Name and Tutor group:

Year 9 Knowledge Organiser

Term 1

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

PROPAGANDA

Images that are used to persuade and encourage

EXAMPLES OF FINAL OUTCOMES:

YOU WILL LEARN:

Skills to produce a propaganda poster using text, and your chosen theme in the style of a contemporary artist.
You will make use of composition and layering with different materials to develop our art and design skills

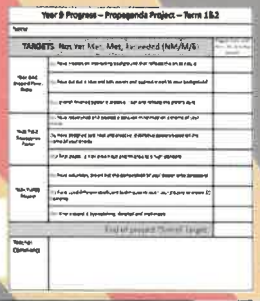
Why am I learning this?

To know and understand the way posters were created and used.
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.

Homework Tasks:

Tick when complete ✓

1. Research a theme
2. Research WW1 and WW2 propaganda
3. Create a Shepard Fairey Poster
4. Research Andrea Bowers
5. Redesign a historic poster



Propaganda Art
https://www.youtube.com/watch?v=kQHImN068S

HOW WELL AM I DOING?

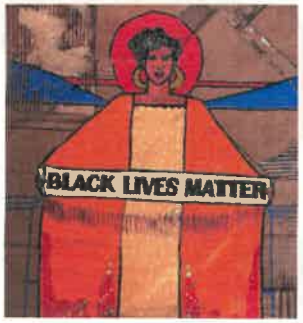
CONTEXTUAL KNOWLEDGE:

Shepard Fairey

Shepard Fairey is an American contemporary artist, activist and founder of OBEY Clothing.

Andrea Bowers, is an American artist working in a variety of media including video, drawing, and installation

Andrea Bowers



Keywords	
Propaganda	Images that are used to persuade and encourage
Symbol	A material object representing something abstract.
Composition	The arrangement of elements within a work of art.
Political	Relating to the government or public affairs of a country.
Typographic	Typography is the art and technique of arranging type to make written language legible, readable and appealing when displayed
Protest Art	Protest art involves creative works grounded in the act of addressing political or social issues

Year 9 Computing – Python Turtle – Knowledge Organiser

Summary

Programming is writing computer code to create a program, in order to solve a problem. Programs consist of a series of instructions to tell a computer exactly what to do and how to do it. An algorithm is a set of instructions that describes how to get something done. It is crucial that the steps in an algorithm are sequenced and performed in the right order - otherwise the algorithm will not work correctly.

Python is a general purpose and high-level programming language. You can use Python for developing desktop GUI applications, websites and web applications. Also, Python, as a high-level programming language, allows you to focus on core functionality of the application by taking care of common programming tasks

Key Words	
Shell	This is the window where you type in the commands
Loop	A concept called loop, which helps in executing one or more statements up to a desired number of times.
Function	A function is a block of organized, reusable code that is used to perform a single, related action.
Variable	Variables are used to store information to be referenced and manipulated in a computer program. They also provide a way of labelling data with a descriptive name, so our programs can be understood more clearly by the reader and ourselves. It is helpful to think of variables as containers that hold information.

Mistake!	Key Words continued	Correct!
Import turtle		import turtle
wn=turtle.Screen		wn=turtle.Screen()
Bob=Turtle()		Bob=turtle()
wn.bgcolour("lightgray")		wn.bgcolour("lightgray")
Bob.color(red)		Bob.color("red")
bob.pensize(2)		Bob.pensize(2)
Bobforward(200)		Bob.forward(200)
Bob.left(90		Bob.left(90)
Bob.forwards(200)		Bob.forwards(200)

Improve the code	

Import turtle
wn=turtle.Screen()
turtle.forward(200)
turtle.right(90)
turtle.forward(200)
turtle.right(90)
turtle.forward(200)
turtle.right(90)
turtle.forward(200)
turtle.right(90)
turtle.reset()
	import turtle
	wn=turtle.Screen()
	def line():
	  turtle.forward(200)
	def angle():
	  turtle.right(90)
	for i in range(4):
	  line()
	  angle()

Drama – Year 9 Term 1

PRACTITIONERS

For comp 1 and 2 of the GCSE, you need to include aspects of work from different theatre practitioners. We are looking at Brecht and Stanislavski.

Constantin Stanislavski 1863-1938

A Russian actor and theatre director, he created The System of 'Method Acting'. As a reaction to the melodramatic acting of the late 19th century, he developed methods to help actors create the illusion of reality on stage – **Naturalism.**

Key Terms

Objectives: The actor needs to know what their character wants in each unit of the play – What are they trying to achieve?
Super-Objective: The character's ultimate goal over the whole play – Each objective should 'link in' and help the character achieve this goal.
The Magic If: How would the actor react/behave if they were in the same situation as the character?
Units – Dividing a play or scene into different units of action.
Tempo-Rhythms – Using music and tension to creating a realistic attitude.

"If we can tell you're acting, you're not doing it right."

Bertolt Brecht 1898-1956

Verfremdungseffekt (V-effect):
The process of 'making strange'. This is where the audience experience something familiar, but it is presented in an unrecognisable way or context. The audience then work to reach a new understanding in order to 'move past' the strangeness.

This effect can be created through the use of:

Direct Address	Narration
Placards	Gestic Acting
Multi-rolling	Speaking stage directions
Music/song	Props table / costumes change on stage

Naturalism was at its peak, but Brecht thought that theatre should be political and be a force for change. He wanted his audiences to remain objective and distant from emotional involvement, so that they could make considered and rational judgements about the issues in the play – this is called **Epic Theatre**

Brecht said that in naturalistic theatre, "audiences hang up their brains with their hats in the cloakroom." what do you think he was saying here?
How could using placards in a scene, change the meaning for an audience?
How could Stanislavski's techniques help you to develop a naturalistic character?
What makes a successful, naturalistic performance?

Year 9 Food and Nutrition- Knowledge Organiser

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

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

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

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

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

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

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

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

Year 9 Electronics

DESIGN AND TECHNOLOGY

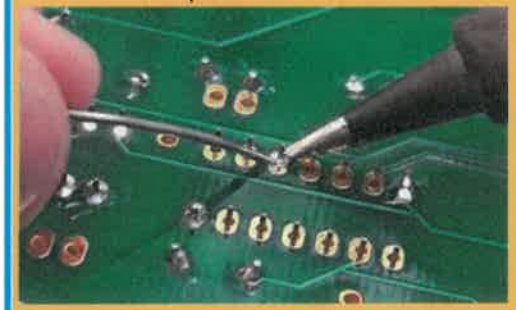
Tools and Equipment

Tools used for Soldering

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

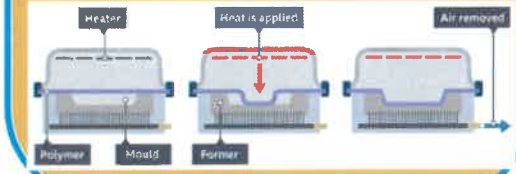
Soldering

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



Vacuum Forming

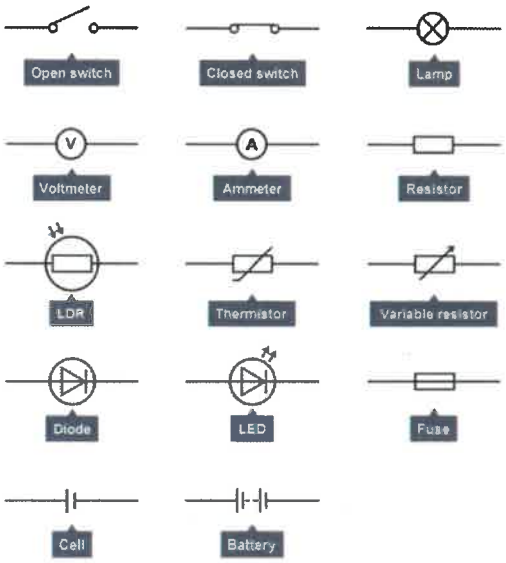
Vacuum forming is a polymer process. A sheet of thermoplastic is heated and pressed onto the former (mould) to create a shape.

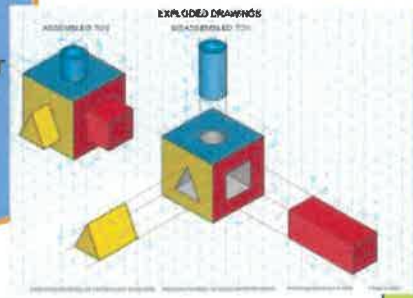


Keywords

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

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





Memphis design movement

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

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

Ettore Sotsass

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

CAD: Computer Aided Design
CAM: Computer Aided Manufacture

Adobe Illustrator

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

TinkerCAD

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

Key words

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

3D printing

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

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

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

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

Year 7 / 9 D&T RESISTANT MATERIALS UCD &Modelling: Playgrounds

Tools and Equipment

Measuring and marking

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

Card shaping and adhesives

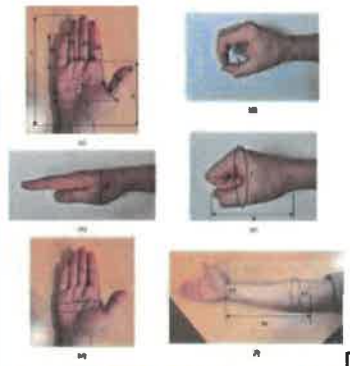
Slot		A joining technique to join card.
Curve cut		Kerf cutting (partial cuts) will ensure a smoother curve in the card.
Tabs		Tabs help to join the card components together.
Hot glue gun		An adhesive which joins card.
Masking tape		A temporary adhesive which joins card / paper.

Anthropometrics

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

Ergonomics

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



Maths in DT:

Multiplication / Divide
Add / Subtract
Measurement conversion
Ratios /Percentages

Keywords

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

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

ACCESS FM - Helpsh

- **A** is for **Aesthetics**
- **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**

Cutting

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

Materials

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

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

THE CORSHAM SCHOOL

Y9 POETRY KNOWLEDGE ORGANISER

LANGUAGE DEFINITIONS

Alliteration: repeated first consonant.
Assonance: repeated vowel sound.
Colloquial language: casual, informal language.
Extended metaphor: series of linked metaphors.
Hyperbole: exaggeration to emphasise a point.
Imagery: visually descriptive or figurative language.
Internal rhyme: rhyme on the same line.
Metaphor: describing something as something else.
Motif: recurring theme or symbol.
Onomatopoeia: a sound word.
Pathetic Fallacy: giving human emotions and conduct to things found in nature.
Personification: giving human qualities to inanimate objects.
Plosive: letters p/t/k/b/d/g
Semantic field: a group of words related in meaning.
Sibilance: use of the 's' sounds in quick succession.
Simile: a comparison of two things that uses the words 'like' or 'as'.

VOCABULARY FOR COMPARISON

SIMILAR:	DIFFERENT
Similarly	Contrastingly
Likewise	However
In the same way	Whereas
Also	Unlike
In addition to	Yet
Moreover	But
Correspondingly	On the contrary
Parallel to this	In antithesis to this
Comparably	In contrast
	Juxtaposing this
	On the other hand

ELEMENTS OF WRITTEN ANALYSIS

WHAT? MAKE A STATEMENT **POINT**

HOW? LOOK AT THE TEXT AND **TECHNIQUES** **EVIDENCE**

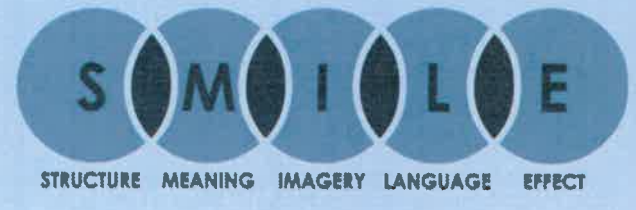
HOW? MEANS? SUGGESTS? **ANALYSIS**

WHY? MAKE DEVELOPMENTS **LINKS**

LINK your analysis together considering the EFFECT on the reader alongside the poet's intentions.

S.M.I.L.E. and remember to include:

- Tone
- Image
- Emotion



METHODS (A01) – Form/Structure

Autobiographical: about the poet's life/experiences.
Ballad: dramatic story poem with four-line stanzas.
Blank verse: verse with no rhyme – usually 10 syllables.
Closed form: poems written in specific patterns.
Free Verse: no regular rhyme or rhythm.
Narrative: descriptions of an event.
Persona: voice/speaker of the poem.
Sonnet:

- Shakespearean – 14 lines, typical love poem
- Petrarchan – eight lines (octave)rhyming ABBAABBA, and six lines (sestet) CDCDCD.

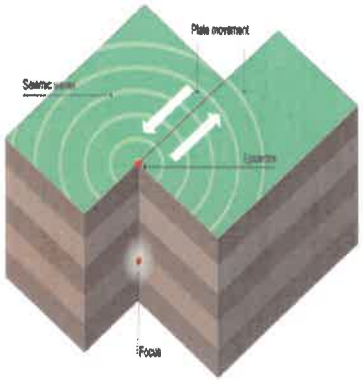
Anaphora: repeated first words at the beginning of a line.
Chronological: in time order.
Caesura: a pause in the middle of the line, often marked by punctuation or grammar.
Enjambment: the continuation of a sentence or clause across a line break and/or stanza.
Iambic Pentameter: 5 sets of stressed/unstressed beats on a line.
Juxtaposition: placing contrasting ideas close together in a text.
Oxymoron: two opposite words next to each other.
Refrain: repeated lines (like a chorus in singing).
Repetition: a pattern of repeated words/ideas.
Rhyme Scheme: organisation of the rhyme.
Rhyming couplet: two consecutive lines that end with the same sound.
Rhythm: recurring beat and pace of a poem.
Stanza: the division of a poem consisting of two or more lines arranged together as a unit.
Title: set the scene/time/place/mood/tome or create anticipation/confusion/connection.
Volta: the turning point of a poem.

Year 9 Topic 1: How do humans adapt to living with tectonic hazards?

Causes of Earthquakes

Earthquakes are caused when two plates become locked causing stress energy to build up. Eventually the stress energy will become to great and one plate will lurch forward/up/down. This movement releases energy in the form of seismic waves, which travel out from the focus in all directions. As a result, the crust shakes.

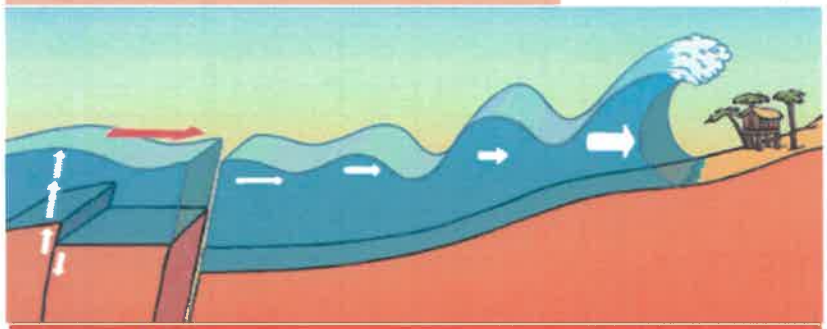
Labelling an earthquake



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

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

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



Earthquake Hazards

Ground shaking	Violent ground shaking can cause buildings and other infrastructure to collapse, trapping and crushing people. It can also block evacuation routes and emergency responses.
Liquefaction	The ground becomes saturated as ground water is forced to the surface. This means that ground that was once solid acts like a liquid. This can cause buildings to collapse.
Tsunami	When the focus is at sea it can trigger a tsunami. This is a giant wave that increases in height as it approaches land. Due to its power it can destroy coastal towns and will travel far inland.

Earthquake Management

PREDICTING

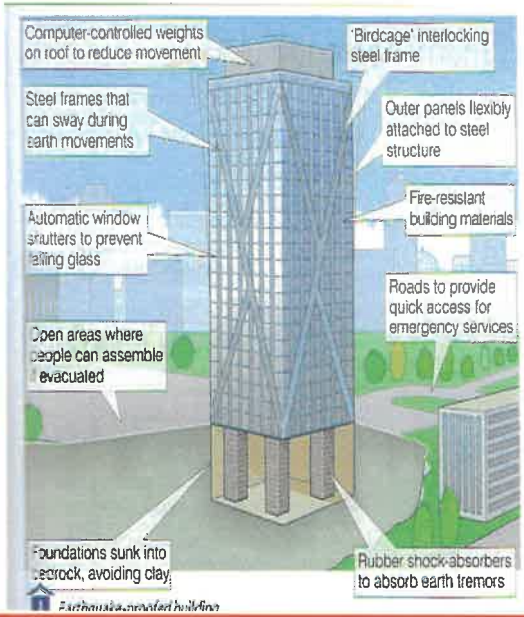
Methods include:

- Radon gas sensor (radon gas is released when plates move so this finds that)
- Seismometer
- Water table level (water levels fluctuate before an earthquake).
- Scientists also use seismic records to predict when the next event will occur.

PROTECTION

You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:

- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

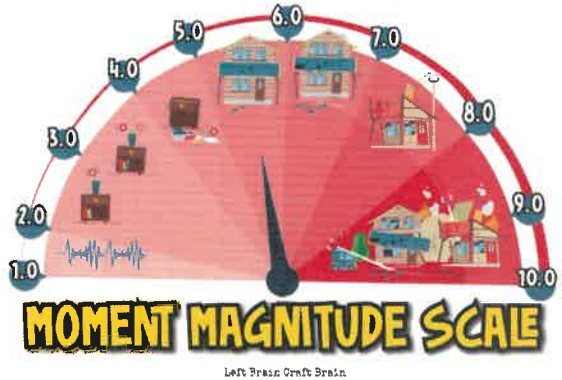


Earthquake proof buildings ideas

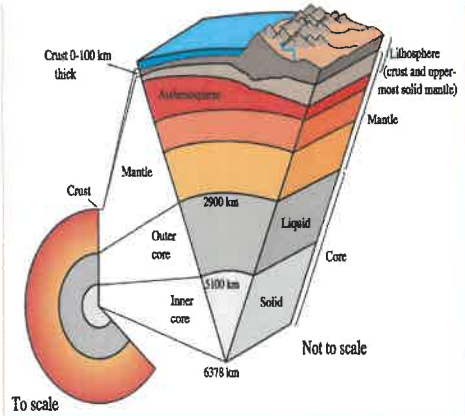
1. Counter-weights to the roof to help balance any swaying.	2. Roof made from reinforced cement concrete.
3. Foundations made from reinforced steel pillars, bail-bearings or rubber.	4. Windows fitted with shatter-proof glass to reduce breakage.
5. Lightweight materials that cause minimal damage if fallen during an earthquake.	6. Ensure gas pipes have an automatic shut off to prevent risk of fire.

How do we measure earthquakes?

To tell the strength of an earthquake scientists use a scale called the Moment Magnitude Scale or MMS (it used to be called the Richter scale). The larger the number on the MMS scale, the larger the earthquake. You usually won't even notice an earthquake unless it measures at least a 3 on the MMS scale.



The structure of the Earth



The inner core is radioactive, generating it's own heat at 5000 degrees. The outer core surrounds the inner core and moves.

The mantle is between the cores and the crust and this is where convection currents occur.

The crust is what we stand on and is divided into many tectonic pates.

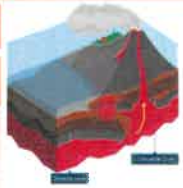
The lithosphere is the crust and upper mantle and this sits on top of the asthenosphere which is the part of the mantle that moves.

How convection current in the mantle moves the plates

The core heats the mantle above it, this makes that part of the mantle less dense and form a "plume of magma" which starts to rise to the surface. When it reaches the lithosphere (solid mantle and crust) it spreads out sideways and drags the lithosphere with it. (this causes the plates to move). The plume then cools down and sinks back to the core where it is re-heated.

Types of Plate Margins

Destructive Plate Margin



Two plates move towards each other, one plate (the oceanic plate) is denser and so subducts and melts beneath the other. Volcanoes and earthquakes occur on this boundary.

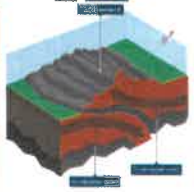
Constructive Plate Margin

Two plates are moving apart causing new magma to reach the surface through the gap. Volcanoes form along this crack, creating a submarine mountain range (Mid Atlantic Ridge). Small earthquakes also occur here.

Conservative Plate Margin

Occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes. E.g. along the San Andreas Fault, USA.

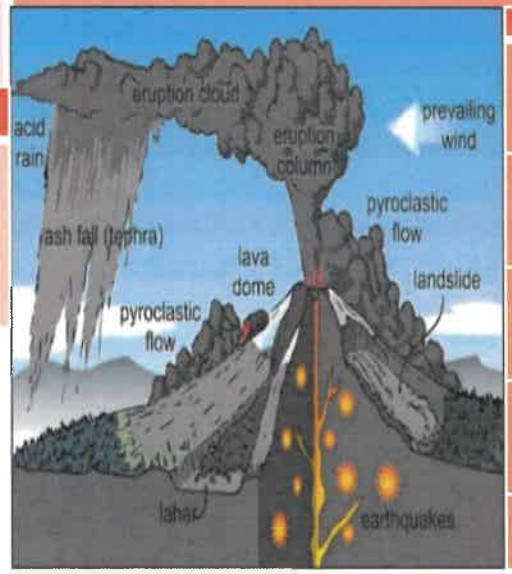
Collision Zones



Form when two continental plates collide. Neither plate is forced under the other, and so both are forced up and form fold mountains. These zones are responsible for shallow earthquakes in the Himalayas.

How a volcano is formed

At a destructive plate boundary 1 plate subducts under the other because it is more sense.
The subducting plate melts and forms magma in a magma chamber.
Due do constant subduction, pressure increases in the magma chamber.
The magma rises through weaknesses in the Earth's crust and erupts explosively.



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

Managing Volcanic Eruptions

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

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

Enquiry: Why did the Allies win WW2?

Outline: For much of the Second World War, it was unclear that the Allies would emerge victorious, but there are many key events that acted as key turning points in the war.

History – Year 9
Knowledge Organiser
Topic 1

Date	Event	Description
May 1940	Dunkirk	British forces were rescued from France after becoming trapped by the German advance.
July-October 1940	Battle of Britain	Combat in the skies between the RAF and the Luftwaffe to prevent the German invasion of Britain.
December 1941	Pearl Harbor	Japan's attack on the USA that brought the US into the War.
1942-3	Battle of Stalingrad	Soviet forces defeated the Wehrmacht and began to push the Germans back from the east.
6 June 1944	D-Day	The Allied invasion of France to push Germany back from the west.
1945	Dresden	City in Germany which was bombed by the Allies.
6-9 August 1945	Atomic bombs	USA used nuclear weapons to end the war by dropping two on Japan.

Key individuals

Joseph Stalin. Communist leader of the USSR. Stalin was a dictator who originally supported Hitler until Germany invaded the USSR.

Franklin D. Roosevelt. President of the USA during WW2. Roosevelt helped the Allies before the USA joined the War.

Alan Turing. Broke the German codes for their messages using the enigma machine which he helped to invent; crucial to the Allied victory.

Rosie the Riveter. Created by the US government to encourage women to work during WW2. She became a symbol of women's contribution during the war.

Key vocabulary:

Blitzkrieg: lightning war where Germany took over countries quickly using a combination of armed forces.
Communism: left-wing political ideas where the ideal is to share out resources in a country.
Dictator: a ruler of a country who rules through fear and doesn't allow basic freedoms.
Enigma machine: the British invention which cracked the German code during WW2.
Fascism: right-wing political ideas that use strong leadership and limit freedom as seen in Germany and Italy.
Luftwaffe: German airforce.
Manhattan Project: USA's project to design and make nuclear weapons from 1942.
Morale: the spirit of a nation or people that keeps people happy.
Nazi: someone who followed Hitler and the Nazi government in Germany.
Operation Barbarossa: Germany's campaign to take over the USSR.
Operation Overlord: The Allied campaign to invade Europe and free it from Nazi German occupation.
Total war: using any means possible to win
USSR: name for the Soviet Union which was an empire with Russia as the main country.
Wehrmacht: German army

Furthering learning

Want to find out more about WW2?

Prior learning?

Y7: how to win a battle
Y8: WW1 key events

Main Participating Countries

ALLIED POWERS			AXIS POWERS		
Country	Date Joined	Flag	Country	Date Joined	Flag
FRANCE	3rd Sep, 1939		GERMANY	1st Sep, 1939	
UK	3rd Sep, 1939		ITALY	10th Jun, 1940	
SOVIET UNION	22nd Jun, 1941		BULGARIA	1st Mar, 1941	
USA	8th Dec, 1941		JAPAN	7th Dec, 1941	

Enquiry: Why did the Allies win WW2?

Historical skill focus: interpretations

- What does an interpretation tell us?
- How convincing is the interpretation?

History – Year 9
Knowledge Organiser
Topic 1

Section C: Using interpretations

How CONVINCING is Interpretation A to a historian studying the Battle of Britain?
Make sure you use your own knowledge to show why the Interpretation is or isn't convincing.

John Keegan. The Second World War. 1989.

The victory of "the Few" was narrow. During the critical months of August and September, when the Battle of Britain was at its height, Fighter Command lost 832 fighters, the Luftwaffe only 668. It was the loss of nearly 600 German bombers which made the balance sheet read so disfavourably to the attacker...the pragmatism of Dowding and his Fighter Command staff, the self-sacrifice of their pilots and the innovation of radar inflicted on Nazi Germany its first defeat. The legacy of that defeat would be long delayed in its effects; but the survival of an independent Britain which it assured was the event that most certainly determined the downfall of Hitler's Germany.

What to focus on:	Starting sentences
What does the interpretation show? Does this fit your own knowledge? What is the historian's opinion? Is he/she right? When was the historian writing – what does this tell us? Do any of the above make the interpretation convincing?	Interpretation A is convincing because... This is shown by... The interpretation is also convincing due to its purpose which was to...

Point = This interpretation is convincing because...
Evidence = This is shown by...
Explain = This is convincing because...

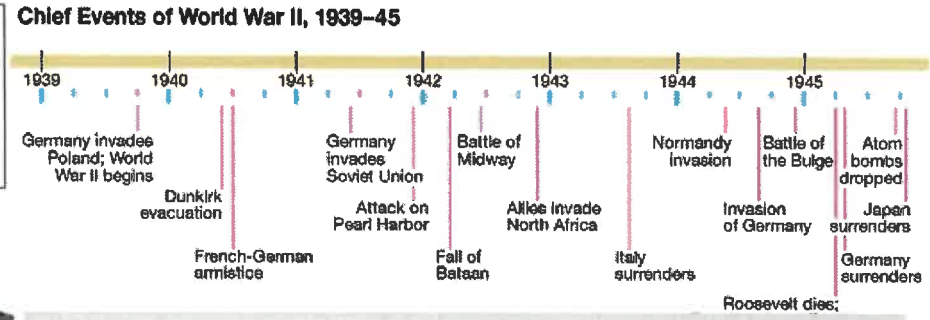
Developing	Secure	Exceeding
I can decide whether an interpretation is convincing with some evidence. I can write a PEE paragraph. I can begin to explain the purpose of an interpretation	I can decide whether an interpretation is convincing with detailed evidence. I can write a PEE paragraph. I can explain the purpose of an interpretation. I can begin to think about why interpretations change.	I can decide whether an interpretation is convincing with detailed evidence. I can write a PEEL paragraph I can explain why interpretations change, linking this to purpose. I can explain how the TYPE of historian affects their interpretation.

Preparation for summative assessment

History – Year 9
Knowledge Organiser
Topic 1

Historical skill focus: cause and consequence

- Why do events happen?
- What is the impact of these events?



Can you explain why?

You could **write one or two paragraphs** to explain.

➢ Why did the Allies win WW2?

What to focus on:	Starting sentences
One or two reasons why the event happened. Think about the actions of the countries and people involved Think about political reasons or military reasons?	One cause of… The most significant cause was… This cause led to…

Point = A key cause was…
Evidence = This cause led to…
Explain = This is important because…

Developing	Secure	Exceeding
I can explain why an event happened in a PEE paragraph.	I can make a judgement on why an event happened, using causes in a PEEL paragraph. I can identify long and short term causes and use these in my answers.	I can make a judgement on the significance of causes in a PEEL paragraph. I can make links between different causes in my response.

Preparation for summative assessment

History – Year 9
Knowledge Organiser
Topic 1

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...

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

A British cartoon made on 16 June 1940 after the fall of France to German invasion.

Using evidence

Write at least two paragraphs to answer this question:
How useful is this cartoon to a historian investigating the impact of the Dunkirk evacuation?

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.

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 ALGEBRA...

Straight Line Graphs

@whisto_maths

What do I need to be able to do?

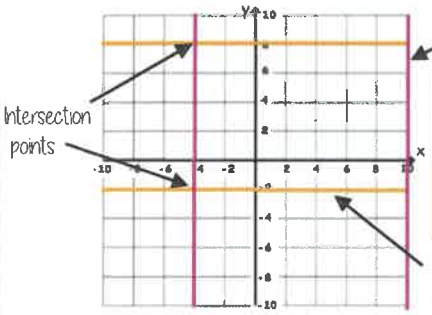
By the end of this unit you should be able to:

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

Keywords

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

Lines parallel to the axes (R)



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

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

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

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

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

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

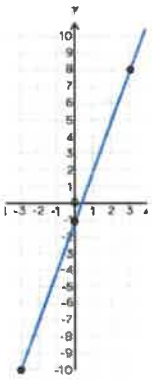
Plotting y = mx + c graphs (R)

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

x	-3	0	3
y	-10	-1	8

Draw a table to display this information

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



You only need two points to form a straight line

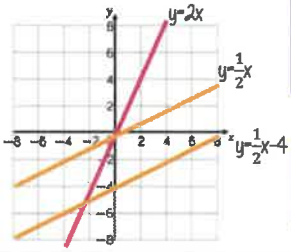
Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line

Compare Gradients

$y = mx + c$

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



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

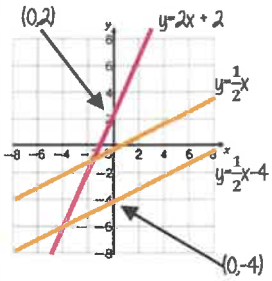
Parallel lines have the **same** gradient

Positive gradients

Negative gradients

Compare Intercepts

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



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

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

y = mx + c

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

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

y and x are **coordinates**

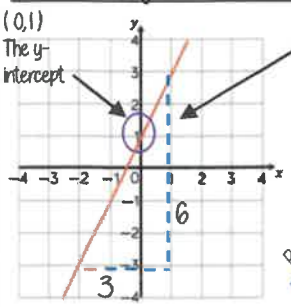
The equation of a line can be rearranged: E.g

$y = c + mx$

$c = y - mx$

Identify which coefficient you are identifying or comparing

Find the equation from a graph



The Gradient $\frac{6}{3} = 2$

$y = 2x + 1$

The direction of the line indicates a positive gradient

Positive gradients

Negative gradients

Real life graphs

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

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

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

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

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

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

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

Boxes	0	1	2	3	8
Cost (£)		£2.30			

YEAR 9 — REASONING WITH ALGEBRA...

Forming and Solving Equations

@whisto_maths

What do I need to be able to do?

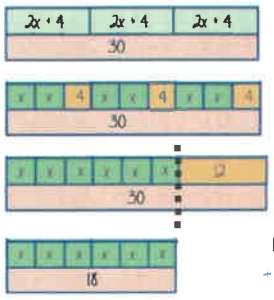
By the end of this unit you should be able to:

- Solve inequalities with negative numbers
- Solve equations with unknowns on both sides
- Solve inequalities with unknowns on both sides
- Substitute into formulae and equations
- Rearrange formulae

Keywords

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another
Variable: a quantity that may change within the context of the problem
Rearrange: Change the order
Inverse operation: the operation that reverses the action
Substitute: replace a variable with a numerical value
Solve: find a numerical value that satisfies an equation

Solve equations with brackets (R)



$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

$-12 \quad -12$

$6x = 18$

$-6 \quad -6$

$x = 3$

Form and solve inequalities (R)

"Two more than treble my number is greater than 11"

Find the possible range of values

$3x + 2 > 11$

Solve

$x \leftarrow -3 \leftarrow -2 \leftarrow 11$

$x > 3$

Inequalities with negatives

Method 1 Make x positive first

$2 - 3x > 17$

$+3x \quad +3x$

$2 > 17 + 3x$

$-17 \quad -17$

$-15 > 3x$

$\div 3 \quad \div 3$

$-5 > x$

x is true for any value smaller than -5

Smaller ← → Bigger

-7 -5 -3

✓ CHECK IT!
$2 - 3(-6) = 20$
TRUE/ CORRECT

Method 2 Keep the negative x

$2 - 3x > 17$

$-2 \quad -2$

$-3x > 15$

$\div -3 \quad \div -3$

$x > -5$

x is true for any value bigger than -5

This cannot be true...

$x < -5$

When you multiply or divide x by a negative you need to reverse the inequality

Equations with unknown on both sides

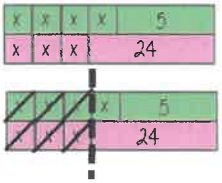
$4x + 5 = 3x + 24$

$-3x \quad -3x$

$x + 5 = 24$

$-5 \quad -5$

$x = 19$



Inequalities with unknown on both sides

Solving inequalities has the same method as equations

$5(x + 4) < 3(x + 2)$

$5x + 20 < 3x + 6$

$2x + 20 < 6$

$2x < -14$

$x < -7$

Check it!

$5(-8 + 4) < 3(-8 + 2)$

$5(-4) < 3(-6)$

$-20 < -18$

✓ -20 IS smaller than -18

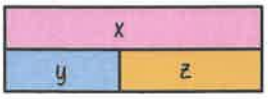
Formulae and Equations

Formulae – all expressed in symbols

Substitute in values →

Equations – include numbers and can be solved

Rearranging Formulae (one step)



$x = y + z$

Rearrange to make y the subject

$y = x - z$

$y \rightarrow +z \rightarrow x$

$y \leftarrow -z \leftarrow x$

Using inverse operations or fact families will guide you through rearranging formulae

Rearranging can also be checked by substitution

Language of rearranging...

Change the subject

Make XXX the subject

Rearrange

Rearranging Formulae (two step)

In an equation (find x)

$4x - 3 = 9$

$+3 \quad +3$

$4x = 12$

$\div 4 \quad \div 4$

$x = 3$

In a formula (make x the subject)

$xy - s = a$

$+s \quad +s$

$xy = a + s$

$\div y \quad \div y$

$x = \frac{a + s}{y}$

The steps are the same for solving and rearranging

Rearranging is often needed when using $y = mx + c$

e.g. Find the gradient of the line $2y - 4x = 9$

Make y the subject first $y = \frac{4x + 9}{2}$

Gradient $= \frac{4}{2} = 2$

YEAR 9 — REASONING WITH ALGEBRA...

Testing conjectures

@whisto_maths

What do I need to be able to do?

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

- Use factors, multiples and primes
- Reason True or False
- Reason Always, sometimes never true
- Show that reasoning
- Make conjectures about number
- Expand binomials
- Make conjectures with algebra
- Explore the 100 grid

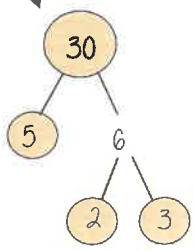
Keywords

Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number.
Prime: an integer with only 2 factors.
HCF: highest common factor (biggest factor two or more numbers share)
LCM: lowest common multiple (the first time the times table of two or more numbers match)
Verify: the process of making sure a solution is correct
Proof: logical mathematical arguments used to show the truth of a statement
Binomial: a polynomial with two terms
Quadratic: a polynomial with four terms (often simplified to three terms)

Factors, Multiples and Primes

R

Multiplication part-whole models



All three prime factor trees represent the same decomposition

HCF – Highest common factor

HCF of 18 and 30

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

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

Common factors are factors two or more numbers share

LCM – Lowest common multiple

LCM of 9 and 12

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

12: 12, 24, 36, 48, 60

Common multiples are multiples two or more numbers share

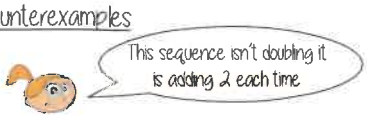
True or False?

Conjecture

A pattern that is noticed for many cases

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

Counterexamples



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

Always, Sometimes, Never true.

Always — Every value always supports the statement

Sometimes — Examples show the statement being true and counter examples to show when it is false.

Never — No example supports the statement

Examples to try
- 0 and 1
- Fractions
- Negative numbers

Show that

Numerical verification — Show the stages to a solution with numerical values

Algebraic verification — Show algebraic properties of the solution
You may want to use pictorial images to support this

Proof — Simple proofs using algebra

Compare the left hand side of an equation with the right hand side – are they the same or different?

Conjectures

Even $(2n)$
Multiple of 2

Odd $(2n+1)$
One more than any even

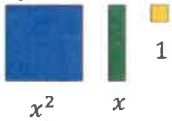
Use numerical verification first
Use pictorial verification – the representations of numbers of odd and even

Expanding binomials

$2(x+2) \equiv 2x+4$

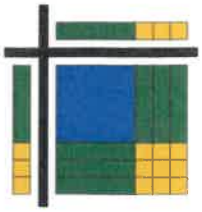
Algebra tiles can represent a binomial expansion
Has two terms

Algebra tiles



Positive values

$(x+3)(x+3) \equiv x^2+6x+9$



This is a quadratic
It has four terms which simplified to three terms

The order of the binomial has no impact on the outcome
e.g. $(x+3)(3+x)$

Exploring the 100 square

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

In terms of 'n' is used to make generalisations about relationships between numbers

Positions of numbers in relation to n form expressions.
E.g. one space to the right of n
$n+1$

E.g. One row below n
$n+10$

The size of the grid for generalisation changes the relationship statements

Year 9 music term 1

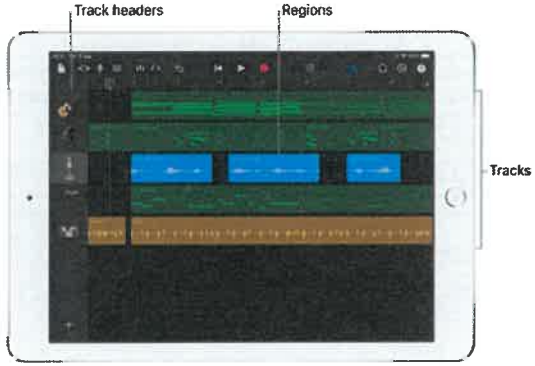
Syncing	Matching events on screen to recorded sound.
Theme music	Theme music is music that represents a tv show, place or character.
Lite motif	A short musical idea that represents a character, feeling or place.
Diegetic sound	Diegetic sound is sound that a character would be able to hear if they were in that location.
Non diegetic sound	Diegetic sound is sound that a character would NOT be able to hear if they were in that location.
Soundtracking	Sound tracking is using pre-existing pieces of music in a film.
Foley	Foley is all of the non-musical diegetic sound that is recorded. It is recorded by a foley artist.

Record a Touch Instrument

1. Tap the Record button ● in the control bar.

Recording starts at the current position of the playhead. The ruler shows red.

2. Play the Touch Instrument (or, for the Audio Recorder or Amp, sing or play).



Play chords or bass notes with chord strips

- *Play chords higher or lower:* Tap one of the five upper segments of a chord strip.
- *Play a bass note or sets of bass notes:* Tap one of the three lower segments of a chord strip.
- *Play chords and bass notes together:* Tap an upper segment and a lower segment at the same time.

You can add your own custom chords to play.

Open the My Songs browser

- Tap the My Songs button in the control bar.

  The default view shows songs in their current location on your iPad. Tap Recents in the sidebar to show songs you last worked on.

Create a new song

- In the My Songs browser, tap the Add Song button + in the top-right of the screen.

  The Sound browser opens, where you can choose a Touch Instrument to use in the song.

Absolutism: The belief that there is a right course of action which is correct in *all* situations.

Agape: Selfless, sacrificial, unconditional love. Christians believe Jesus is the perfect example of this.

Deontological: To do with moral obligations, duties and ethics.

Ethics: Moral principles that govern a person's behaviour.

Eudaimonia

Morality: The distinction between right and wrong or good and bad behaviour.

Relativism: The belief that the right course of actions depends on a variety of things and may *differ* from person to person.

Teleological: focuses on the consequences or outcomes of the actions being classed as right or wrong

Utilitarianism: ethical theory that suggests actions are right if they are useful or for the benefit of a majority.

Virtue Ethics

Virtue ethics is a philosophy developed by Aristotle. It is the quest to understand and live a life of moral character.

This character-based approach to morality assumes that we acquire virtue through practice. By practicing being honest, brave, just, generous, and so on, a person develops an honorable and moral character. According to Aristotle, by honing virtuous habits, people will likely make the right choice when faced with ethical challenges.

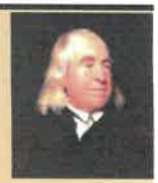
So, virtue ethics helps us understand what it means to be a virtuous human being. And, it gives us a guide for living life without giving us specific rules for resolving ethical dilemmas.

https://youtu.be/NMblKpkKYao

The principal virtues and vices

Sphere of feeling or action	Excess (vice)	Mean (virtue)	Deficiency (vice)
Fear and confidence	Rashness	Courage	Cowardice
Pleasures and pains	Self-indulgence	Temperance	Insensibility (rare)
Getting and spending (minor)	Prodigality	Liberality	Meanness
Getting and spending (major)	Tastelessness	Magnificence	Niggardliness
Honour and dishonour (major)	Vanity	Proper pride	Pusillanimity
Honour and dishonour (minor)	Ambition	Proper ambition	Lack of ambition
Anger	Irascibility	Good temper	Lack of spirit
Self-expression	Boastfulness	Truthfulness	Mock modesty
Conversation	Buffoonery	Wittiness	Boorishness
Disposition to others	Obsequiousness	Friendliness	Cantankerousness
Shame	Bashfulness	Modesty	Shamelessness
Indignation	Envy	Proper indignation	Spite

Utilitarianism



Utilitarianism is all about choosing '***the greatest good for the greatest number'.***

This makes it a teleological ethical theory.

Everyone has an equal right to happiness, so utilitarian's say we should consider how a decision will affect everyone involved, not just ourselves.

It seems sensible to base ethics on producing **happiness** and reducing unhappiness.

https://www.youtube.com/watch?v=bOpf6KcWYyw

Absolute morality

If you believe in absolute morality you will have faith that there is a right course of action to take in a moral dilemma, which is true in all situations regardless of culture, religious tradition, time or age.

How would a follower of this sort of morality respond to the commandment You shall not murder? They would try to make sure that they were not involved in any killing, which would affect their views on issues such as war, abortion and euthanasia. They would say that these actions are wrong in all circumstances.

https://en.wikipedia.org/wiki/Ten_Commandments

Are there universal moral rules?

Chapter 1: Atomic structure

Knowledge organiser

Development of the model of the atom

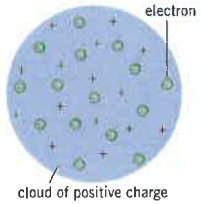
Dalton's model

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

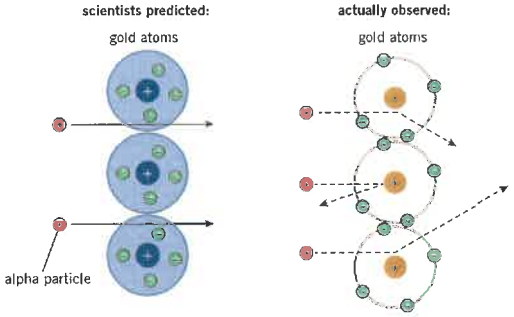
Scientists' experiments resulted in the discovery of sub-atomic charged particles. The first to be discovered were electrons – tiny, negatively charged particles.

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.

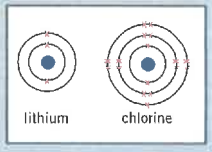
Compounds are made of different types of atoms chemically bonded together. The atoms in a compound have different numbers of protons.

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

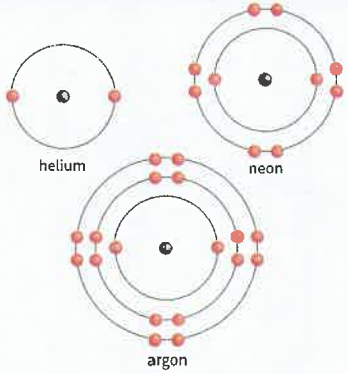
The Periodic Table has changed over time as scientists have organised it differently. Mendeleev was able to accurately predict the properties of undiscovered elements based on the gaps in the table.

	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.

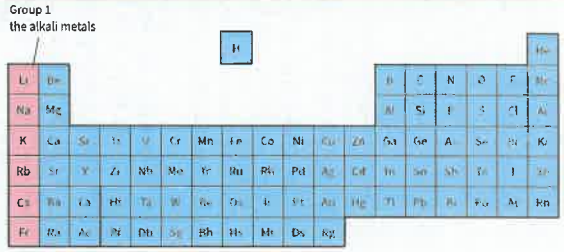
alkali metals chemical properties displacement groups halogens inert isotopes noble gas organised Periodic Table reactivity undiscovered unreactive

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

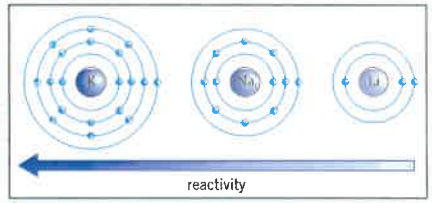
Group 1 elements are called **alkali metals** because they react with water to form an alkali (a solution of their metal hydroxide).



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

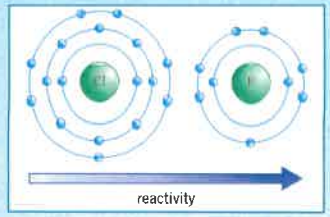
Group 7 elements are called the **halogens**. They are non-metals that exist as molecules made up of pairs of atoms.

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: 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).

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

Renewable energy resources

Resource	Main uses	Source	Advantages	Disadvantages
solar energy	generating electricity	sunlight transfers energy to solar cells	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
	heating	sunlight transfers energy to solar heating panels		
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

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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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

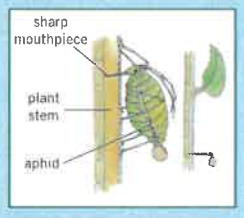
- gardening manuals and websites
- laboratory testing of infected plants
- testing kits containing monoclonal antibodies (Chapter 9 *Monoclonal antibodies*)

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

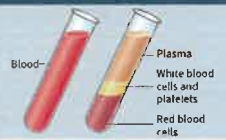
Produces strong acid (pH 2) that destroys pathogens in mucus, food, and drinks.

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

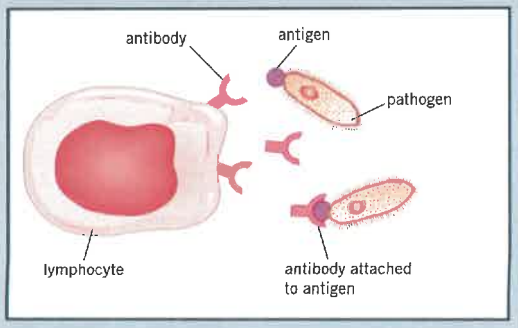
Lymphocytes fight pathogens in two ways:

Antitoxins

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

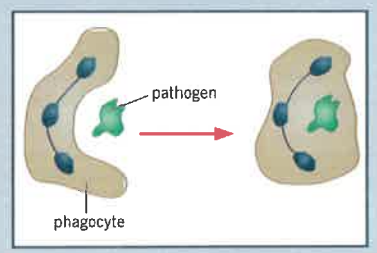
Antibodies

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

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