors

If a vector spreads a disease destroying or controlling the population of the vector can limit the spread of disease.

Vaccination

Vaccination can protect large numbers of individuals against diseases.

Key terms

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

aphid, bacterium, communicable disease, fungicide, fungus, isolation, mimic, pathogen, protist, sexually transmitted disease (STD), toxin, vaccination, vector, virus

Chapter 5: Communicable diseases

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.

	B5 questions	Answers
1	What is a communicable disease?	a disease that can be transmitted from one organism to another
2	What is a pathogen?	a microorganism that causes disease
3	Name four types of pathogen.	bacteria, fungi, protists, viruses
4	How can pathogens spread?	air, water, direct contact
5	How do bacteria make you ill?	produce toxins that damage tissues
6	How do viruses make you ill?	reproduce rapidly inside cells, damaging or destroying them
7	Name three examples of viral diseases.	measles, HIV, tobacco mosaic virus
8	Name two examples of bacterial diseases.	*Salmonella*, gonorrhoea
9	Name four methods of controlling the spread of communicable disease.	good hygiene, isolating infected individuals, controlling vectors, vaccination
10	Describe an example of a protist disease.	malaria – caused by a protist pathogen that is spread from person to person by mosquito bites, and causes recurrent fevers
11	Describe an example of a fungal disease in plants.	rose black spot – spread by water and wind, and affects plant growth by reducing a plant's ability to photosynthesise
12	How can the cause of a plant disease be identified?	gardening manuals and websites, laboratory testing, monoclonal antibody kits
13	What are three mechanical defences that protect plants?	thorns and hairs, leaves that droop or curl, mimicry to trick animals
14	Give three physical defences of plants.	cellulose cell walls, tough waxy cuticles, bark on trees
15	How can aphids be controlled by gardeners?	introduce ladybirds to eat the aphids
16	How can plant diseases be detected?	areas of decay, discolouration, growths, malformed stems or leaves, presence of pests, spots on leaves, and stunted growth

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Chapter 6: Preventing and treating disease

Knowledge organiser

Non-specific defences

Non-specific defences of the human body against all pathogens include:

Skin

- physical barrier to infection
- produces antimicrobial secretions
- microorganisms that normally live on the skin prevent pathogens growing

Nose

Cilia and **mucus** trap particles in the air, preventing them from entering the lungs.

Trachea and bronchi produce mucus, which is moved away from the lungs to the back of the throat by cilia, where it is expelled.

Stomach

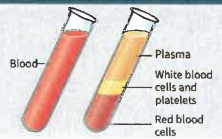
Produces strong acid (pH 2) that destroys pathogens in mucus, food, and drinks.

White blood cells

If a pathogen enters the body, the immune system tries to destroy the pathogen.

The function of **white blood cells** is to fight pathogens.

There are two main types of white blood cell – lymphocytes and phagocytes.



Lymphocytes

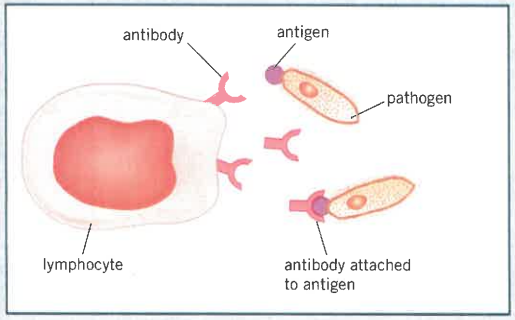
Lymphocytes fight pathogens in two ways:

Antitoxins

Lymphocytes produce **antitoxins** that bind to the toxins produced by some pathogens (usually bacteria). This *neutralises* the toxins.

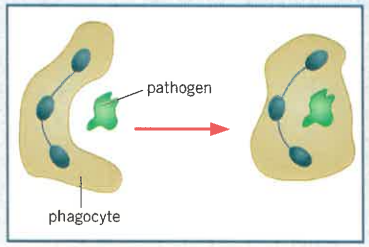
Antibodies

Lymphocytes produce **antibodies** that target and help to destroy specific pathogens by binding to **antigens** (proteins) on the pathogens' surfaces.



Phagocytes

1. Phagocytes are attracted to areas of infection.
2. The phagocyte surrounds the pathogen and engulfs it.
3. Enzymes that digest and destroy the pathogen are released.



Monoclonal antibodies (HT only)

Monoclonal antibodies are produced by mouse lymphocytes which are combined with a tumour cell to make a hybridoma cell. These can divide to make an antibody which can later be cloned and used to treat diseases such as cancer or used in pregnancy tests.

Key terms

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

antibiotic | antibody | antigen | antitoxin | dose | double-blind trial | efficacy | Herd immunity | monoclonal antibodies | mucus | peer review | placebo | toxicity | vaccination | white blood cell

Treating diseases

Antibiotics

- **Antibiotics** are medicines that can kill *bacteria* in the body.
- Specific bacteria need to be treated by specific antibiotics.
- Antibiotics have greatly reduced deaths from infectious bacterial diseases, but antibiotic-resistant strains of bacteria are emerging.

Treating viral diseases

- Antibiotics *do not* affect viruses.
- Drugs that kill viruses often damage the body's tissues.
- Painkillers treat the symptoms of viral diseases but do not kill pathogens.

Discovering and developing new drugs

Drugs were traditionally extracted from plants and microorganisms, for example

- the heart drug digitalis comes from foxglove plants
- the painkiller aspirin originates from willow trees
- penicillin was discovered by Alexander Fleming from *Penicillium* mould.

Most modern drugs are now synthesised by chemists in laboratories.

New drugs are extensively tested and trialled for

- **toxicity** – is it harmful?
- **efficacy** – does it work?
- **dose** – what amount is safe and effective to give?

Stages of clinical trials

Pre-clinical trials

Drug is tested in cells, tissues, and live animals.

Clinical trials

1. Healthy volunteers receive very low doses to test whether the drug is safe and effective.
2. If safe, larger numbers of healthy volunteers and patients receive the drug to find the optimum dose.

Peer review

Before being published, the results of clinical trials will be tested and checked by independent researchers. This is called **peer review**.

Double-blind trials

Some clinical trials give some of their patients a **placebo** drug – one that is known to have no effect.

Double-blind trials are when neither the patients nor the doctors know who has been given the real drug and who has been given the placebo. This reduces biases in the trial.

Vaccinations

Vaccinations involve injecting small quantities of dead or inactive forms of a pathogen into the body. This stimulates lymphocytes to produce the correct antibodies for that pathogen. If the same pathogen re-enters the body, the correct antibodies can be produced quickly to prevent infection. If a large proportion of the population is vaccinated against a disease, it is less likely to spread. This is called **herd immunity**.

Chapter 6: Preventing and treating disease

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.

	B6 questions	Answers
1	What non-specific systems does the body use to prevent pathogens getting into it?	• skin • cilia and mucus in the nose, trachea, and bronchi • stomach acid
2	What three functions do white blood cells have?	phagocytosis, producing antibodies, producing antitoxins
3	What happens during phagocytosis?	phagocyte is attracted to the area of infection, engulfs a pathogen, and releases enzymes to digest the pathogen
4	What are antigens?	proteins on the surface of a pathogen
5	Why are antibodies a specific defence?	antibodies have to be the right shape for a pathogen's unique antigens, so they target a specific pathogen
6	What is the function of an antitoxin?	neutralise toxins produced by pathogens by binding to them
7	What does a vaccine contain?	small quantities of a dead or inactive form of a pathogen
8	How does vaccination protect against a specific pathogen?	vaccination stimulates the body to produce antibodies against a specific pathogen – if the same pathogen reenters the body, white blood cells rapidly produce the correct antibodies
9	What is herd immunity?	when most of a population is vaccinated against a disease, meaning it is less likely to spread
10	What is an antibiotic?	a drug that kills bacteria but not viruses
11	What do painkillers do?	treat some symptoms of diseases and relieve pain
12	What properties of new drugs are clinical trials designed to test?	toxicity, efficacy, and optimum dose
13	What happens in the pre-clinical stage of a drug trial?	drug is tested on cells, tissues, and live animals
14	What is a placebo?	medicine with no effect that is given to patients instead of the real drug in a trial
15	What is a double-blind trial?	a trial where neither patients nor doctors know who receives the real drug and who receives the placebo
16	What is a monoclonal antibody?	A monoclonal antibody is an antibody produced by a single clone of cells.
17	Give two examples in which monoclonal antibodies can be used for.	Treating cancer, in pregnancy tests

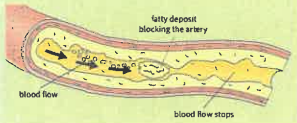
Chapter 7: Non-communicable diseases

Knowledge organiser

Coronary heart disease

Coronary heart disease (CHD) occurs when the coronary arteries become narrowed by the build-up of layers of fatty material within them.

This reduces the flow of blood, resulting in less oxygen for the heart muscle, which can lead to heart attacks.



Health issues

Health is the state of physical and mental well-being.

The following factors can affect health:

- communicable and non-communicable diseases
- diet
- stress
- exercise
- life situations.

Different types of disease may interact, for example:

- defects in the immune system make an individual more likely to suffer from infectious diseases
- viral infection can trigger cancers
- immune reactions initially caused by a pathogen can trigger allergies, for example skin rashes and asthma
- severe physical ill health can lead to depression and other mental illnesses.

Treating cardiovascular diseases

Treatment	Description	Advantages	Disadvantages
stent	inserted into blocked coronary arteries to keep them open	• widens the artery – allows more blood to flow, so more oxygen is supplied to the heart • less serious surgery	• can involve major surgery – risk of infection, blood loss, blood clots, and damage to blood vessels • risks from anaesthetic used during surgery
statins	drugs that reduce blood **cholesterol** levels, slowing down the deposit of fatty material in the arteries	• effective • no need for surgery • can prevent CHD from developing	• possible side effects such as muscle pain, headaches, and sickness • cannot cure CHD, so patient will have to take tablets for many years
replace faulty heart valves	heart valves that leak or do not open fully, preventing control of blood flow through the heart, can be replaced with biological or mechanical valves	• allows control of blood flow through the heart • long-term cure for faulty heart valves	• can involve major surgery – risk of infection, blood loss, blood clots, and damage to blood vessels • risks from anaesthetic used during surgery
transplants	if the heart fails a donor heart, or heart and lungs, can be transplanted **artificial hearts** can be used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest during recovery	• long-term cure for the most serious heart conditions • treats problems that cannot be treated in other ways	• transplant may be rejected if there is not a match between donor and patient • lengthy process • major surgery – risk of infection, blood loss, blood clots, and damage to blood vessels • risks from anaesthetic used during surgery

Risk factors and non-communicable diseases

A **risk factor** is any aspect of your lifestyle or substance in your body that can increase the risk of a disease developing.

Some risk factors cause specific diseases. Other diseases are caused by factors interacting.

Risk factor	Disease	Effects of risk factor
diet (obesity) and amount of exercise	Type 2 diabetes	body does not respond properly to the production of insulin, so blood glucose levels cannot be controlled
	cardiovascular diseases	increased blood cholesterol can lead to CHD
alcohol	impaired liver function	long-term alcohol use causes liver cirrhosis (scarring), meaning the liver cannot remove toxins from the body or produce sufficient bile
	impaired brain function	damages the brain and can cause anxiety and depression
	affected development of unborn babies	alcohol can pass through the placenta, risking miscarriages, premature births, and birth defects
smoking	lung disease and cancers	cigarettes contain carcinogens, which can cause cancers
	affected development of unborn babies	chemicals can pass through the placenta, risking premature births and birth defects
carcinogens, such as ionising radiation, and genetic risk factors	cancers	for example, tar in cigarettes and ultraviolet rays from the Sun can cause cancers
		some genetic factors make an individual more likely to develop certain cancers

Cancer

Cancer is the result of changes in cells that lead to uncontrolled growth and division by mitosis.

Rapid division of abnormal cells can form a **tumour**.

Malignant tumours are cancerous tumours that invade neighbouring tissues and spread to other parts of the body in the blood, forming secondary tumours.

Benign tumours are non-cancerous tumours that do not spread in the body.

Treatment

Treatment of non-communicable diseases linked to lifestyle risk factors – such as poor diet, drinking alcohol, and smoking – can be very costly, both to individuals and to the Government.

A high incidence of these lifestyle risk factors can cause high rates of non-communicable diseases in a population.

Key terms

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

artificial heart benign carcinogen cholesterol coronary heart disease
health malignant risk factor statin stent transplant tumour

Chapter 7: Non-communicable diseases

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.

	B7 questions	Answers
1	What is coronary heart disease?	layers of fatty material that build up inside the coronary arteries, narrowing them - resulting in a lack of oxygen for the heart
2	What is a stent?	a device inserted into a blocked artery to keep it open, allowing more blood and oxygen to the heart
3	What are statins?	drugs that reduce blood cholesterol levels, slowing the rate of fatty material deposit
4	What is a faulty heart valve?	heart valve that doesn't open properly or leaks
5	How can a faulty heart valve be treated?	replace with a biological or mechanical valve
6	When do heart transplants take place?	in cases of heart failure
7	What are artificial hearts used for?	keep patients alive whilst waiting for a transplant, or allow the heart to rest for recovery
8	Define health.	state of physical and mental well-being
9	What factors can affect health?	disease, diet, stress, exercise, life situations
10	What is a risk factor?	aspect of lifestyle or substance in the body that can increase the risk of a disease developing
11	Give five risk factors.	poor diet, smoking, lack of exercise, alcohol, carcinogens
12	What is cancer?	a result of changes in cells that lead to uncontrolled growth and cell division by mitosis
13	What are malignant tumours?	cancerous tumours that can spread to neighbouring tissues and other parts of the body in the blood, forming secondary tumours
14	What are benign tumours?	non-cancerous tumours that do not spread in the body
15	What two types of risk factor affect the development of cancers?	lifestyle and genetic risk factors
16	What is a carcinogen?	a substance that can cause cancers to develop

Chapter 1: Atomic structure

Knowledge organiser

Development of the model of the atom

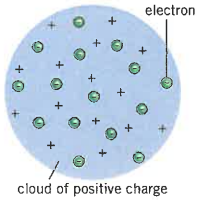
Dalton's model

John Dalton thought of the **atom** as a solid sphere that could not be divided into smaller parts. His model did not include **protons**, **neutrons**, or **electrons**.

The plum pudding model

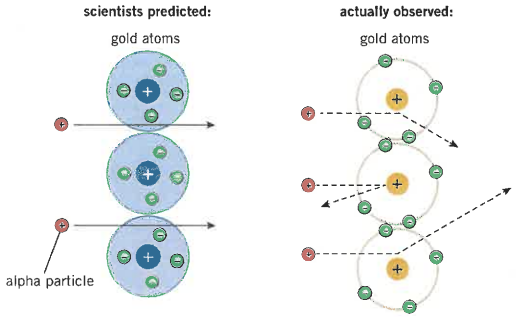
Scientists' experiments resulted in the discovery of sub-atomic charged particles. The first to be discovered were electrons – tiny, negatively charged particles.

The discovery of electrons led to the plum pudding model of the atom – a cloud of positive charge, with negative electrons embedded in it. Protons and neutrons had not yet been discovered.



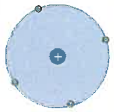
Alpha scattering experiment

1. Scientists fired small, positively charged particles (called alpha particles) at a piece of gold foil only a few atoms thick.
2. They expected the alpha particles to travel straight through the gold.
3. They were surprised that some of the alpha particles bounced back and many were deflected (alpha scattering).
4. To explain why the alpha particles were repelled the scientists suggested that the positive charge and mass of an atom must be concentrated in a small space at its centre. They called this space the **nucleus**.



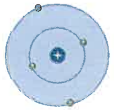
Nuclear model

Scientists replaced the plum pudding model with the nuclear model and suggested that the electrons **orbit** the nucleus, but not at set distances.



Electron shell (Bohr) model

Niels Bohr calculated that electrons must orbit the nucleus at fixed distances. These orbits are called **shells** or **energy levels**.



The proton

Further experiments provided evidence that the nucleus contained smaller particles called protons. A proton has an opposite charge to an electron.

The neutron

James Chadwick carried out experiments that gave evidence for a particle with no charge. Scientists called this the neutron and concluded that the protons and neutrons are in the nucleus, and the electrons orbit the nucleus in shells.

Relative mass

One property of protons, neutrons, and electrons is **relative mass** – their masses compared to each other. Protons and neutrons have the same mass, so are given a relative mass of 1. It takes almost 2000 electrons to equal the mass of a single proton – their relative mass is so small that we can consider it as 0.

Size

The atom has a radius of 1×10^{-10} m. Nuclei (plural of nucleus) are around 10 000 times smaller than atoms and have a radius of around 1×10^{-14} m.

Elements and compounds

Elements are substances made of one type of atom. Each atom of an element will have the same number of protons.

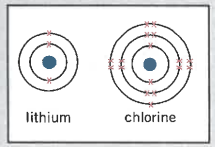
Compounds are made of different types of atoms chemically bonded together. The atoms in a compound have different numbers of protons.

Drawing atoms

Electrons in an atom are placed in fixed shells. You can put

- up to two electrons in the first shell
- eight electrons each in the second and third shells.

You must fill up a shell before moving on to the next one.



Mixtures

- A mixture consists of two or more elements or compounds that are not chemically combined together.
- The substances in a mixture can be separated using physical processes.
- These processes do not use chemical reactions.

Separating mixtures

- filtration – insoluble solids and a liquid
- crystallisation – soluble solid from a solution
- simple distillation – solvent from a solution
- fractional distillation – two liquids with similar boiling points
- paper chromatography – identify substances from a mixture in solution

Atoms and particles

	Relative charge	Relative mass	
Proton	+1	1	= atomic number
Neutron	0	1	= mass number – atomic number
Electron	−1	0 (very small)	= same as the number of protons

All atoms have equal numbers of protons and electrons, meaning they have no overall charge:

total negative charge from electrons = total positive charge from protons

Isotopes

Atoms of the same element can have a different number of neutrons, giving them a different overall mass number. Atoms of the same element with different numbers of neutrons are called **isotopes**.

The **relative atomic mass** is the average mass of all the atoms of an element:

$$\text{relative atomic mass} = \frac{(\text{abundance of isotope 1} \times \text{mass of isotope 1}) + (\text{abundance of isotope 2} \times \text{mass of isotope 2}) \ldots}{100}$$

Key terms

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

abundance, atom, atomic number, aqueous, compound, electron, element, energy level, isotope, neutron, nucleus, orbit, product, proton, reactant, relative atomic mass, relative charge, relative mass, shell

Chapter 1: Atomic structure

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.

C1 questions	Answers
1 What is an atom?	smallest part of an element that can exist
2 What is Dalton's model of the atom?	atoms as solid spheres that could not be divided into smaller parts
3 What is the plum pudding model of the atom?	sphere of positive charge with negative electrons embedded in it
4 What did scientists discover in the alpha scattering experiment?	some alpha particles were deflected by the gold foil – this showed that an atom's mass and positive charge must be concentrated in one small space (the nucleus)
5 Describe the nuclear model of the atom.	dense nucleus with electrons orbiting it
6 What did Niels Bohr discover?	electrons orbit in fixed energy levels (shells)
7 What did James Chadwick discover?	uncharged particle called the neutron
8 Where are protons and neutrons?	in the nucleus
9 What is the relative mass of each sub-atomic particle?	proton: 1, neutron: 1, electron: 0 (very small)
10 What is the relative charge of each sub-atomic particle?	proton: +1, neutron: 0, electron: −1
11 How can you find out the number of protons in an atom?	the atomic number on the Periodic Table
12 How can you calculate the number of neutrons in an atom?	mass number – atomic number
13 Why do atoms have no overall charge?	equal numbers of positive protons and negative electrons
14 How many electrons would you place in the first, second, and third shells?	up to 2 in the first shell and up to 8 in the second and third shells
15 What is an element?	substance made of one type of atom
16 What is a compound?	substance made of more than one type of atom chemically joined together
17 What is a mixture?	two or more substances not chemically combined
18 What are isotopes?	atoms of the same element (same number of protons) with different numbers of neutrons
19 What are the four physical processes that can be used to separate mixtures?	filtration, crystallisation, distillation, fractional distillation, chromatography
20 What is relative mass?	the average mass of all the atoms of an element

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Chapter 2: The Periodic Table

Knowledge organiser

Development of the Periodic Table

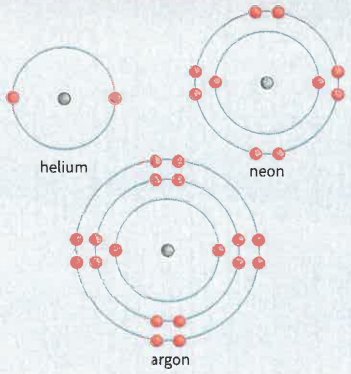
The Periodic Table has changed over time as scientists have organised it differently. Mendeleev was able to accurately predict the properties of undiscovered elements based on the gaps in the table.

	First lists of elements	Mendeleev's Periodic Table	Modern Periodic Table
How are elements ordered?	by atomic mass	normally by atomic mass but some elements were swapped around	by atomic number
Are there gaps?	no gaps	gaps left for undiscovered elements	no gaps – all elements up to a certain atomic number have been discovered
How are elements grouped?	not grouped	grouped by chemical properties	grouped by the number of electrons in the outer shells
Metals and non-metals	no clear distinction	no clear distinction	metals to the left, non-metals to the right
Problems	some elements grouped inappropriately	incomplete, with no explanation for why some elements had to be swapped to fit in the appropriate groups	—

Group 0

Elements in **Group 0** are called the **noble gases**. Noble gases have the following properties:

- full outer shells with eight electrons, so do not need to lose or gain electrons
- are very unreactive (**inert**) so exist as single atoms as they do not bond to form molecules
- boiling points that increase down the group.



Key terms

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

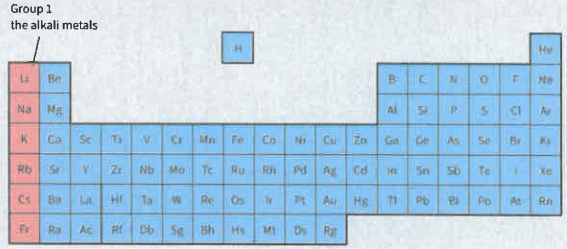
alkali metals chemical properties displacement groups halogens inert isotopes noble gas organised Periodic Table reactivity undiscovered unreactive

Group 1 elements

Group 1 elements react with oxygen, chlorine, and water, for example:

lithium + oxygen → lithium oxide
lithium + chlorine → lithium chloride
lithium + water → lithium hydroxide + hydrogen

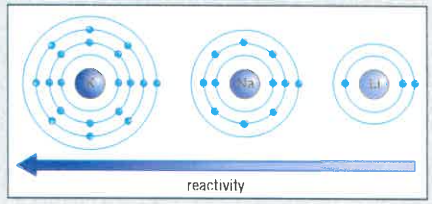
Group 1 elements are called **alkali metals** because they react with water to form an alkali (a solution of their metal hydroxide).



Group 1 properties

Group 1 elements all have one electron in their outer shell.
Reactivity increases down Group 1 because as you move down the group:

- the atoms increase in size
- the outer electron is further away from the nucleus, and there are more shells shielding the outer electron from the nucleus
- the electrostatic attraction between the nucleus and the outer electron is weaker so it is easier to lose the one outer electron
- the melting point and boiling point decreases down Group 1.



Group 7 elements

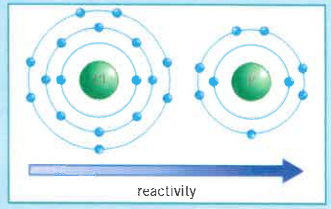
Group 7 elements are called the **halogens**. They are non-metals that exist as molecules made up of pairs of atoms.

Name	Formula	State at room temperature	Melting point and boiling point	Reactivity
fluorine	F_2	gas	increases down the group	decreases down the group
chlorine	Cl_2	gas		
bromine	Br_2	liquid		
iodine	I_2	solid		

Group 7 reactivity

Reactivity decreases down Group 7 because as you move down the group:

- the atoms increase in size
- the outer shell is further away from the nucleus, and there are more shells between the nucleus and the outer shell
- the electrostatic attraction from the nucleus to the outer shell is weaker so it is harder to gain one electron to fill the outer shell.



Group 7 displacement

More reactive Group 7 elements can take the place of less reactive ones in a compound. This is called **displacement**.
For example, fluorine displaces chlorine as it is more reactive:

fluorine + potassium chloride → potassium fluoride + chlorine

Chapter 2: The Periodic Table

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.

	C2 questions	Answers
1	How is the modern Periodic Table ordered?	by atomic number
2	How were the early lists of elements ordered?	by atomic mass
3	Why did Mendeleev swap the order of some elements?	to group them by their chemical properties
4	Why did Mendeleev leave gaps in his Periodic Table?	leave room for elements that had not yet been discovered
5	Why do elements in a group have similar chemical properties?	have the same number of electrons in their outer shell
6	Where are metals and non-metals located on the Periodic Table?	metals to the left, non-metals to the right
7	What name is given to the Group 1 elements?	alkali metals
8	Why are the alkali metals named this?	they are metals that react with water to form an alkali
9	Give the general equations for the reactions of alkali metals with oxygen, chlorine, and water.	metal + oxygen → metal oxide metal + chlorine → metal chloride metal + water → metal hydroxide + hydrogen
10	How does the reactivity of the alkali metals change down the group?	increases (more reactive)
11	Why does the reactivity of the alkali metals increase down the group?	they are larger atoms, so the outermost electron is further from the nucleus, meaning there are weaker electrostatic forces of attraction and more shielding between the nucleus and outer electron, and it is easier to lose the electron
12	What name is given to the Group 7 elements?	halogens
13	Give the formulae of the first four halogens.	F_2, Cl_2, Br_2, I_2
14	How do the melting points of the halogens change down the group?	increase (higher melting point)
15	How does the reactivity of the halogens change down the group?	decrease (less reactive)
16	Why does the reactivity of the halogens decrease down the group?	they are larger atoms, so the outermost shell is further from the nucleus, meaning there are weaker electrostatic forces of attraction and more shielding between the nucleus and outer shell, and it is harder to gain an electron
17	What is a displacement reaction?	when a more reactive element takes the place of a less reactive one in a compound
18	What name is given to the Group 0 elements?	noble gases
19	Why are the noble gases inert?	they have full outer shells so do not need to lose or gain electrons
20	How do the melting points of the noble gases change down the group?	increase (higher melting point)

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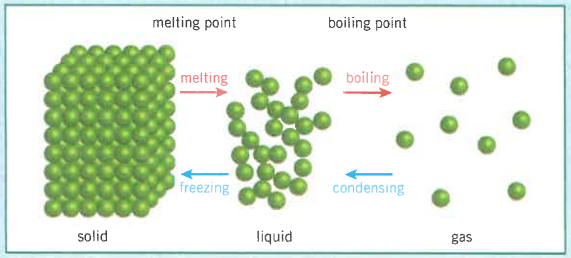
Chapter 3: Bonding 1

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.

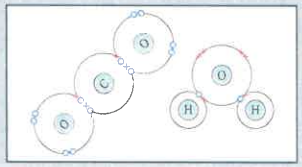
Covalent bonding

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

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

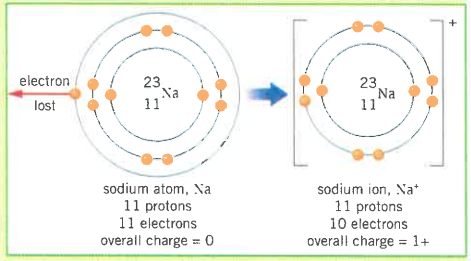
The number of electrons shared depends on how many extra electrons an atom needs to make a full outer shell.

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.



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.

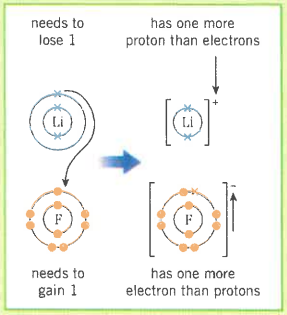
When melted or dissolved in water, ionic substances do conduct electricity because the ions are free to move and carry charge.

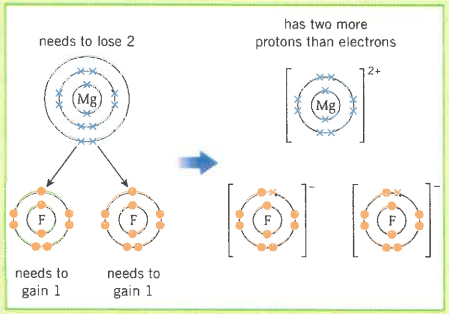
Melting points

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.

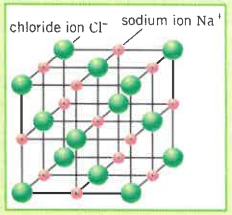




Metal atoms lose electrons to become positive ions. Non-metal atoms gain electrons to become negative ions.

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.

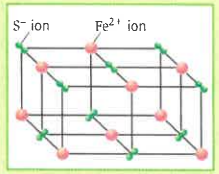


The electrostatic force of attraction works in all directions, so many billions of ions can be bonded together in a 3D structure.

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



Covalent structures

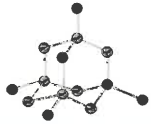
There are three main types of covalent structure:

Structure and bonding

Giant covalent

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

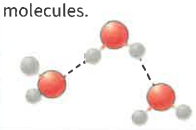
An example of a giant covalent structure is diamond.



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.



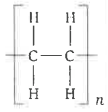
Large molecules

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.



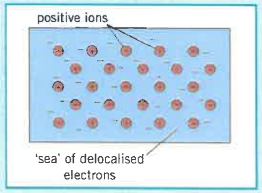
Metals: structure and properties

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

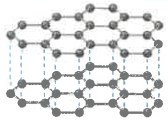
Properties			
	High melting and boiling points because the strong covalent bonds between the atoms must be broken to melt or boil the substances. This requires a lot of energy. Solid at room temperature.	Low melting and boiling points because only the intermolecular forces need to be overcome to melt 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.

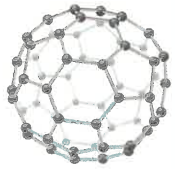
Graphene

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

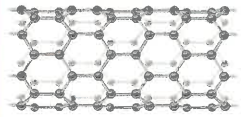


Buckminsterfullerene was the first fullerene to be discovered, and has 60 carbon atoms.

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

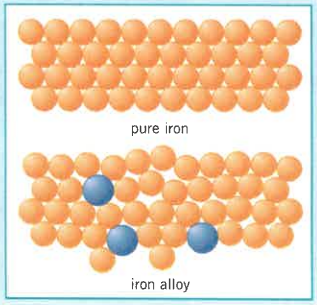


The carbon atoms in nanotubes are arranged in cylindrical tubes.
Their high **tensile strength** (they are difficult to break when pulled) makes them useful in electronics.

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

Chapter 3: Energy resources

Knowledge organiser

Energy resources

The main ways in which we use the Earth's energy resources are:

- generating electricity
- heating
- transport.

Most of our energy currently comes from **fossil fuels** – coal, oil, and natural gas.

Reliability and environmental impact

Some energy resources are more reliable than others. **Reliable** energy resources are ones that are available all the time (or at predictable times) and in sufficient quantities.

Both **renewable** and **non-renewable** energy resources have some kind of **environmental impact** when we use them.

Non-renewable energy resources

- not replaced as quickly as they are used
- will eventually run out

For example, fossil fuels and nuclear fission.

Renewable energy resources

- can be replaced at the same rate as they are used
- will not run out

For example, solar, tidal, wave, wind, geothermal, biofuel, and hydroelectric energies.

Non-renewable energy resources

Resource	Main uses	Source	Advantages	Disadvantages
coal	generating electricity	extracted from underground	• enough available to meet current energy demands • reliable – supply can be controlled to meet demand • relatively cheap to extract and use	• will eventually run out • release carbon dioxide when burned – one of the main causes of climate change • release other polluting gases, such as sulfur dioxide (from coal and oil) which causes acid rain • oil spills in the oceans kill marine life
oil	generating electricity transport heating			
natural gas	generating electricity heating			
nuclear fission	generating electricity	mining naturally occurring elements, such as uranium and plutonium	• no polluting gases or greenhouse gases produced • enough available to meet current energy demands • large amount of energy transferred from a very small mass of fuel • reliable – supply can be controlled to meet demand	produces nuclear waste, which is: • dangerous • difficult and expensive to dispose of • stored for centuries before it is safe to dispose of. nuclear power plants are expensive to: • build and run • decommission (shut down).

Renewable energy resources

Resource	Main uses	Source	Advantages	Disadvantages
solar energy	generating electricity heating	sunlight transfers energy to solar cells sunlight transfers energy to solar heating panels	can be used in remote places very cheap to run once installed no pollution/greenhouse gases produced	supply depends on weather expensive to buy and install cannot supply large scale demand
hydroelectric energy	generating electricity	water flowing downhill turns generators	low running cost no fuel costs reliable and supply can be controlled to meet demand	expensive to build hydroelectric dams flood a large area behind the dam, destroying habitats and resulting in greenhouse gas production from rotting vegetation
tidal energy	generating electricity	turbines on tidal barrages turned by water as the tide comes in and out	predictable supply as there are always tides can produce large amounts of electricity no fuel costs no pollution/greenhouse gases produced	tidal barrages: – change marine habitats and can harm animals – restrict access and can be dangerous for boats – are expensive to build and maintain cannot control supply supply varies depending on time of month
wave energy	generating electricity	floating generators powered by waves moving up and down	low running cost no fuel costs no pollution/greenhouse gases produced	floating generators: – change marine habitats and can harm animals – restrict access and can be dangerous for boats – are expensive to build, install, and maintain dependent on weather cannot supply large scale demand
wind energy	generating electricity	turbines turned by the wind	low running cost no fuel costs no pollution/greenhouse gases produced	supply depends on weather large amounts of land needed to generate enough electricity for large scale demand can produce noise pollution for nearby residents
geothermal energy	generating electricity heating	radioactive substances deep within the Earth transfer heat energy to the surface	low running cost no fuel costs no pollution/greenhouse gases produced	expensive to set up only possible in a few suitable locations around the world
biofuels	generating electricity transport	fuel produced from living or recently living organisms, for example, plants and animal waste	can be **carbon neutral** – the amount of carbon dioxide released when the fuel is burnt is equal to the amount of carbon dioxide absorbed when the fuel is grown reliable and supply can be controlled to meet demand	expensive to produce biofuels growing biofuels requires a lot of land and water that could be used for food production can lead to deforestation – forests are cleared for growing biofuel crops

Key terms

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

biofuel, carbon neutral, environmental impact, fossil fuel, geothermal, hydroelectric, non-renewable, reliability, renewable

Chapter 3: Energy resources

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.

	P3 questions	Answers
1	What is a non-renewable energy resource?	will eventually run out, is not replaced at the same rate it is being used
2	What is a renewable energy resource?	will not run out, it is being (or can be) replaced at the same rate as which it is used
3	What are the main renewable and non-renewable resources available on Earth?	renewable: solar, tidal, wave, wind, geothermal, biofuel, hydroelectric non-renewable: coal, oil, gas, nuclear
4	What are the main advantages of using coal as an energy resource?	enough available to meet current demand, reliable, can control supply to match demand, cheap to extract and use
5	What are the main disadvantages of using coal as an energy resource?	will eventually run out, releases CO_2 which contributes to climate change, releases sulfur dioxide which causes acid rain
6	What are the main advantages of using nuclear fuel as an energy resource?	lot of energy released from a small mass, reliable, can control supply to match demand, enough fuel available to meet current demand, no polluting gases
7	What are the main disadvantages of using nuclear fuel as an energy resource?	waste is dangerous and difficult and expensive to deal with, expensive initial set up, expensive to shut down and to run
8	What are the main advantages of using solar energy?	can be used in remote places, no polluting gases, no waste products, very low running cost
9	What are the main disadvantages of using solar energy?	unreliable, cannot control supply, initial set up expensive, cannot be used on a large scale
10	What are the main advantages of using tidal power?	no polluting gases, no waste products, reliable, can produce large amounts of electricity, low running cost, no fuel costs
11	What are the main disadvantages of using tidal power?	can harm marine habitats, initial set up expensive, cannot increase supply when needed, amount of energy varies on time of month, hazard for boats
12	What are the main advantages of using wave turbines?	no polluting gases produced, no waste products, low running cost, no fuel costs
13	What are the main disadvantages of using wave turbines?	unreliable, dependent on weather, cannot control supply, initial set up expensive, can harm marine habitats, hazard for boats, cannot be used on a large scale
14	What are the main disadvantages of using wind turbines?	unreliable, dependent on weather, cannot control supply, take up lot of space, can produce noise pollution
15	What are the advantages and the disadvantages of using geothermal energy?	advantages: no polluting gases, low running cost disadvantages: initial set up expensive, available in few locations
16	What are the main advantages and disadvantages of using biofuels?	advantages: can be 'carbon neutral', reliable disadvantages: expensive to produce, use land/water that might be needed to grow food
17	What are the main advantages and disadvantages of using hydroelectric power?	advantages: no polluting gases, no waste products, low running cost, no fuel cost, reliable, can be controlled to meet demand disadvantages: initial set up expensive, dams can harm/ destroy marine habitats

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