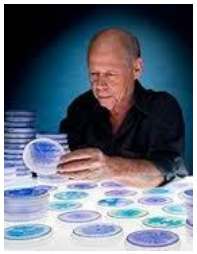
Y9: Bacteria

Key Figures	
Antoni van Leeuwenhoek 	Antonie van Leeuwenhoek used single-lens microscopes, which he made, to make the first ever observations of bacteria.
Eshel Ben-Jacob 	Eshel Ben-Jacob, was a theoretical and experimental physicist who disovered new species of bacteria. He created artwork using the bacteria he grew in petri dishes.
Marilee Salvator 	Salvator's highly layered, abstract and biology-inspired work is created with a mix of printmaking process including etching, relief, screen-print and monotype.

Knowledge Links:
History, English, Science

Key Terms	
Bacteria	Bacteria, also called germs, are microscopic organisms not visible with the naked eye. Some bacteria are good for you, while others can make you sick.
Petri dish	A shallow, circular, transparent dish with a flat lid, used for the culture of microorganisms.
Colour	What the eye sees when light is separated.
Relief sculpture	A sculptural technique where the sculpted elements remain attached to a solid background of the same material.
Ceramics	Objects made from clay that are then hardened by heat.
Form	An element in art where an object appears to have three-dimensions.
Line	A line is a mark made in art. A line has a width and a length. A line can be straight, curved, continuous, dashed or broken.
Pattern	Any regularly repeated arrangement, especially a design made from repeated lines, shapes, or colours on a surface.
Blending	The technique of gently intermingling two or more colors or values to create a gradual transition or to soften lines.
Tone	Light to dark shade used to create form in an artwork.
PVA	Abbreviated: polyvinyl acetate. Glue.
Line drawing	Any image that consists of distinct lines placed against a background, without gradations in shade or hue.
Microscope	An optical instrument used for viewing very small objects, such as mineral samples or animal or plant cells, typically magnified several hundred times.
Background	The part of a picture, scene, or design that forms a setting for the main figures or objects, or appears furthest from the viewer.
Printmaking	The activity or occupation of making pictures or designs by printing them from specially prepared plates or blocks.
Abstract	Relating to or denoting art that does not attempt to represent external reality, but rather seeks to achieve its effect using shapes, colours, and textures.

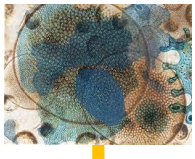
Timeline

1670's
Van Leeuwenhoek started creating his own microscopes to discover microbes

1920's

Sir Alexander Fleming discovered penicillin and started to create microbial art.

1952
Eshel Ben-Jacob is born.

1974

Marilee Salvator is born

2015
Agar art contest started to award artists who create artwork using microbes.

Year 9- Computing – Advanced Image Editing Knowledge Organiser

Key Words	
Vector Image 	• Is created in graphics packages and consist of shapes called objects. • Even if an object in a vector graphic is quite large, it doesn't need a lot of computer. memory. Therefore the file size of a vector graphic is often very small. • Are scalable - i.e. when you resize them, they do not lose quality.
Bitmap (raster) Image 	• Is composed of many tiny parts, called pixels. The pixels are often many different colours. • It is possible to edit each individual pixel. • Since the computer has to store information about every single pixel in the image, the file size of a bitmap graphic is often quite large. • Are NOT scalable – i.e. when you resize a bitmap graphic, it tends to lose quality.
Manipulation 	• Transforming or altering an asset using methods/techniques to achieve desired results.
Composition	• Is the result of 2 or more images that have been combined or overlaid.
Layer 	• Photoshop layers are like sheets of stacked acetate. • Transparent areas on a layer let you see layers below. You use layers to perform tasks such as compositing multiple images, adding text to an image, or adding shapes.
Client brief	• Outlines the client's objectives, expectations, target audience, budget, timeline, and any specific requirements or constraints that must be considered
Target audience	• A group of people identified as likely customers of a product. The product should be developed with them in mind so they are more likely to buy.

Why someone might use Photoshop to manipulate an image.

- To improve it in some way, e.g. by removing a spot from a supermodel's nose!
- To use as proof that something actually happened, e.g. UFO flying over your house!
- To provoke a shock reaction.
- To create a piece of art.

File Types.

- . JPG (Lossy) - Joint Photographic Experts Group, does not keep transparency.
- . PNG (Lossless) - Portable Network Graphic, good for images in colour, larger file size than a jpeg, keeps transparency.
- . TIFF (Lossless) - Tagged Image File Format, not used on the WWW due to its very large file size, file standard in printing.

Shortcuts

Ctrl + D	Deselect
Ctrl + T	Free transform
Ctrl + alt + z	Go backwards a step
Ctrl + "-" (or use +)	Zoom in and out

Layer effects

Warping Text

Modelling and CAD Development

What is modelling?

Modelling is an **inexpensive** tool designers use to **refine** and **communicate** their ideas to clients and manufacturing companies.

It allows designs to be moved forward and **improved**.

Modelling can also help you test:

- Ergonomics
- Materials
- Construction

Types of Models

Quick Modelling - These are the first initial models you will make of an idea. You will use materials that are easy to hand, such as paper and card.

Prototyping - This is a type of modelling that happens later on in the project. When the idea is more refined. The model will be an accurate reflection of what the final idea will look like and how it will work. It will help manufacturers to determine dimensions and a final product spec.

CAD Modelling - Ideas can be modified rapidly, shared electronically, and even involve virtual testing!

Using ICT as a Design Tool:

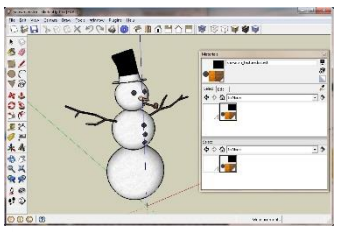
Computer Aided Design (CAD) allows designers use many different software programmes to help develop ideas.

CAD can help you "render" an idea, giving it a realistic colour or material effect.

CAD can allow you to run simulations of constructing the ideas, or testing materials and how they stand up to various forces.

It can also help you to see all the different components separately, in what we call an "exploded view".

Manufacturers find CAD modelling vital, as they can find out accurate dimensions and other details of the product from a single "engineering drawing" – which can be produced at the click of a button from a CAD programme.



Types of Modelling Materials:

Paper and Card	Easy to cut and fold Paper not as rigid as card
Corrugated Card	Easily available Good for large scale models Not easy to fold
Polystyrene Foam	Good for shaping in solid block shapes Lightweight and glues well
Foamboard	Clean and crisp models Can be cut with a knife
Balsa and Jelutong	Can be cut in a school workshop Sanding gives smooth finish
Wire and Straws	Good for representing piping and tubing Wire easily bent into complex shapes
Polymorph	Can be reused Easy to shape by hand or by using moulds Can be painted

Text Book Alert!

Be able to describe the advantages and disadvantages of using modelling to communicate.

Look on pg. 91-95 to learn more about modelling and the different types.

Terms for Analysis: The poem…

Achieves	Advances	Affects	Symbolises
Allows	Alludes to	Builds	Transforms
Concludes	Confirms	Conveys	Typifies
Denotes	Develops	Demonstrates	Reinforces
Displays	Justifies	Exaggerates	Offers
Encourages	Enhances	Establishes	Presents
Exemplifies	Emphasises	Explores	Portrays
Exposes	Forces	Generates	Questions
Highlights	Hints	Identifies	Provokes
Ignites	Illustrates	Impacts	Signifies
Implies	Identifies	Indicates	Juxtaposes

Year 9 English Poetry KO

5 Steps for Amazing Unseen Poetry Analysis

1. Look at the title
2. Look at the first and last lines
3. Examine the turning point
4. What changes throughout the poem?
5. Pick out three things to comment on…
   … then find three things to say about each of those things

Structural Techniques

Rhythm	The beat of the poem
Volta	The point in the poem where the mood changes
Caesura	A deliberate break or pause in a metric line
Enjambment	Sentences running on over more than one line
Stanza	A group of lines in a poem
Rhyme	Words that have the same rhyming sound
Rhyme Scheme	Patterns of rhyming words
Meter	The pattern of stressed and unstressed syllables
Free Verse	Lines of poetry that do not follow any regular metrical structure
Blank Verse	Lines of poetry that are unrhymed but follow a regular meter
Repetition	Repeated words or phrases
Anaphora	The repetition of words or phrases at the beginning of a line or sentence

Language Techniques

Simile	A comparison using *like* or *as.*
Metaphor	A comparison using *is*, *was* or *were.*
Imagery	When the writer creates a mental picture or image.
Symbolism	The use of "symbols" to signify or connote particular (usually well-established) ideas.
Motif	A recurring image in a poem.
Personification	Giving human attributes to something non-human.
Zoomorphism	Giving animal attributes to something which is not an animal.
Oxymoron	Two words which directly contrast, placed together.
Alliteration	Repeating the same letter.
Connotations	Associated words or meanings.
Pathos	Creating a strong emotional effect.
Semantic field	A group of words related by meaning.
Emotive Language	Language which appeals to the emotions.
Hyperbole	The use of exaggeration for dramatic effect
Imperatives	Command words which direct the reader.
Syntax	The order of words within a line.
Sibilance	Repetition of the S sound.
Euphony/ Cacophony	Pleasant sounds/ Harsh and discordant sounds

Poetry Key Terms

Word classes	Nouns, adjectives, adverbs, verbs, pronouns
Language	Word choices made by the poet
Structure	How the poem appears - the order and flow
Form	Physical layout of the poem, what kind of poem it is
Tone	How a text sounds, e.g. humorous or serious
Mood	How readers feel or respond to texts, e.g. playful, lonely, warm
Theme	Underlying messages, or "big ideas"

Number of lines in or within a poem		**Couplet** **Rhyming Couplet**	2
Tercet	3	**Sestet**	6
Quatrain	4	**Septet**	7
Quintet	5	**Octave**	8
Sonnet	A 14-line poem		

Year 9 English TRAGEDY KO

WORD	DEFINITION
Tragedy	A play dealing with tragic events and having an unhappy ending, especially one concerning the downfall of the main character.
Tragic hero	A tragic hero is the protagonist of a tragedy. They gain the sympathy of the audience but often have a fatal flaw.
Regicide	The killing, murder or assassination of a monarch (a King or Queen.)
Prophecy (n) **Prophesy (v)**	A prophecy is a prediction of what will happen in the future. To prophesy is to make a a prediction of what will happen in the future.
Hamartia	A fatal flaw leading to the downfall of a tragic hero or heroine.
Mimesis	The imitation of real life in art and literature.
Peripeteia	A sudden reversal of fortune or change in circumstances.
Anagnorisis	The discovery of a truth – i.e. the character realising their **hamartia** or discovering a prophecy or act of fate.
Catharsis	A release of emotions in order to feel purified and cleansed.
Jacobean	The period of time from 1603-1625 when James I was King of England (and Scotland.)
Eponymous	An eponymous character will have their name in the title of the play, novel or poem they appear in.
Machiavellian	Machiavelli was an Italian politician who wrote a book explaining how to be cunning. Machiavellian can mean evil or devious.

CONVENTIONS OF TRAGIC HEROES

Hamartia	• All tragic heroes have a single character flaw which leads to their undoing • Often, their discovery of this flaw leads to their death
High born/noble	• They tend to be high born or noble, e.g. kings or important soldiers • This emphasises the fall from grace
Neither good nor evil	• Tragic heroes are never entirely pure or evil • This makes tragedy a complicated and interesting form of literature
Relatable and understandable	• Audiences can relate to and understand the actions of tragic heroes • We feel sorry for tragic heroes even when they behave badly

CONTEXT

Ancient Greece	• c.1200 BC to 343 BC • Aristotle, a Greek philosopher, defined the features of tragedy • Greek literature often features stories from mythology, about gods, goddesses and fantastical creatures • Greek drama featured a chorus, who commented on the action
The Jacobean Era	• James I became King in 1603 following the death of Elizabeth I • He was the first King of England AND Scotland in 1603 • He was Shakespeare's patron, and so his plays were often written to please the King • James I was superstitious and hated witches • Life in the Jacobean era was difficult for Black people, something we see in *Othello*
The Holocaust	• The genocide of 6 million European Jews during World War II – almost two-thirds of Europe's Jewish population • 1941 and 1945 • Jews were sent to concentration camps set up by Hitler

PLAY	SUMMARY OF THE PLOT
Oedipus Rex **Sophocles** **429 BC** Set in Thebes during the time of Greek myths	By leaving his home in Corinth, Oedipus thinks he has escaped a terrible prophecy that says that he will kill his father and marry his mother. On the way to Thebes, Oedipus kills a fellow traveller. He then defeats the Sphinx and marries queen Jocasta. When Oedipus finds out he has fulfilled the prophecy, he blinds himself.
Othello **Shakespeare** **1603** Set during the Ottoman-Venetian war 1570-1573 in Cyprus	Iago is furious about being overlooked for promotion and plots to take revenge against his General; Othello, the Moor of Venice. Iago manipulates Othello into believing his wife Desdemona is unfaithful, stirring Othello's jealousy. Othello allows jealousy to consume him, murders Desdemona, and then kills himself.
The Shawl **Cynthia Ozick** **1980** Set during the Holocaust, in a concentration camp	The story follows Rosa, her baby Magda, and her niece Stella on their march to a Nazi Concentration camp in the middle of winter. Rosa hides Magda in a shawl which she sucks on for food. One day, Stella takes Magda's shawl away to warm herself. Magda begins screaming for her "Ma." Rosa is too late and watches as the Nazi guards pick Magda up and throw her into the electric fence, killing her. Rosa stuffs the shawl into her mouth to stop herself from screaming.

KEY CHARACTERS

Oedipus	• Oedipus' hamartia is his ignorance, or his inability to see the truth • He is a King by birth and then when he saves Thebes, making him a noble hero • Oedipus is punished when he blinds himself, perhaps symbolising his ignorance or lack of knowledge
Othello	• Othello is a 'Moor', an old-fashioned term which referred to someone from North Africa • He is Shakespeare's only black hero • Othello begins the play as a noble soldier and loving husband, but ends the play as a violent and jealous husband who murders his own wife • His hamartia is his jealousy or perhaps his gullibility • Othello's punishment is his own suicide
Iago	• Iago is a Machiavellian villain who seems to have little motive for his plans except pure evil • Iago hates Othello, although we're not sure why • Iago tells Othello that Desdemona is having an affair with Cassio • This causes Othello to kill his wife, and then himself
Stella	• Stella is initially described as starving, weak and defenceless • Her decision to steal Magda's shawl causes the baby's death • Stella is 'always cold' afterwards, suggesting she always felt guilty

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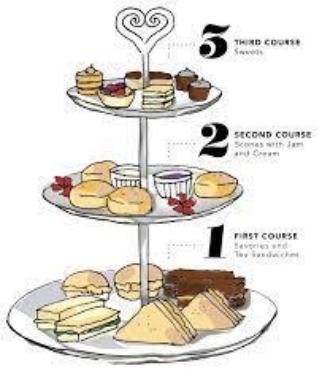
YEAR 9 Afternoon Tea SKO



Presentation plates and ideas:
Select plates/stands and dishes that will showcase your dishes. Think about how the dishes will allow you to plate up and the ease in which the customer will be able to select the dishes to eat.

KEY VOCABULAR	
Fine Dining	Caters to an upscale clientele and provides the highest quality of food. A fine dining restaurant has a formal atmosphere, is almost always a sit down restaurant, and has a
Afternoon tea	Afternoon Tea is a tea-related ritual, introduced in Britain in the early 1840s. It evolved as a mini meal to stem the hunger and anticipation of an evening meal at 8pm.
Presentation techniques	Techniques used to make food look more attractive and appetising.
Creaming method	Cake making method where the butter and sugar is mixed together first, then the egg added and then the flour folded in gently
All-in one method	Cake making method where all the ingredients are whisked together.
Finger sandwich	Sandwich that is easy to handle and can be eaten in two-three bites.
Egg wash	A beaten egg is used to brush the top of bread/ pastry prior to baking.

POINTS TO CONSIDER	
Skills of staff	Dishes can only be put on the menu if the staff have the skills to produce them.
Themes	If there is a theme to the menu every element of the dish on the menu must fit with that theme. As this is what the customer will expect.
Seasonality	Seasonal foods that foods that are grown naturally in the in each season e.g. asparagus in spring, pumpkin in autumn.
Ingredients/equip ment available	Dishes can only be put on the menu if the kitchen have the ingredients and equipment available to make those dishes
Types of customer	Different customers will have different needs and requirements from a product: Customers are people who purchase and/or consume the product.

Piping	Using piping bags and different nozzles to create different patterns using buttercream/ fresh cream or meringue by squeezing the filled bag.
Modelling	Use fondant icing to create shapes for decoration
Feathering	Where you cover your baked item with one colour of icing and then pipe thin parallel lines using a different coloured icing. Then you drag a skewer through the lines to create a wavy effect.
Lattice	Criss-crossing pattern of strips. Weaving lines of pastry over and under other strips of pastry.
Glazing	Coating of food such as bread or pastry before baking used egg, milk or another liquid to create an attractive finish
Crimping	Crimping the edges of pastry not only looks pretty but it helps keep the filling inside.
Positioning	The way you position the food on a plate can dramatically alter it's appearance. Centre foods that are the same shape as the plate.

RESEARCH

Remember that this does not need to be in written format BUT photographs of displays, printouts from the computer, leaflets, etc. must be produced as evidence that you have carried out the research or investigation. Answer the following questions using the internet to find out:

What is afternoon tea?
·Where does it originate from? · What time is it eaten?
· How is it served? What beverages are served with afternoon tea?
· How much does it cost for 2 people to eat afternoon tea at e.g. Betty's or Harvey Nichols?
· How is afternoon tea presented?
· What does it look like?
· Consider the nutritional content of afternoon tea products. Analyse the nutritional content of a few items . Use bbcgoodfood.com (i.e. Mini quiche, ham and mustard sandwich, profiteroles). Comment whether these products are high in fat, salt, sugar, low in fibre, contain vitamins/minerals/protein are a carbohydrate etc.
· How are the products decorated?
· Draw a mind map of different dishes that could be served.
· Produce a table of suitable recipes you could make for the task.
· List the level of skill; high, medium or basic.
· Make an image board to show recipe ideas.
· Trial and test recipes in practical lessons.
· Watch demonstrations of recipes.
· Carry out a survey of varieties of products available for sale. Record your results in a table.
· Taste testing of different dishes suitable for afternoon tea.
· Make a fact file or information leaflet that could be used in a Hotel or restaurant to promote afternoon tea

REASONS FOR CHOICE

JUSTIFICATION AND REASONS FOR CHOICE Research recipes and choose what you will make in the practical session. Remember the practical carries the most marks so make sure your choice is: • Suitable for the brief – each recipe must be suitable for afternoon tea. • You have the time, skill and equipment to make. • Recipes show a variety of colour, texture and flavours. • Show skills which reflect your ability.

Higher Level Skills: · Pastry making – short crust, pate sucre, choux · Roux based sauces · Meringues and pavlovas · Meat and fish cookery (using high risk foods) · Decorated cakes and gateaux · Rich yeast doughs including pizza, shaped bread rolls. · Complex accompaniments and garnishes e.g. piping cream, coulis sauce, vegetable accompaniments.

Medium Level Skills: · Puff pastry items that need shaping but use readymade pastry · Vegetable and fruit dishes requiring even sizes · Cheesecakes and similar desserts · Simple sauces e.g. red wine sauce · Simple cakes, biscuits, cookies and scones · Complex salad with a homemade dressing such as mayonnaise

Basic Skills: · Crumbles · Sandwiches · Pizza with readymade base · Jacket potatoes · Simple salads · Assembling products e.g. using prepared sauces, bought meringue nests etc.

JUSTIFICATION AND REASONS FOR CHOICE Create a table with your 4 chosen dishes in. List the skills and cooking methods for each product. Write an introduction to the dishes you are going to make. Did you trial any of these dishes?

Dish	Skills	Cooking methods
Victoria sandwich cake	Creaming method Decorating, piping	Baking
Strawberry Gateau	Whisking method, fruit preparation, piping cream and making chocolate curls.	Baking and chilling.
Stilton & vegetable quiche	Shortcrust pastry, making custard, vegetable preparation.	Baking and sauté.
Shortbread biscuits	biscuit made by the rubbing in method	baking.

Write a paragraph for each product you are making. Explain why you are making the product, and how it is suitable for afternoon tea. i.e. Victoria Sandwich Cake Read the examples below and tailor these to your dish. This dish shows a variety of colours; state the colours used in each dish. I have trialled this dish so I know how long it will take to make/I know what it will look lke. This dish is nutritionally balanced (contains carbohydrates, protein, vitamins and minerals, is low in salt, low in fat) This dish shows a variety of textures; chewy, crunchy, soft, crisp etc. This dish will demonstrate a range of skills such as….(creaming, pastry making, whipping, proving) This dish shows a variety of flavours. · Cost – state how economical the dishes chosen are. Use of staple or store cupboard ingredients, ingredients which are in season etc. ·This dish can be made in time available. This dish look attractive with accompaniments and/or garnishing. This dish is saleable – customers in restaurant would want to buy them. This dish is easy to portion control and to serve. State how you will portion dishes; use of spoons, ladles etc. This dish would be suitable for making in bulk. This dish can be chilled/frozen for use another time. Chilled at 1-5GC and frozen at -18GC. Make a menu card to show the dishes you are making. Present attractively. You will need to display this with your food during the practical .

Paper 1: Challenge of Natural Hazards

Structure of the Earth Tectonic Theory

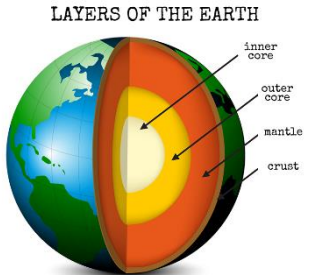
Topic Keywords Key Words

Tectonic hazards – earthquakes / volcanoes
Plate margin – where two of the earths plates meet and you get earthquakes and volcanoes
Distribution – where something happens / the pattern of where it happens (e.g. earthquakes/ volcanoes
Volcanic eruption – hot magma erupts from the ground
Earthquake – where sudden movement in the crust causes the ground to shake and move
Primary effects – the first effects that happen straight away
Secondary effects – later effects (weeks/ months later)
Short term (immediate responses) – helping straight away
Long term responses – later responses to help in the future

Structure of the Earth

Remember the crust is split into Oceanic and Continental

Oceanic - 5-10 km thick, denser, is destroyed through subduction, is younger
Continental - 30-50 km thick, older, lighter and cannot be destroyed.



Convection Currents

Radioactive heat from the core causes the mantle to warm. The hot magma within the mantle will rise and spread out near the crust; this causes the plates above to move too.

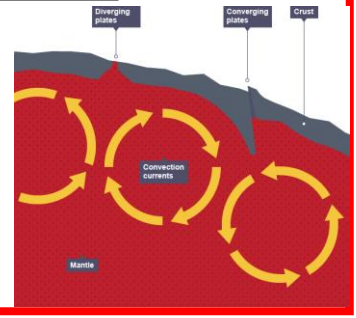
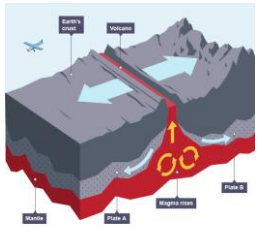


Plate Margins

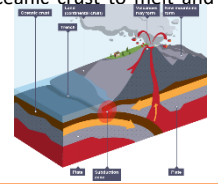
Constructive Plate Margin

1. convection currents make plates pull apart
2. fissures (cracks) form in the curst
3. Magma rises and begins to erupt through the fissures
4. The eruptions are gentle and non violent with runny lava
5. When the lava cools it will solidify (become solid) to make new crust and land.



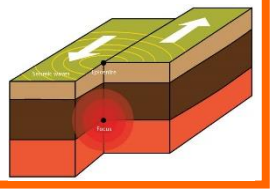
Destructive Plate Margin

1. Convection currents make the oceanic and continent plates move towards each other
2. The heavier oceanic plate is subducted (sinks) in to the mantle because it is dense
3. The movement causes earthquakes
4. The heat from the mantle causes the oceanic crust to melt and form magma
5. Magma will build in the magma chamber along with volcanic gas until the pressure is too great. There is a large eruption, usually with a pyroclastic flow (hot gas /ash)



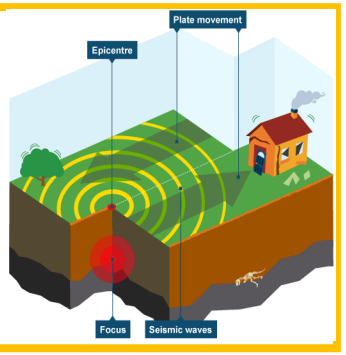
Conservative Plate Margin

1. Convection currents cause two plates to move side by side or in the same direction
2. Due to the crust being jiggered they get stuck
3. Tension builds until one plate moves suddenly
4. The energy is released as seismic waves to make the ground shake as an earthquake



Earthquakes

What? Sudden violent shaking of the ground
Why? Pressure builds up as the plates try to move and is released, causing huge energy and the surface to shake
Focus – inside the Earth's crust where the earthquake originates from
Epicentre – The point on the Earth's surface above the focus
Seismic waves – what the earthquakes energy is released as



HIC –Japan 2011
Primary Effects – 15,800 deaths (more due to tsunami), 4.4m houses with no electricity
Secondary Effects - The tsunami waves swept away cars. Nissan's UK Sunderland plant closed for two weeks, Nuclear leak from the Fukashima plant

Short term response - Warning 3 minutes after. Army held a quick search and rescue
Long term response -New homes inland away from the coast and sea water. Taller sea walls (30ft) to keep out tsunami waves

LIC – Haiti 2010
Primary Effects – 316,000 deaths, 1 million homeless, damage totalled $8billion
Secondary Effects - 1 year later people were still living in shelters, diseases like cholera spread quickly due to contaminated water. 1 in 5 people lost their jobs
Short term response - Emergency services from HICs helped with shelters but they were easily damaged and had no running water, emergency schools set up and emergancy hospitals for treatment
Long term response - £1 billion donated for rebuilding. Locals paid to help with repairs as this gave them jobs in a 'cash for work scheme'

Living Near Hazards and Managemen t

Living Near Tectonic Hazards

- **Geothermal Power** - energy made from heat energy from the earth. The heat from underground steam is used to drive turbines and produce electricity. 2/3 of Iceland's energy comes from geothermal power.
- **Tourism** – for the danger and scenery. Creates jobs and leads to a multiplier effect. Iceland makes 10% of their GDP.
  Agriculture (farming) – when lava is broken down through weathering it creates very fertile soil good for faming. This creates job opportunities and the produce can be exported.
- **Mineral Extraction –** for example sulphur mining in Indonesia where it is sold to go in fertilizers. This creates well paid jobs for locals.

Management Strategies

Prediction – volcanoes give warning signs such as sulphur dioxide gases so they collect gas samples to monitor changes. The volcano can also bulge so they use a tilt metre to measure the changes. They use the information gathered through monitoring to predict when an eruption may take place

Protection - there is not a lot that can be done to protect people as we cannot stop the lava flow. They try and build a channel to divert the flow of the lava.

Planning - Having a hazard map shows the areas that are at risk of the eruption and that need to be evacuated first.

Earthquake Management Strategies

Prediction – Earthquakes occur without any warning so they are very hard to monitor. However, you can use a seismometer to detect them and record the results as lots of smaller earthquakes may result in a larger one.
Protection – Earthquake proof building. The steel crossed frame sway with the movement of the earthquake. The window shutters automatically comes down to protect the glass.
Planning - In Japan they have a Disaster Prevention Day, emergency drills so people and emergency services know how to react.

Year 9
Dangers in the Atmosphere

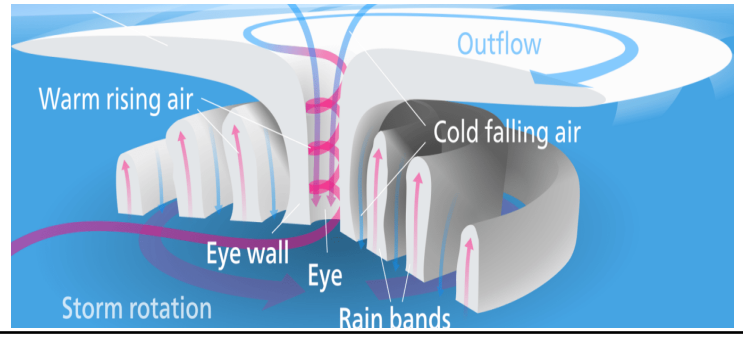
Make sure you know the 'bare bones' of this unit.

Keywords:

1. **Weather** – the day to day conditions of the atmosphere
2. **Weather Hazard** - weather condition that has the potential to cause either harm or damage. E.g. storms, extreme cold / snow and flooding in the winter. Droughts and heatwaves in the summer
3. **Low pressure** – rising air that condenses to make the clouds that are needed for tropical storms
4. **Tropical storm –** area of low pressure with storm winds (75mph+)
5. **Eye –** centre of the storm it is calm
6. **Storm Surge** – an increase in the sea level due to the tropical storm winds, it causes flooding
7. **Eye Wall** – This surrounds the eye, it has the strongest winds and rainfall
8. **Tornado** - a type of storm in which powerful rotating winds form a column, which reaches from a cloud down toward the ground.
9. **Drought** – long periods of dry weather result in drought when there is a lack of water

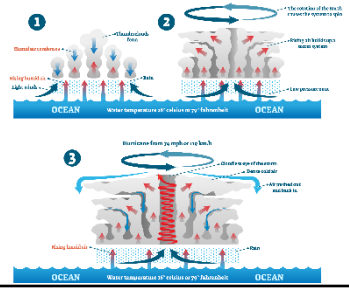
Characteristics of Tropical Storms

They require low pressure with warm moist air rising over oceans that are 27C+. They have bands of rainclouds and a calm eye in the centre.



Formation of Tropical Storms

1. Warm sea / ocean near the equator – the water is 27C+
2. Air rises (ascends) because of low pressure and condenses to make clouds
3. Strong winds form (75mph or above) and there is rain
4. Air spins around the eye of the storm
5. It moves towards the land and the high wind causes a storm surge where the waves are pushed in land causing flooding
6. On the land it looses its energy and looses power.



Tropical Storm: Hurricane Sandy (2012)

Primary Effects – There were 147 direct deaths: 72 in the USA and the rest mainly in the Caribbean, including 54 in Haiti and 11 in Cuba. Roads, train lines and other transport infrastructure became unusable due to flooding, resulting in disruptions to travel and trade.

Secondary Effects – Hurricane Sandy was the second most costly hurricane on record, causing $71 billion in damages. More than 8.5 million homes and businesses were left without power.

Short Term Responses – People received early warnings in the days leading to the event. Early curfews were put in place to protect residents, properties and to prevent crime

Long term responses – Investments made in flood prevention and coastal protection schemes such as sea walls will be essential.

Tropical Storm Management

Predication –monitoring the storm to say when it will happen and warn people so they can prepare and plan – people can be more prepared and effects will not be as bad (hopefully!)

Protection – emergency supplies and boarding up windows, having a supply kit. **Planning** – teaching people what to do to stay safe, having an evacuation route

Future of Tropical Storms

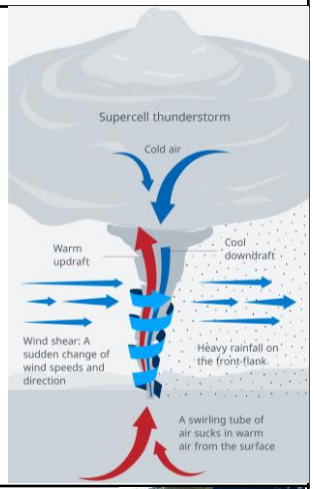
Due to climate change scientists predict tropical storms will be more **frequent** (happen often) as the ocean is hotter for longer.

Also, more **intense** (stronger) tropical storms as ocean temperatures stay warmer for longer.

The **distribution** will be bigger as oceans further north will be warmer too so they will travel to other locations.

Formation of Tornadoes

1. When the warm, moist air meets cold dry air, it explodes upwards. A thunder cloud may begin to build.
2. Upward movement of air can become very rapid. Winds from different directions cause it to rotate.
3. A visible cone or funnel drops out of the cloud towards the ground.
4. The vortex of winds varies in size and shape, and can be hundreds of metres wide. A tornado can last from several seconds to more than an hour and may travel dozens of miles.



Drought e.g. in the UK 2022

By Mid-2022, the UK had experienced the driest nine-month period since 1916. The South East received just 74% of the long term average for the period November to July.

Impacts:

- The dry ground made it easier for wild fires to spread
- Reservoir levels have decreased
- Hose pipe bans have been introduced
- HEP production has decreased
- Farmers have been unable to plant crops they usually would and livestock has less grass to graze on so they have had to use their winter feed early

Year 9 History: The Holocaust

Key Vocabulary	Definitions
Genocide	The deliberate killing of a large group of people, especially those of a particular nation or ethnic group.
Concentration Camp	A camp where people had to do forced labour.
Auschwitz-Birkenau	A Nazi Concentration and extermination camp, became a major site of the Nazi Final Solution to the Jewish Question.
Ethnic Cleansing	Systematic killing of a racial or cultural group.
Warsaw Ghetto	A section of a city which Jews were forced to live in.
Holocaust	The mass murder of Jews and other minority groups under the German Nazi regime from 1941 until 1945.
Deportation	Forced removal often through transportation.
Death Camp	A camp where people were killed immediately upon arrival.
Gas Chamber	A method of killing Jews in Death Camps.
Anti-Semitic	To be hostile to or prejudiced against Jews.

Jewish Life in Nazi Germany

The Jews in Nazi Germany suffered appallingly after January 1933.Some rich Jews could afford to leave Nazi Germany (or were forced to) but many could not.

1933 March 31: A decree in the city of Berlin said that Jewish doctors were suspended from the city's charity services.

1933 April 7: There was a law for the Restoration of the Professional Civil Service. This law removed all Jews from government service.

1933 July 14: The Jewish people lost citizenship because of a Denaturalization Law.

1935 September 15: The Nazi leaders announced the Nuremberg Laws. These laws excluded Jews from having citizenship and marrying or having sex with German women. They also deprived the Jews of basic political rights such has voting rights.

Warsaw Ghetto

The Warsaw Ghetto was the largest ghetto in Nazi-occupied Europe. The Warsaw Ghetto was established on the orders of Hans Frank who was the most senior Nazi in Poland after the success of the invasion that started on September 1st 1939. Frank ordered that all the Jews in Warsaw and the surrounding areas had to live in specified areas within the city boundaries, these were the Ghettos. To begin with it is thought that about 400,000 Jews were forced to live within the ghetto.

The Final Solution

This was the Nazi policy of exterminating European Jews. Introduced by Heinrich Himmler and administered by Adolf Eichmann, the policy resulted in the murder of 6 million Jews in concentration camps between 1941 and 1945.

Anne Frank

Anne was a German-born Jew. One of the most discussed Jewish victims of the Holocaust, she gained fame much later following the publication of *The Diary of a Young Girl* (originally *Het Achterhuis;* English: *The Secret Annex*), in which she documents her life in hiding from 1942 to 1944, during the German occupation of the Netherlands in World War II.

The Liberation of the Camps

Soviet soldiers were the first to **liberate concentration camp** prisoners in the final stages of the war. On July 23, 1944, they entered the Majdanek **camp** in Poland, and later overran several other killing centers. On January 27, 1945, they entered **Auschwitz** and there found hundreds of sick and exhausted prisoners.

Nazi Propaganda

Hitler established a Reich Ministry of Public Enlightenment and Propaganda headed by Joseph Goebbels. The Ministry's aim was to ensure that the Nazi message was successfully communicated through art, music, theatre, films, books, radio, educational materials, and the press. By the late 1930s, the increasingly fanatical tone of Nazi propaganda reflected the growing radicalisation of the regime's anti-Semitic policies. The Jewish stereotypes shown in such propaganda served to reinforce anxieties about modern developments in political and economic life, without bothering to question the reality of the Jewish role in German society.

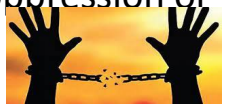
1933 — **Denaturalization Law**

1935 — **The Nuremburg Laws.**

1939 — **Jews are placed Warsaw Ghetto**

1941 — **The Final Solution begins**

1945 — **Liberation of the Camps**

Genocide (Jen-oh-side) Deliberate killing of a large group of people from a particular nation or ethnic group with the intention of destroying that group.	**Holocaust** (Holl-oh-caust) Mass Killing of European Jews during WWII. 	**Deportation** (Dee-port-ay-shon) Remove from a from a country 	**Anti-Semitic** (ant-y Sem-it-ic) Against Jews. Hatred against Jewish people. 
Liberation (Lib-er-ay-shon) Freedom from oppression or imprisonment. 	**Nazi Party** (Nat-zy par-ty)  Extreme right wing political party led by Hitler.	**Ghetto** (Get-tow)  Place where groups of people were kept separate from others. Often treat cruelly.	**Concentration Camps** (con-sen-tray-shon camps) a place where large numbers of people (mainly Jews) were kept prisoner. Sometimes they were forced to work.
Warsaw (War-saw)  One of the largest Ghettoes during WWII.	**Auschwitz** (Ow-shwitz) Concentration camp in Poland. 	**Adolf Hitler** Extreme right-wing, racist and anti-semitic leader of the Nazi Party. 	**Anne Frank** (Ann Frank)  Jewish girl who hid in an attic during WWII. Famous for writing a diary.
Jewish (Jew-ish)  Practicing the Jewish religion, Judaism.	**Nuremberg Trial** (New-rem-burg Try-al)  The trials where Nazi leaders were sentenced for their actions.	**Denazification** (Dee-nat-zy-fic-ay-shon) Removing anything to do with Nazi beliefs 	**Minority group** (My-nor-it-ee) Groups with little numbers of individuals in society.

Genocide (Jen-oh-side) up.	**Holocaust** (Holl-oh-caust) 	**Deportation** (Dee-port-ay-shon) 	**Anti-Semitic** (ant-y Sem-it-ic) 
Liberation (Lib-er-ay-shon) 	**Nazi Party** (Nat-zy par-ty) 	**Ghetto** (Get-tow) 	**Concentration Camps** (con-sen-tray-shon camps)
Warsaw (War-saw) 	**Auschwitz** (Ow-shwitz) 	**Adolf Hitler** 	**Anne Frank** (Ann Frank) 
Jewish (Jew-ish) 	**Nuremberg Trial** (New-rem-burg Try-al) 	**Denazification** (Dee-nat-zy-fic-ay-shon) 	**Minority group** (My-nor-it-ee)

Charts and averages Student Knowledge Organiser

Key words and definitions

Frequency – How many times a value occurs

Cumulative Frequency – Frequency added together

Ascending – Going up from smallest to biggest

Median – Middle value in an ascending list of data

Mode/Modal value – most common value in the data

Mean - The total of the numbers divided by how many numbers there are.

Range – Biggest number – smallest number

Sum - addition of values

Averages from lists

7 babies weigh the following amounts:
2.5 kg, 3.1 kg, 3.4 kg, 3.5 kg, 3.5 kg, 4 kg, 4.1 kg

- $mean = \frac{2.5+3.1+3.4+3.5+3.5+4+4.1}{7} = \frac{24.1}{7} = 3.44$ (2 dp)
- 2.5 kg, 3.1 kg, 3.4 kg, **3.5 kg**, 3.5 kg, 4 kg, 4.1 kg
  The median weight of these babies is 3.5 kg.
- 2.5 kg, 3.1 kg, 3.4 kg, **3.5 kg**, **3.5 kg**, 4 kg, 4.1 kg
  The modal weight is 3.5 kg.

Hegarty Maths Links

Pie charts - 427, 428, 429

Averages – 413, 419, 417,418, 416, 415, 404, 409, 406

Scatter Graphs – 453, 454

Averages from table

	Number of Goals	Frequency	Cumulative Frequency
	0	2	2
	1	3	5
	2	5	10
	3	1	11
Total		11	

Mode = category with biggest frequency = **2 goals**

Median = value in the $\frac{Total+1}{2}$ position = 6th position = **2 goals**

Mean = $\frac{Sum\ of\ frequency \times number\ of\ goals}{Total}$ = $\frac{0\times2+1\times3+2\times5+3\times1}{11}$

= $\frac{16}{11}$ = **1.5 goals** (1.d.p)

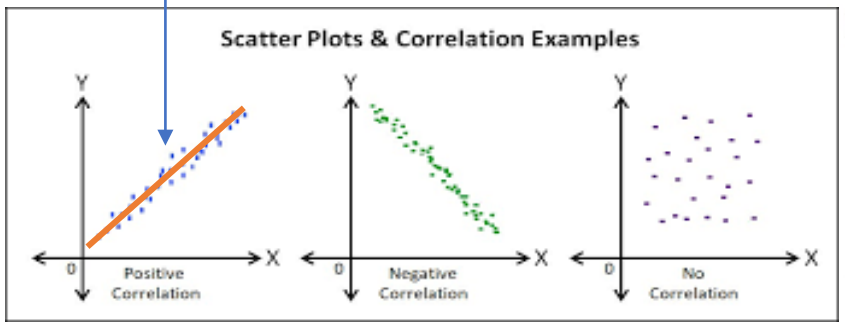
For grouped data,

$0 \le m < 4$	12

use the middle value when multiplying the data by the frequency when calculating the mean.

Scatter Graphs

Use a line of best fit to show correlation and to estimate values using the scatter graph



Reverse mean

The mean height jumped by a high jumper after 10 jumps is 1.81m. He jumps another jump at 1.73m, what is his new mean height?

1.81 x 10 = 18.1m = Sum of all 10 jumps

Mean of 11 jumps = $\frac{Sum\ of\ 11\ jumps}{Total\ no.of\ jumps}$

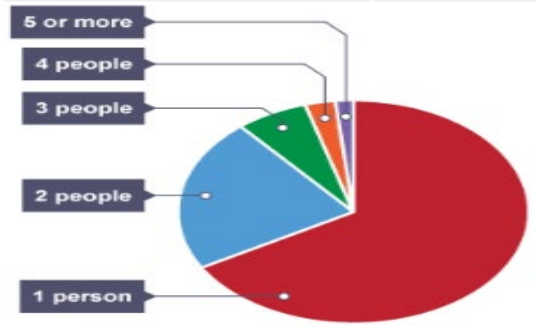
= $\frac{18.1+1.73}{11}$ = 1.80m (2.d.p)

Pie Charts

To draw a pie chart, find the proportion of 360° :

1 item/frequency = $\frac{360°}{Total\ Frequnecy}$ = $\frac{360°}{180}$ = 2°

People travelling in a vehicle	Frequency	Calculation	Angle
1 person	120	2 × 120	240°
2 people	40	2 × 40	80°
3 people	13	2 × 13	24°
4 people	5	2 × 5	10°
5 or more people	2	2 × 2	4°
Total	**180**		



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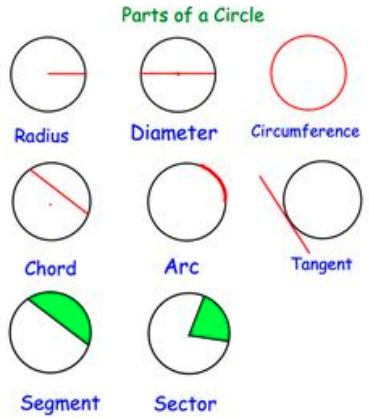
Area and volume Student Knowledge Organiser

Key words and definitions



Volume
A measure of the amount of space occupied by an object.

Surface area
The area of all the faces in a 3D shape added together.

Compound shape
A shape made up of two or more basic shapes.

Prior Knowledge

Understand what is meant by area of a shape.

Understand what is meant by perimeter of a shape.

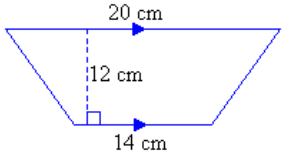
Calculate the area of a rectangle.

Calculate the area of a triangle.

Calculate the volume of a cuboid.

Calculate the volume of a prism.

Area



$a = 20$ cm, $b = 14$ cm, $h = 12$ cm

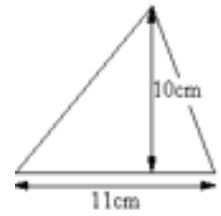
$A = \frac{1}{2}(a+b)h$

$= \frac{1}{2}(20+14)\times 12$

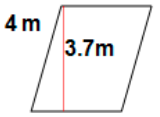
$= \frac{1}{2}\times 34\times 12$

$= 204$

So, the area of the trapezium is 204cm²



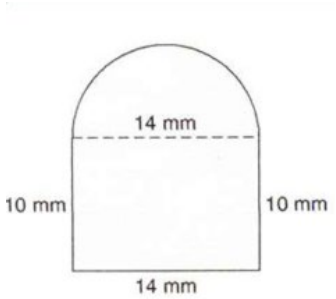
Area of tringle
= bh / 2
= 11x10 / 2
= 55cm²



Parallelogram
Area = bh
Area = 3.2m x 3.7m
Area = 11.84m²

3.2 m

Compound area



This figure can be separated into a rectangle and a semicircle. Find the area of each.

Rectangle: $A = L \times W$

$A = 10 \times 14$

$A = 140mm^2$

Semicircle: $A = \frac{\pi \times r^2}{2}$

$A = \frac{3.14 \times 7^2}{2}$

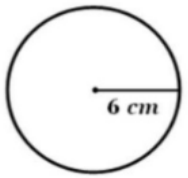
$A = \frac{3.14 \times 49}{2}$

$A = 76.93mm^2$

Area = 140 + 76.93

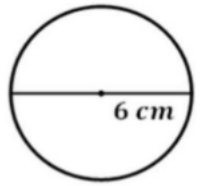
Area = 216.93mm^2

Circumference and area of a circle



$A = \pi r^2$
$= 3.142 \times 6^2$
$= 3.142 \times 36$
$= 113.11\ cm^2$

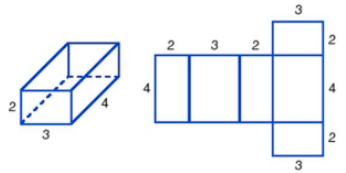
In terms of π
$= \pi \times 6^2$
$= 36\ \pi$



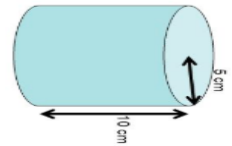
$C = \pi d$
$= 3.142 \times 6\ cm$
$= 18.85\ cm$

In terms of π
$= \pi \times 6$
$= 6\ \pi$

Surface area of a prism



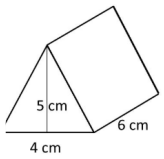
S.A. = 2(2 x 4) + 2(3 x 4) + 2(2 x 3)
S.A. = 2(8) + 2(12) + 2(6)
S.A. = 16+ 24+ 12
S.A. = 52



- Area of rectangle = 2πrh = 2 x 3.14 x 5 x 10 = 314 cm²
- Area of two ends = 2πr² = 2 x 3.14 x 5 x 5 = 157 cm²
- Total surface area is 2πrh + 2πr²
- Total surface area = 314 + 157 = 471 cm²

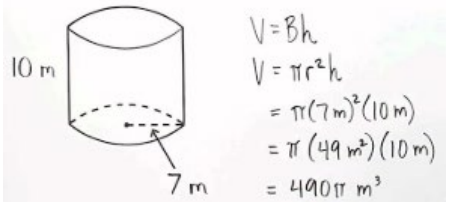
Volume of a prism

Volume of prism: $V = area\ cross\ section \times length$



Area of triangle = ½ x 5 x 4
= ½ x 20
= 10 cm²

Volume = area x length
= 10 X 6
= 60 cm³



Hegarty Maths Links

Area of triangle	557, 558
Area of parallelogram	556
Area of trapezium	559
Circumference of circle	534, 535
Area of circle	539, 540
Volume of prism	570, 571, 572, 573, 574
Surface area of prism	585
Compound shapes	555

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Fractions, decimals and percentages Student Knowledge Organiser

Key words and definitions

Numerator - the top number of a fraction.
Denominator – the bottom number of a fraction, represents the number of parts to make one whole.
Equivalent – worth the same amount.
Simplify – reducing a fraction to an equivalent fraction with the lowest possible numerator and denominator.
Reciprocal – is one of a pair of numbers that when multiplied together gives the answer equal to 1.
Depreciation – the decrease in the value of something over time.
Interest - is money that is paid regularly at a particular percentage, usually when money has been lent or borrowed.

Multiply, divide, add and subtract fractions

$$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$$

Simplify first?
Multiply numerator
Multiply denominator
Simplify?

$$\frac{2}{15} \div \frac{4}{5} = \frac{2}{15} \times \frac{5}{4} = \frac{1}{6} = \frac{10}{60}$$

Flip the second fraction (reciprocal) and change to x
Multiply the fractions
Simplify?

$$\frac{2}{7} + \frac{3}{5} = \frac{10}{35} + \frac{21}{35} = \frac{31}{35}$$

Make common denominator
Do same to numerator as the denominator
Add/subtract numerators – keep the same denominator
Simplify?

$$\frac{7}{9} - \frac{3}{4} = \frac{28}{36} - \frac{27}{36} = \frac{1}{36}$$

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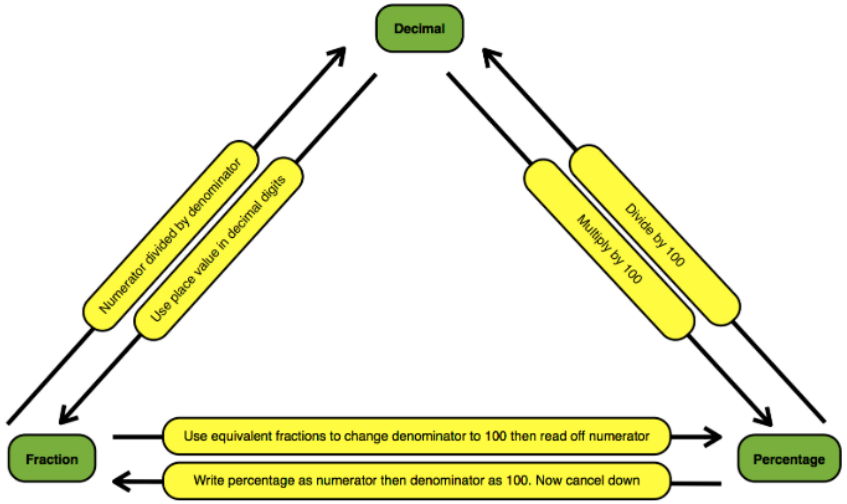
Equivalent fractions, decimals and percentages



Percentage increase and decrease and percentage change.

Increase £240 by 15%

100% of £240
15% of £240 +
115% of £240
= 240 × 1.15
= £276

Or multiply by 1.15

Decrease £90 by 12%

100% of £90
12% of £90 −
88% of £90
= 90 × 0.88
= £79.20

Or multiply by 0.88

$$\%\ change = \frac{change}{orig\ value} \times 100$$

Equivalent Fractions

Fractions that have the same value, eg → $\frac{2}{5} = \frac{20}{50}$

"What I do to the top, I do to the bottom"

Place the following in order $\frac{3}{8}$ $\frac{2}{5}$ $\frac{1}{4}$

Equivalent fractions with a common denominator are $\frac{15}{40}$ $\frac{16}{40}$ $\frac{10}{40}$

Answer $\frac{1}{4}$ $\frac{3}{8}$ $\frac{2}{5}$

Reverse Percentages

The cost of a television is £540 including a 20% sales tax. Work out the cost of the television without tax.

original price × 1.2 = 540
original price = 540 ÷ 1.2
original price = £450

The cost of a holiday is reduced by 15% to £833. What was the original price of the the holiday?

original price × 0.85 = 833
original price = 833 ÷ 0.85
original price = £980

Hegarty Maths Links

Adding, subtracting,	65, 66
Multiplying and dividing fractions	68, 69, 70
FDP	73, 74, 75, 76, 82, 83, 149
Equivalent fractions	59
Percentage increase and decrease	88, 89, 90
Percentage change	97
Reverse percentages	96

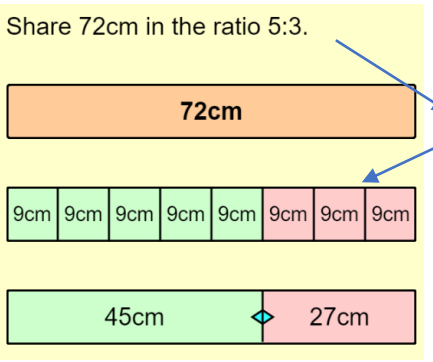
Ratio Student Knowledge Organiser

Key words and definitions

Ratio – ratio compares the size of one part to another part.
Proportion – compares the size of one part to the size of the whole.
Speed – the rate at which something moves.
Density – the mass of a substance per unit volume.
Pressure – the force per unit area exerted on an object.

Sharing in a ratio

Share 72cm in the ratio 5:3.



Draw a bar model to calculate how much one part is worth.

5 + 3 = 8 parts
72cm ÷ 8 = 9cm per part

5 parts x 9cm = 45cm

3 parts x 9cm = 27cm

Simplifying a Ratio

Ratios can be simplified, similar to fractions, by dividing each number in the ratio by their highest common factor (HCF).

Simplify the Ratio 6 : 15

Divide both our number values by **HCF (3)**

3 ↺ 6 : 15 ↻ 3
2 : 5

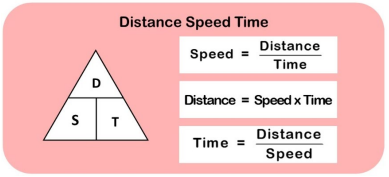
The simplified Ratio Answer is 2 : 5 ✓

Proportion Problems - Recipes

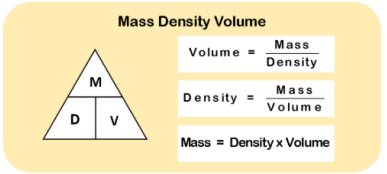
When solving recipe problems, find out how many ingredients are needed to make 1 of something, then multiply by how many you need.
Eg. To make 3 sponge cakes…

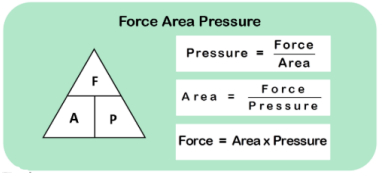
To make 2 sponge cakes		÷2	x3
½ pint	milk	1 cake	3 cakes
2 lb	plain flour	¼ pint	¾ pint
4	eggs	1 lb	3 lb
20 ounces	sugar	2	6
20 ounces	butter	10 oz	30 oz
		10 oz	30 oz

Speed, Density and Pressure



Using each triangle, cover the measurement that you are trying to find. This will derive the given formulae.





Timetables

The table shows part of a bus timetable from Shotton to Alton.

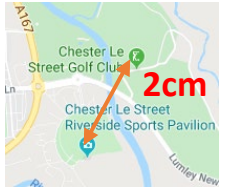
Shotton	07 30	08 00	09 00	10 00	11 00
Crook	07 45	08 15	09 15	10 15	11 15
Prudhoe	07 58	08 28	09 28	10 28	11 28
Hexham	08 15	08 45	09 45	10 45	11 45
Alton	08 30	09 00	10 00	11 00	12 00

Serena lives in Crook. She has to be in Hexham by 11:15. What is the time of the latest bus she can catch from Crook to arrive in Hexham by quarter past 11?

The bus, which arrives in Hexham at 10:45, leaves Crook at 10:15.

Ratio Problems - Maps

When solving problems with map scales, label the ratio "map : real life" and scale up/down as needed.
Eg. If the scale is 1cm : 200m, what is the distance from the golf club to the cricket club?



Map : real life
x2 ↺ 1cm : 200m ↻ x2
2cm : 400m

Hegarty Maths Links

Ratio: 328-338
Proportion: 339-342
Recipe Problems: 739-742
Scale Diagrams: 864-871
Speed, Density and Pressure: 716-738

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Ratio Student Knowledge Organiser

Simplifying a Ratio

Write out and simplify the following ratios:

For every 6 women,
the school employs 8 men.

women : men

..... : .....

red squares: green circles

15cm to 75cm

400m to 1.5km

Ellie is making a cake.
The instructions say that the ratio of sugar to flour should be 1 : 3
Ellie uses 250g of sugar and 650g of flour.
Has Ellie used the correct ratio of sugar to flour?

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Sharing in a Ratio

Share £60 in the ratio 5:1.
Divide £48 in the ratio 5:3.
Share £72 in the ratio 4:5.
Divide £40 in the ratio 3:5.
Share £132 in the ratio 8:3.

- The angles in a triangle are in the ratio 1:5:6. Work out the angles in degrees.

- The ratio of boys to girls in a class is 3:5.

  Explain why there could not be 30 pupils in the class.

- William has a collection of coins. Each of the coins is either silver or bronze.

  The ratio of the number of bronze coins to the number of silver coins is 4 : 1.

  William has 12 **more** bronze coins than silver coins. Work out the total number of coins in his collection.

- Over the course of a season, a football team won, drew and lost matches in the ratio 2 : 1 : 5.

  The team lost 12 **more** matches than they won.

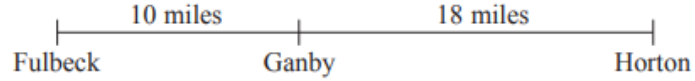
  Work out how many matches the team drew in the season.

Speed, Density and Pressure

- A bus travels 222 miles in 6 hours.
  What was the average speed of the bus?

- Mr Jenkins catches the 11:45am bus from London to Glasgow.
  The distance between the two cities is 407 miles.
  The bus travels at an average speed of 55mph.
  What time should he arrive in Glasgow?

- The distance from Fulbeck to Ganby is 10 miles.
  The distance from Ganby to Horton is 18 miles.



  Raksha is going to drive from Fulbeck to Ganby.
  Then she will drive from Ganby to Horton.
  Raksha leaves Fulbeck at 10 00
  She drives from Fulbeck to Ganby at an average speed of 40mph.
  Raksha wants to get to Horton at 10 35
  Work out the average speed Raksha must drive at from Ganby to Horton.

- A cube of ice has side length of 5cm.
  The mass of the cube of ice is 114.5g.

  Find the density of ice.
  Give your answer in g/cm^3

- A box is placed on the floor.

  The area of the box in contact with the floor is $2.4m^2$
  Pressure exerted on the floor 16 newtons/m^2

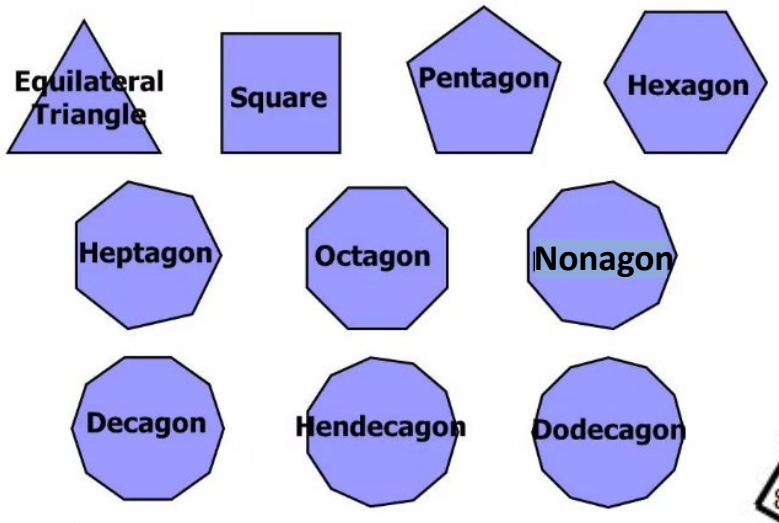
  Work out the force exerted by the box on the floor.

Shapes and angles Student Knowledge Organiser

Key words and definitions

Polygon – a plane figure with at least three straight sides and angles, and typically five or more.
Quadrilateral – 4 sided shape.
Pentagon – 5 sided shape.
Hexagon - 6 sided shape.
Heptagon – 7 sided shape.
Octagon – 8 sided shape.
Nonagon – 9 sided shape.
Decagon - 10 sided shape.
Hendecagon – 11 sided shape.
Dodecagon – 12 sided shape.

Polygons



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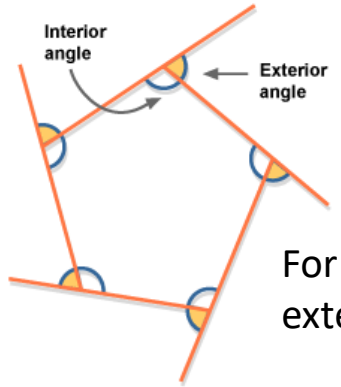
Prior Knowledge

Angles on straight lines/internal angle sums in polygons
Angles in parallel lines

Interior and exterior angles of polygons

***Sum of interior angles* = $180^o \times (n - 2)$**

n = number of sides

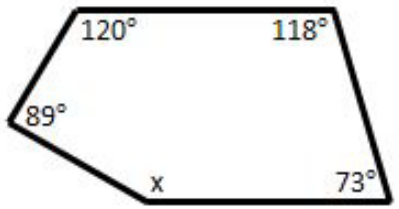


For all polygons the exterior angles total 360°

A regular polygon has an exterior angle of 20°.

How many sides does it have?

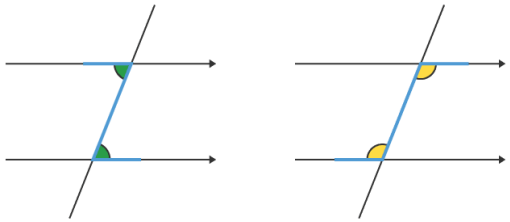
Number of sides
= 360° ÷ 20°
= 18 sides



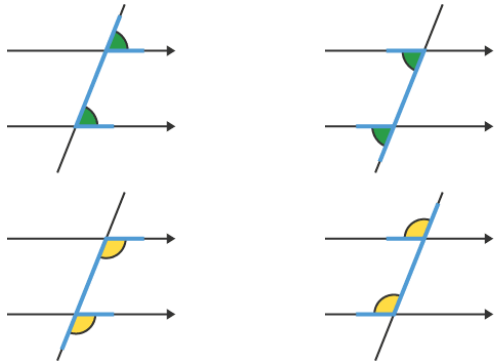
Sum of angles
= 89°+120°+118°+ 73°
= 400°
Sum of interior angles
= 180° x (5-2)
= 540°
x = 540° - 400°
= 140°

Angles in parallel lines

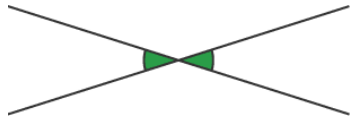
Alternate angles are equal



Corresponding angles are equal



Vertically opposite angles are equal



Hegarty Maths Links

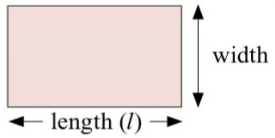
Angles in polygons	561, 562, 563, 564, 565
Vertically opposite angles	480
Alternate angles	481
Corresponding angles	483

Area and volume Knowledge Organiser

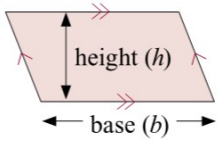
Key words and definitions

Perimeter: total distance around the edge of a shape
Perpendicular: two straight lines at right-angles to each other
Radius: distance from the centre to outer edge of a circle – notation is r
Diameter: distance from one side of a circle to the other passing through the centre – notation is d
Circumference: total distance around a circle
Arc: part of the circumference
Sector: part of a circle, cut from the centre to the edge (a pizza slice)
Π: Pi – mathematical value used when calculating with circles/curved shapes
Prism: 3D shape with constant cross-section through the entire length

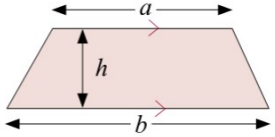
Area



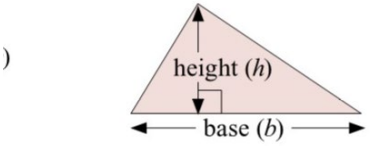
Area = length × width



$A = bh$



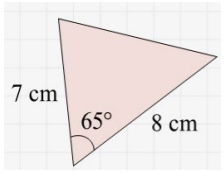
$A = \frac{1}{2}(a + b) \times h$



Area = $\frac{1}{2}$ × base × perpendicular height

You can also find the area of a triangle using Sine. You must know 2 sides and the angle formed between them.

$Area = \frac{1}{2}ab \sin C$



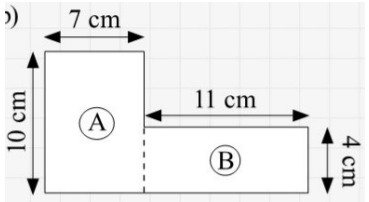
Area = $(\frac{1}{2} \times 7 \times 8)\sin 65°$
= **25.38 cm²** (to 2 d.p.)

Hegarty Maths Links

Area: 44, 45, 48, 49
Sine rule: 337
Compound area: 41
Circles: 40, 59, 60
Sectors: 46, 58
Volume: 355 – 358
Surface area: 310 – 312, 315

Compound shapes – formed by merging multiple shapes

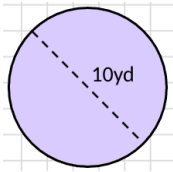
Split the shape up into basic shapes. Find the area of each, then add together.



Area of rectangle A = 10 × 7 = 70 cm²
Area of rectangle B = 11 × 4 = 44 cm²
Total area of shape = 70 + 44 = **114 cm²**

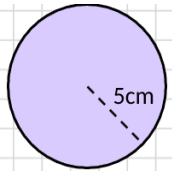
Circles – Circumference & Area

$C = \pi d$



C = πd
= π ×10yd
= 10π yd
= 31.4yd

$A = \pi r^2$



A = πr²
= π ×5²
= π ×25
= 78.5cm²

Sectors

Length of arc = $\frac{\theta}{360}$ × circumference of circle = $\frac{\theta}{360} \times 2\pi r$

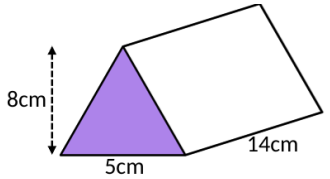
Area of sector = $\frac{\theta}{360}$ × area of circle = $\frac{\theta}{360} \times \pi r^2$

Area of sector = $\frac{60}{360} \times \pi \times 3^2 = \frac{1}{6} \times 9\pi = \frac{3}{2}\pi$ cm²

Length of arc = $\frac{60}{360} \times (2 \times \pi \times 3) = \frac{1}{6} \times 6\pi = \pi$ cm

Volume of Prisms – example shown of triangular prism

Volume of a prism = area of cross section x length of prism



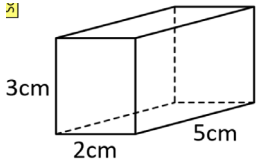
This volume formula works for all prisms. Only the formula for the cross-section area will change dependent on the shape.

Area of Δ = $\frac{5 \times 8}{2}$ = **20cm²**

Volume = **20cm²** × 14 = **280cm³**

Surface area of Prisms – examples of cuboid & cylinder

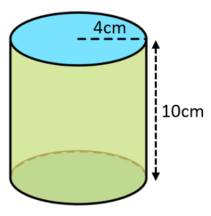
Surface area of a prism = sum of the areas of all the faces

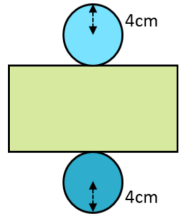


Front = 2 x 3 = 6
Back = 2 x 3 = 6
Top = 2 x 5 = 10
Base = 2 x 5 = 10
Left side = 3 x 5 = 15
Right side = 3 x 5 = 15

Total surface area = 62 cm²

Surface area of cylinder = $2\pi r^2 + \pi dh$ *special case





The 2 dimensions of the rectangular face are the circumference of the circular end and the height. So, the area of this face is π x d x h.

Area of ○ = πr^2 = π × 4² = **16π**
○ + ○ = **16π** × 2 = **32π**

Area of □ = 8π × 10 = **80π**
Total SA = 32π + 80π = **112π**cm²

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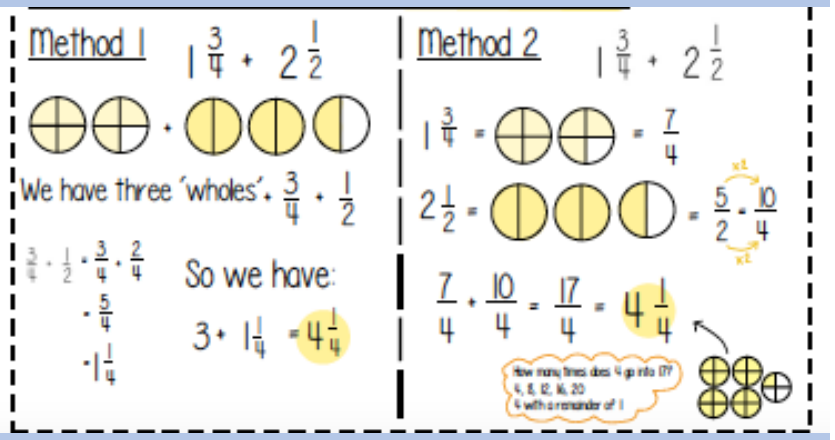
Fractions, decimals and percentages Student Knowledge Organiser

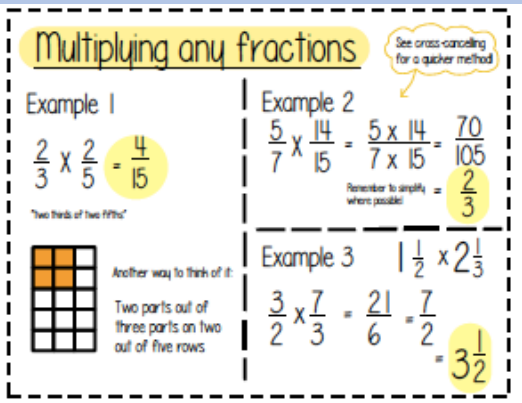
Key words and definitions

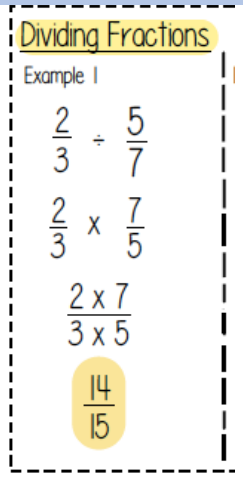
- Reciprocal – The reciprocal of a number is 1 divided by the number
- Simple Interest – Interest calculated as a percentage of the original amount
- Compound Interest – Interest calculated on the amount borrowed plus previous interest
- Equivalent – Of equal value
- Recurring Decimal – A decimal number with a digit, or group of digits, that repeat forever

Adding and Subtracting Mixed Numbers



Multiplying and Dividing Fractions





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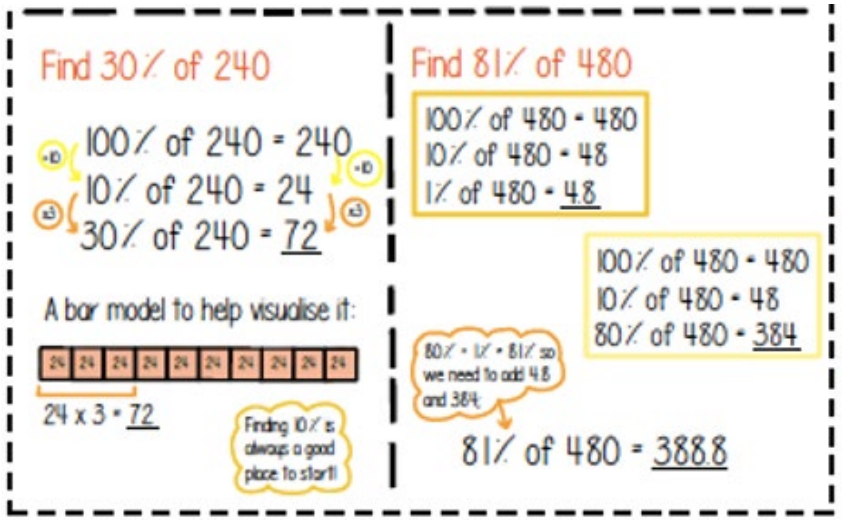
Percentages of Amounts



Reverse Percentages

60% of a number is 48. What is the number?

60% of x = 48
10% of x = 8
100% of x = 80

A pair of shoes are on sale for 87.5% off. The sale price is £49.50, how much did they cost originally?

12.5% of x = £49.50
25% of x = £99
100% of x = £396

Hegarty Maths Links

- Recurring decimals to fractions: 53, 54
- Converting FDP: 72–76, 82–85
- Adding and Subtracting Fractions: 66
- Multiplying Fractions: 67, 68, 69
- Dividing Fractions: 70
- Percentages of amounts: 86, 87, 89
- Compound Interest: 94
- Percentage Change: 97
- Reverse Percentages: 96

Compound Growth and Decay

I put £1000 in a bank account. It earns compound interest of 10% per year. How much will be in the account after 5 years?

INTEREST:

Compound interest means we work out the interest each year and the original amount plus any interest in the account.

- 10% of £1000 = £100

So after year 1, the account will have £1100

- 10% of £1100 = £110

So after year 2, the amount is £1210 etc..

If we are increasing by 10% each time, this is the same as finding 110% of the amount, or multiplying by 1.1 (see multipliers). So another way we can work this out is:

£1000 x 1.1 x 1.1 x 1.1 x 1.1 x 1.1

Or £1000 x 1.1^5 = £1610.51 (5 years)

I know which account I'd go for!

For compound decay or depreciation questions we would do the same thing, just our multiplier at the start is calculated by subtracting rather than adding

Recurring decimals to fractions

Example (TWO RECURRING DIGITS)

Convert $0.\dot{3}\dot{5}$ to a fraction

$x = 0.353535...$

$100x = 35.353535...$

Because we have two digits that are repeating, we need to multiply it by 100!

$99x = 35 \rightarrow x = \frac{35}{99}$

Example

Convert $0.2\dot{5}$ to a fraction

$x = 0.255555...$

Here, we cannot just take 2.555 away from 0.255 as we will not reduce it to an integer

$10x = 2.5555555...$

25.555... - 2.55... = 23

$100x = 25.55555$

$100x - 10x = 90x$

$90x = 23 \rightarrow x = \frac{23}{90}$

Ratio Student Knowledge Organiser

Key words and definitions

Compound measure: Compound measures are measures that are made up of two or more other measures. For example, speed is a compound measure, It is made up of distance and time.

Ratio: A ratio shows how much of one thing there is compared to the other.

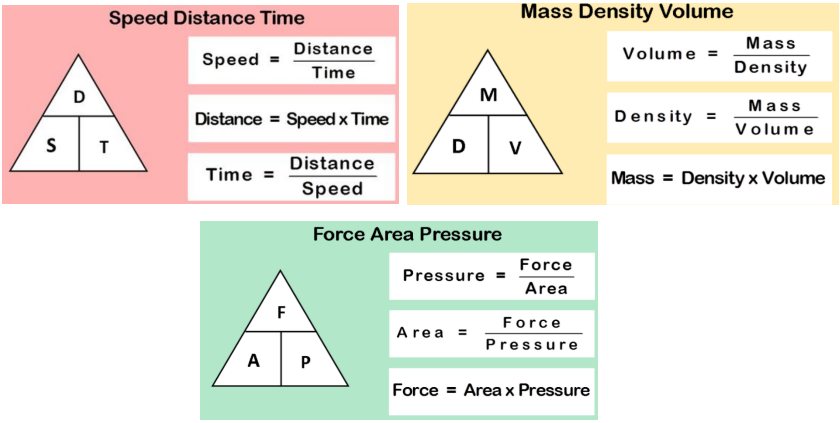
Direct proportion: Direct proportion is when two (or more) quantities increase or decrease in the same ratio.

Indirect proportion: Inverse proportion is when an increase in one quantity results in a decrease in another quantity.

Hegarty maths links

Speed, density & pressure: 716 – 738
Ratio: 328 – 338
Proportion: 339 - 348

Speed, density & pressure.



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Simplifying ratio.

Example 1

There are 15 fiction books and 10 non-fiction books on a shelf.
Write down the ratio of fiction books to non-fiction books in its simplest form.

1. Write down the ratio and divide both sides by the same number.
2. Stop when you can't divide any further.

$\div 5$ (15 : 10 → 3 : 2) $\div 5$

The simplest form is **3 : 2**

Dividing a ratio into parts.

Example 1

Nigel is going to split £40 between his two children. He shares the the money between Matthew and Emily in the ratio 2:3. How much money do Matthew and Emily receive?

40				
8	8	8	8	8

2 + 3 = 5 total shares

1 share = 40 ÷ 5 = **£8**

Matthew's share
2 shares = £8 × 2 = **£16**

Emily's share
3 shares = £8 × 3 = **£24**

Example 2

To make purple paint, red paint and blue paint are mixed in the ratio 3:5. Richard uses 720mL of paint altogether. How much blue paint does he use?

720							
90	90	90	90	90	90	90	90

3 + 5 = 8 total parts

1 part = 720 ÷ 8 = **90**

Red paint
3 shares = 90 × 3 = **270mL**

Blue paint
5 shares = 90 × 5 = **450mL**

Richard uses 450mL of blue paint.

Calculating a part of the ratio, given another.

Example 1

Laura makes some orange juice by mixing orange cordial and water in the ratio 3:10. She uses 42mL of orange cordial.
How much water does she use?

14		
14	14	14	14	14	14	14	14	14	14

3 parts = 42mL
1 part = 42 ÷ 3 = **14mL**
10 parts = 14 × 10 = **140mL**

Laura uses 140mL of water.

Example 2

Michael and Justine share some money in the ratio 5:3. Justine gets £108.
How much money did they share?

Michael	36	36	36	36	36
Justine	36	36	36		

3 parts = £108
1 part = 108 ÷ 3 = **£36**

5 + 3 = 8 total parts
8 parts = 36 × 8 = **£288**

Michael and Justine shared £288.

Direct proportion

Example 1

y is directly proportional to x.
Fill in the gaps in the table.

x	3	5	10	12	
y			25		100

1. Write the proportionality statement and make it into an equation. $y \propto x$, so $y = kx$
2. The table shows that when $x = 10$, $y = 25$. Use this to find k. $25 = k \times 10$, $k = 25 \div 10 = 2.5$, So $y = 2.5x$
3. Use the equation to complete the table:

x	3	5	10	12	$100 \div 2.5 = \mathbf{40}$
y	$2.5 \times 3 = \mathbf{7.5}$	$2.5 \times 5 = \mathbf{12.5}$	25	$2.5 \times 12 = \mathbf{30}$	100

Example 2

m is directly proportional to e. Given that $m = 72$ when $e = 6$,

a) find the constant of proportionality,
1. Write the proportionality statement and make it into an equation. $m \propto e$, so $m = ke$
2. Use the given values to find k. $72 = k \times 6$, so $k = 72 \div 6$, $\mathbf{k = 12}$

b) calculate the value of e when $m = 37$.
1. Put the value of k from part a) into the equation $m = ke$. $m = 12e$
2. Substitute $m = 37$ into the equation and solve for e. $37 = 12e$, $e = 37 \div 12 = \mathbf{3.08}$ (to 2 d.p.)

Inverse proportion

Example 1

y is inversely proportional to x.
Fill in the gaps in the table.

x	1	5	10	
y			20	100

1. Write the proportionality statement and make it into an equation. $y \propto \frac{1}{x}$, so $y = \frac{k}{x}$
2. The table shows that when $x = 10$, $y = 20$. Use this to find k. $20 = \frac{k}{10}$, $k = 20 \times 10 = 200$, So $y = \frac{200}{x}$
3. Use the equation to complete the table:

x	1	5	10	$200 \div 100 = \mathbf{2}$
y	$200 \div 1 = \mathbf{200}$	$200 \div 5 = \mathbf{40}$	20	100

Example 2

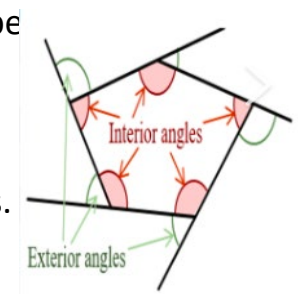
y is inversely proportional to x and $x = 4$ when $y = 15$.

a) Find y when $x = 10$.
1. Write the proportionality statement and make it into an equation. $y \propto \frac{1}{x}$, so $y = \frac{k}{x}$
2. Use the given values to find k. $15 = k \div 4$, so $k = 15 \times 4 = 60$
3. Put $k = 60$ into the equation. $y = \frac{60}{x}$
4. Substitute $x = 10$ into the equation and solve for y. $y = \frac{60}{x} = \frac{60}{10} = \mathbf{6}$

Shapes and angles Student Knowledge Organiser

Key words and definitions

Interior angle – angle inside the shape
Exterior angle- angle on the outside.



Polygon- shape with all straight sides.
Regular polygon- all sides and angles are equal

Angles around a point, on a straight line and in a triangle.

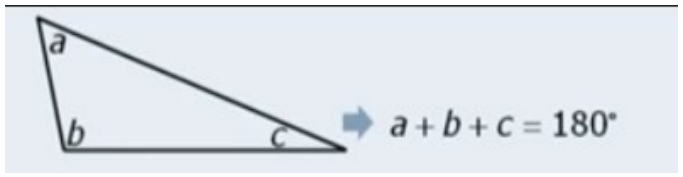
Angles on a straight line add up to 180°

$a+b+c=180°$

Angles around a point add up to 360°

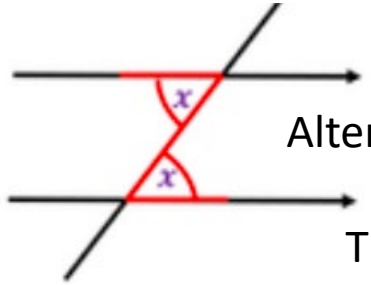
$d+e+f+g+h=360°$

Angles in a triangle sum to 180°



North East Learning Trust

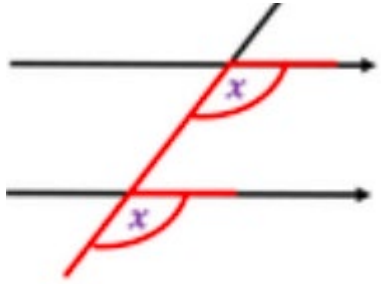
Alternate angles



Alternate angles are equal

They form a Z shape

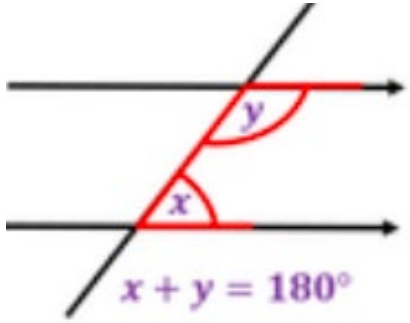
Corresponding angles



Corresponding angles are equal

They form a F shape

Co-interior angles



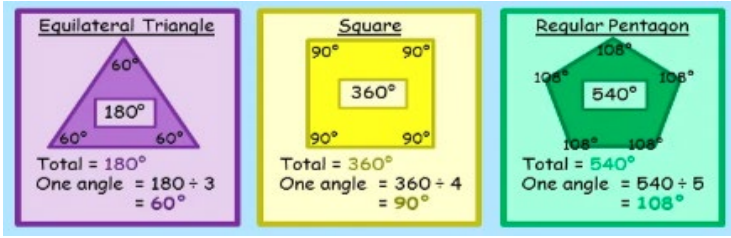
Co-interior angles add to 180°

They form a C shape

Interior angles sum of polygons

A polygon with n number of sides
Angle sum = $(n-2)\times180°$

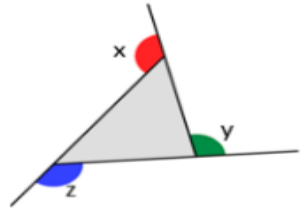
An angle of a regular polygon = $\frac{(n-2)\times180°}{n}$



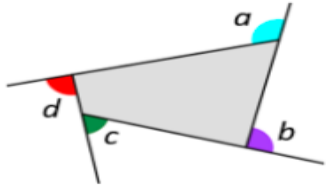
Exterior angles

The sum of the exterior angles of any polygon is 360°.

The exterior angle of a regular n-sided polygon is $\frac{360°}{n}$



$x + y + z = 360°$



$a + b + c + d = 360°$

Hegarty Maths Links

Angles in parallel lines 481 – 483
Angles around a point 812-814
Angles on a straight line 477-478
Angles in a triangle 486-487
Interior angles 560-562
Exterior angles 563-564

Sentence Builder 4
Jobs

Year 9

Phonics

Vocabulary

Job titles and places of work

Grammar and complexity

Imperfect tense

Gender of job titles

Year 9 Sentence Builder 5
Dream jobs

Dans le futur [in the future] À l'avenir [in the future]	je veux [I want] je vais [I am going] je voudrais [I would like] j'aimerais [I would like]	travailler comme [to work as] être [to be] devenir [to become]	ingénieur [engineer] mécanicien [mechanic] vendeur [shop worker] professeur [teacher] infirmier [nurse] médecin [doctor]	parce qu' [because] puisqu' [because] vu qu' [seeing that] étant donné qu' [given that] comme [as] mais [but] cependant [however] pourtant [however]	il serait [it would be]	très [very] vraiment [really] extrêmement [extrememly] plutôt [rather] absolument [absolutely] un peu [a bit] assez [quite] trop [too] si [so] tout à fait [totally] incroyablement [incredibly]	bon [good] bien payé [well paid] enrichissant [enriching, rewarding] intéressant [interesting] mauvais [bad] mal payé [badly paid] fatigant [tiring] difficile [difficult]

ingénieure
[engineer]

mécanicienne
[mechanic]

vendeuse
[shop worker]

professeure
[teacher]

infirmière
[nurse]

médecin
[doctor]

Sentence Builder 5
Dream jobs

Year 9

Phonics

ou

en / an / em

qu

Vocabulary

Job roles

Connectives and adjectives

Grammar and complexity

vouloir in the present and conditional

il serait + modifier + adjective

Year 9 Sentence Builder 6
Events and celebrations

J'ai fêté
J'ai célébré
[I celebrated]

Nous avons fêté
Nous avons célébré
[we celebrated]

Je fête
Je célèbre
[I celebrate / I am celebrating]

Nous fêtons
Nous célébrons
[we celebrate/we are celebrating]

Je vais fêter
Je vais célébrer
[I am going to celebrate]

Nous allons fêter
Nous allons célébrer
[we are going to celebrate]

mon anniversaire
[my birthday]

mes quatorze ans
[my 14th birthday]

l'anniversaire de ma mère
[my mam's birthday]

un mariage
[a wedding]

la fête des mères
[Mothers' Day]

Pâques
[Easter]

le quatorze juillet
[the 14th July

Halloween
[Halloween]

Noël
[Christmas]

et puis
[and then]

et après ça
[and after that]

et ensuite
[and next]

et enfin
[and lastly]

et finalement
[and finally]

j'ai fêté
j'ai célébré
[I celebrated]

nous avons fêté
nous avons célébré
[we celebrated]

je fête
je célèbre
[I celebrate / I am celebrating]

nous fêtons
nous célébrons
[we celebrate/we are celebrating]

je vais fêter
je vais célébrer
[I am going to celebrate]

nous allons fêter
nous allons célébrer
[we are going to celebrate]

mon anniversaire
[my birthday]

mes quatorze ans
[my 14th birthday]

l'annversaire de ma mère
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un mariage
[a wedding]

la fête des mères
[Mothers' Day]

Pâques
[Easter]

le quatorze juillet
[the 14th July

Halloween
[Halloween]

Noël
[Christmas]

Sentence Builder 6
Events and celebrations

Year 9

Phonics

on

é / et / -er / -ez

ère/ aire

Vocabulary

Events and celebrations

Mixed tenses and narration

Grammar and complexity

célébrer and *fêter* in three tenses

Simple narration

Year 9
Term 2

Reggae

Origins...

*Reggae originated in **Jamaica** in the 1960s

*The style incorporates jazz, R and B, traditional *mento* and the earlier genre known as *ska*

***Ska** music sounds like Reggae and also originated in Jamaica. They sound very similar however Reggae is slower and more laidback

***Mento i**s a style of Jamaican folk music that traditionally uses acoustic instruments.

The Style...

*Reggae is instantly recognisable as it has an off-beat rhythm played by a rhythm guitarist. This 'off-beat' is called 'skank.' The bass drum hits on the second and fourth beat of each bar. These are called the 'drop.'

For example: Count **1 and 2 and 3 and 4 and**

And' is the off-beat and the 'skank;' 2 and 4 is the 'drop'

*Reggae music is linked with a religion that developed in Jamaica called **Rastafarianism**

*The lyrics in Reggae music are often about news, social problems, religion and politics

*Famous instruments in reggae music are drums, guitar, saxophone, trumpet and trombone

*Reggae songs often have lots of backing singers.

Jamaica...

*Jamaica is the fourth largest island in the **Caribbean** and **Kingston** is its capital city

*Jamaica is tropical and prone to hurricanes

*Jamaica was a British colony from 1655 when Britain captured it from the Spanish. Jamaica became an independent country in 1962

*Jamaica exports bananas, coffee and sugar

*Athlete **Usain Bolt** is Jamaican

Bob Marley...

*Robert Nesta Marley was an important Jamaican musician in the 70s and 80s who made reggae very popular all over the world

*His music told stories of his home and the Rastafarian religion he followed. Some songs were also about politics

*Bob's dad was a white man called Norvall Marley originally from *Sussex* but living and working in Jamaica when he met his mum

*Bob started his music career in the 1960s with his group **The Wailers**

*Bob toured England and the US in the 70s and had his first international hit in 1975 with *'No Woman No Cry'*

*Other hits of his include *"Three Little Birds", "Africa Unite", "Buffalo Soldier",* and "*One Love".* His most popular studio album was called **Legend,** which includes his greatest hits.

*Bob had over 11 children. Most of these have gone on to become well-known reggae artists in their own right

*Bob was only 36 when he sadly died of skin cancer

Key music and artists to listen to...

THE ALBUM 'LEGEND' - Bob Marley!!!!!

Desmond Dekker and the Aces—Israelites

Toots and the Maytals—Pressure Drop

Magic! - Rude

UB40 –Red Red Wine

Lee 'Scratch' Perry—I Chase the Devil

Jimmy Cliff—Many Rivers to Cross

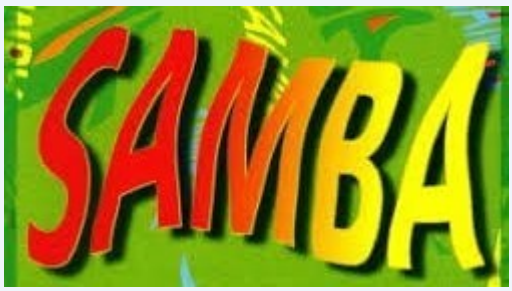
The Melodians—Rivers of Babylon

Jason Mraz—I'm Yours

The Abyssinians—Satta Massagana

Year 9
Term 2

Samba



Samba is now an international genre. Most UK towns and cities have their own Samba band.

Celebration Samba is a local Samba group based in Worthing

SUGGESTED LISTENING

Mas Que Nada featuring Black Eyed Peas by Sergio Mendes

Whenever Wherever by Shakira

Samba Do Brasil by Bellini

*Samba originated in Brazil in the 1800s

*It is important to know that a big part of Brazil's history was the Slave Trade and that Samba originated from the culture and traditions of the African slaves living and working in the Brazilian sugar plantations at the time

*The Samba style includes many layered, often syncopated, rhythms played on many percussion instruments

*The music follows a series of signals from a lead player. The signals are often played on a whistle called the ***apito.*** The other players then respond. As well as *call and response*, music may be played in *unison* and when all players are playing their individual *ostinatos*, this is called the *groove*

*Samba music is very loud as it needs to be heard outside by thousands of people. Dynamic changes are signalled by the leader using the ***apito***

*Other instruments include the ***Repinique, a*** high pitched drum traditionally used to make the calls in call and response sections; the large ***Surdo*** drum, usually in three different sizes; the ***Tamborim;*** a hand-held shaker called a ***Ganza;*** the ***Caixa,*** which is a snare drum; and the ***Agogo bells***

Syncopated	Where the strong beats are unaccented. In a 4 beat rhythm, usually the first beat is the strong beat. If the second beat was stressed, this would be syncopated
Unison	Performed together
Ostinato	A repeated musical phrase
Groove	All instruments are playing together and rhythms are layered

THE CARNIVAL IN RIO

*The Carnival in Rio de Janeiro, Brazil, has been held every year since 1723 and lasts up to six days. It takes place in February or March, 40 days before Easter

*There are many carnivals throughout the world, but the Carnival in Rio is the biggest and most famous. The samba parades and musicians attract millions of people

*People spend more money and party more at Carnival than at Christmas. Loud music, dazzling costumes, dancing, highly decorated floats, and marching bands form the heart of the Carnival. Each float represents a Samba school; a group of people who may be from the same community

RECREATING THE SAMBA STYLE

Using several drums, play rhythms that fit with these phrases. Keep the words in you head. These are just ideas. You can think of you own

Drum, great big drum, have you got a

Low High Low Agogo

Biscuit biscuit, I wanna biscuit

12345 bananas

Fish and chips, fish and chips

To begin, the leader can play: *Samba band is the best…*

Everyone responds with: *That's right!...*

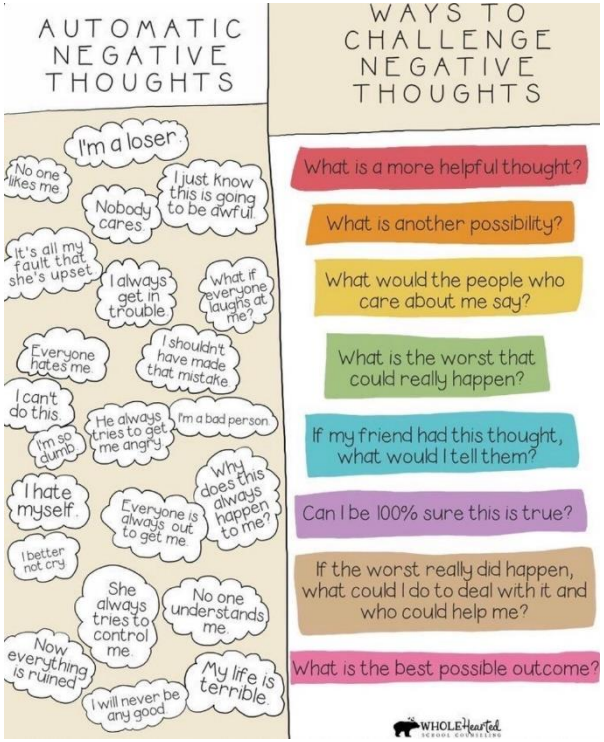
Don't forget the call and response. The leader might blow the whistle and play: *He lives in a pineapple under the sea…*

Everyone responds with: *Spongebob Squarepants*

Mental Wellbeing – Y9 – P4L

Resilience means being able to cope with difficult life events and bounce back afterwards. Resiliency is the process of adapting when you are faced with trauma, stress or any kind of adversity or emotional suffering.

Being resilient does not mean that you don't experience pain and hurt. Someone who is resilient faces tough life situations head-on, experiencing the difficult times and emotions. They process these challenging times by working through difficult emotions, building trust in themselves and their ability to cope through hard times.



SUPPORT

Young Minds www.youngminds.org.uk
Childline - www.childline.org.uk
Phone: 0800 1111
Samaritans - www.samaritans.org

What is mental wellbeing?

Mental wellbeing doesn't have one set meaning. We might use it to talk about how we feel, how well we're coping with daily life or what feels possible at the moment.

Good mental wellbeing doesn't mean you're always happy or unaffected by your experiences. But poor mental wellbeing can make it more difficult to cope with daily life.

Video Clip Topic	Signs that might mean someone has this mental health issue	Strategies and treatments	Ways others can help
Depression	Feels like 'something is missing' Feel like cannot cope Withdrawn, pulling out of activities Note that a person may not always be sad or in a difficult life situation	Medication – can provide relief while building other support strategies CBT – practical techniques Activities e.g. photography and going for a walk Sport/physical activity	Normal routine helpful Show understanding Say someone is there who can help Text asking if okay to call, or send an emoji
Anxiety	Physical symptoms e.g. shaking, heart palpitations, pins and needles, stomach pains. Withdrawn Seeking reassurance Perfectionism Can be linked with depression	CBT Yoga and Pilates Meditation Diary to reassure that things will pass Small steps to build confidence Talking to family and friends Avoid researching physical symptoms as this can increase anxiety	Be patient and reassuring (but also help the person to have faith in their own decisions) Remind them that anxiety does not define a person
Stress	Disrupted sleep cycle False FFF (fight, flight, freeze) responses (i.e. so wired that small stressors provoke big reactions e.g. angry outbursts) Can cause depression and anxiety	Mind tools Exercise Quality sleep Relaxation Sharing feelings with friends	

Is mental health as important as physical health?

Mental and physical health are equally important components of overall health. For example, depression increases the risk for many types of physical health problems, particularly long-lasting conditions like diabetes, heart disease and stroke. Similarly, the presence of chronic conditions can increase the risk for mental illness. The opposite is true as well. According to studies, mental health problems can cause your physical health to deteriorate. For example: if you have chronic anxiety and depression, you may have trouble sleeping, thus, putting your physical health at risk.

KEY WORDS:

Anxiety: is what we feel when we are worried, tense or afraid – particularly about things that are about to happen, or which we think could happen in the future

Depression: is a low mood that lasts for a long time, and affects your everyday life

Panic attacks: are a type of fear response. They're an exaggeration of your body's normal response to danger, stress or excitement.

Stress: is how we react when we feel under pressure or threatened. It usually happens when we are in a situation that we don't feel we can manage or control.

Mindfulness is a technique you can learn which involves noticing what's happening in the present moment, without judgement. You might take notice and be aware of your mind, body or surroundings. Mindfulness aims to help you:

- become more self-aware
- feel calmer and less stressed

PHILISOPHICAL QUESTIONS – Y9 – P4L

Does God exist?

Theist - Believe in God e.g. God(s) exist because prayers are answered and miracles happen.
Atheist - Don't believe in God e.g. Science explains the origin of the universe, so God didn't create the world.
Not sure if you need proof, but doesn't have complete faith either.
Agnostic - Unsure – Hasn't made up mind whether or not God exists e.g.

Arguments for the existence of God

1. Religious experience is when someone feels they have had a direct or personal experience of God – prayer or vision.
2. The Cosmological Argument (first cause) – Someone or something must have caused the world to exist. The cause is God, the effect is the world. A bit like a domino rally. Someone or something has to get things started.
3. The Teological Argument (design) – our world is designed in such a way that it works properly. if it was designed like this, then someone or something must have designed it. William Paley compared the design of the universe to finding a watch.

How should humans treat the environment?

The Bible teaches that creation belongs to God. God gave humans power and authority to take charge of the earth. This is called dominion. It's humans responsibility and duty to look after God's creation as stewards.
The Quran teaches that creation belongs to God. Humans are God's khalifahs (stewards) so it is our duty to look after his creation. We should use the earth's resources carefully. On the Day of Judgement humans will be asked how they looked after the planet.

Should zoos exist?

YES:
•Zoos educate the public and create a personal experience to foster an appreciation of animals
•Zoos save endangered species by bringing them into a safe environment where they are protected from poachers, habitat loss, starvation, and predators

NO:
•There are other options to learn about animals such as virtual reality
•Animals in captivity suffer from boredom, stress, and confinement – it is cruel

How did the universe and life come into existence?

Creation story

Day 1: God created light and day/night. Day 2: God created the sky. Day 3: God created the land, sea and plants. Day 4: God created the sun, moon and stars . Day 5: God created sea creatures and birds. Day 6: God created land animals and humans. Day 7: God rested

Big Bang Theory

Started with a tiny dense hot 'something'. Over 13.8 billion years ago it expanded to become the cosmos as we know it. It continued to expand and cool. Matter that had been flung everywhere became stars grouped into galaxies. The Big Bang theory is supported by evidence that space is expanding, including the redshift of light from distant galaxies and the existence of cosmic background radiation in all directions.

Adam and Eve

Some people think that the creation story goes on to give more detail about the creation of humans, seen as two individuals, Adam and Eve. Adam was made from 'the dust of the ground' when God breathed life into him. Eve was created out of one of Adam's ribs to provide company and help for Adam. They lived in a special place called the Garden of Eden. Both of them were given the task and responsibility to look after the place that God had created for them.

Evolution

All living creatures that exist today, including human beings, have evolved over a period of perhaps millions of years, from more primitive life forms to how they are today by a process of natural selection. The theory of evolution challenged the idea that God is the designer of the universe and that the beauty, order and complexity of the universe is evidence of this. The idea that living things adapt to their environment was opposed to their belief that God had created the perfect environment for them.

Why is there evil and suffering?

Moral evil: Suffering caused by humans. **Natural Evil:** Suffering due to natural causes

Christian response:

1. Many Christians believe that evil is the result of Adam and Eve's disobedience to God in the Garden of Eden. All people inherited the tendency to sin from Adam and Eve.
2. Christians believe that God gave humans free will. This is the ability for humans to make their own decisions.
3. Irenaeus stated that God made humans imperfect and is therefore partly responsible for the existence of evil. Individuals are given the chance to develop and grow through a soul-making process.
4. Some Christians see the world as a test. Human evil is something humans are responsible for and should be able to deal with.
5. Suffering has a purpose, therefore, which is not fully understood, but is an opportunity to share in the suffering that Jesus himself experienced.
6. The Bible says that Satan acts to tempt humans and this leads them to disobey God

What happens when we die?

Christianity: Heaven is a wonderful garden paradise where they will live forever with God and Jesus. Hell is a real place where people will suffer eternal torment and punishment. Catholic Christians believe in a place called purgatory. Where people receive some punishment for their sins. Then, when they are forgiven, they will go to heaven
Hinduism: A circle of life and when you die, you are reborn into another life. (reincarnation). Depending how good a Hindu you are will depend on what you are reborn as, this is karma.
Buddhism: Wheel of reincarnation and karma. They try to release themselves from this wheel. Also try to reach their own Nirvana – a place where there is no more suffering, pain and hunger.
Judaism: When someone dies, the body dies but the soul lives on into eternity. God judges these souls and sends them to the garden of Eden or to Hell.
Sikhism: Reincarnation after death, however, Sikhs believe that by living a life according to Gods plan, humans can end the cycle of rebirth already in this life.
Islam: Judged on how they have lived that life: People who have followed the teachings of Allah will go to Paradise, a perfect world of rest and pleasure forever. People who have ignored Allah's teachings will go to hell where they will be punished.

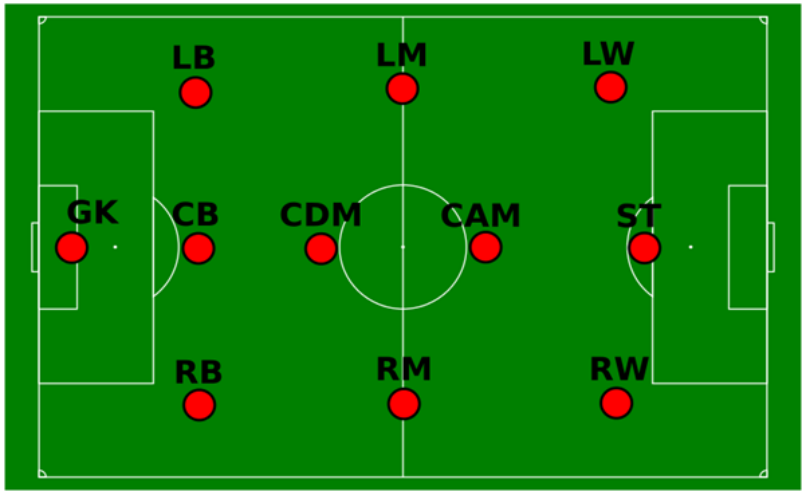
Subject Knowledge Organiser

Football – Rules, Player Positions & Pitch Dimensions

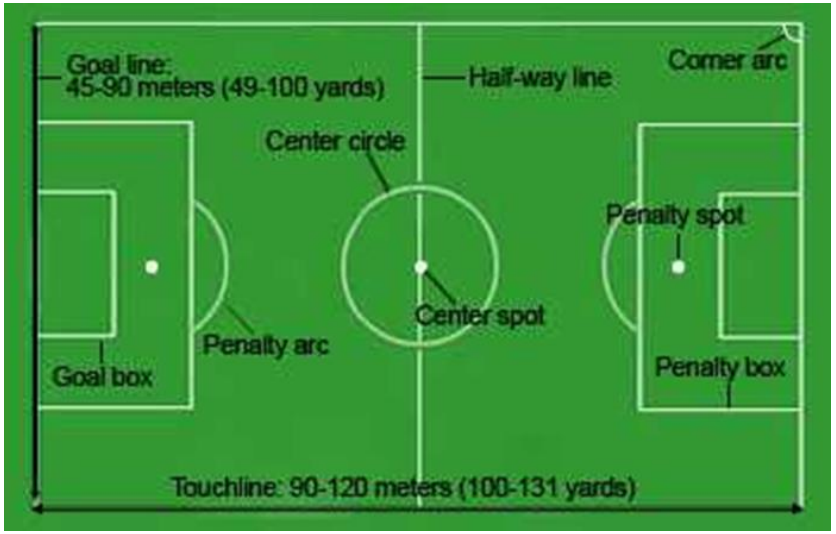
Rules

- A senior football match consists of two 45-minute halves and must have a 15-minute break in the middle.
- A team can start with a maximum of 11 players, of which one is the designated goalkeeper.
- To continue a match, a team must have a minimum of 7 players on the field.
- A team is able to make substitutions at any time of the match and are able to make a maximum of three changes.
- A competitive game must be officiated by a referee and two assistant referees, also known as linesmen.
- The whole ball must cross the goal line for it to constitute a goal.
- A referee may award a foul if they believe an unfair act is committed by a player. A foul contravenes the laws of the game and can be given for a range of offences (for example, kicking the player, pushing, handball etc).
- Fouls are punished by the award of a free kick (direct or indirect, depending on the offence) or penalty kick to the opposing team if it is committed in the penalty box.
- In cases of foul play, a referee can penalise players with either a yellow or red card. A yellow card gives a player a warning about their conduct and a red card requires them to leave the pitch.
- In the event that a player receives two yellow cards, the referee will automatically show a red card.
- A throw-in is awarded to a team if the opposition kicks the ball over the side-lines.
- A corner kick is awarded to a team if the opposition kicks the ball over the goal line and either side of the goal posts.
- A player is deemed offside if they are in front of the last defender when a teammate passes the ball through to them.

Player Positions



Pitch Dimensions



https://www.bbc.com/bitesize/guides/zwfnycw/revision/1

Subject Knowledge Organiser

Football – Short/Long Pass, Control, Block Tackle, Throw In & Heading

Short pass

A short side foot pass enables a team to quickly pass a ball and help maintain possession. It is used for accuracy.

- ❑ Move parallel to the ball and place your non-kicking foot to the side of the ball.
- ❑ Keep your eye on the ball until you have it under your control.
- ❑ Look up to see where is the best place to pass it.
- ❑ On selection of your pass, maintain a strong body position.
- ❑ Swing your kicking foot through and strike the ball with the inside of your foot.
- ❑ Aim to hit the middle of the ball to ensure it stays close to the ground.
- ❑ Keep looking at your target.
- ❑ Follow your kicking leg through towards the intended target.
- ❑ The speed of the kicking leg will direct how hard you kick the ball.

Long pass

A long pass is an attacking skill that allows players to switch the direction of the attack very quickly to create space, find a teammate or to catch out the opposition.

- ❑ Move parallel to the ball and place your non-kicking foot to the side of the ball.
- ❑ Keep your eye on the ball until you have it under your control.
- ❑ Look up to see where is the best place to pass the ball.
- ❑ On selection of your pass, maintain a strong body position.
- ❑ Explosively bring your kicking foot through and strike the ball with laces of your football boot.
- ❑ Aim to hit the middle of the ball to ensure it stays close to the ground or the lower half of the ball if you want to lift it over opposition players.
- ❑ Keep looking at your target.
- ❑ Follow your kicking leg through towards the intended target and your body over the ball.
- ❑ The speed of the kicking leg will direct how hard you kick the ball.

Control

Good control of the football is an essential skill to maintain possession of the ball from the opposition and, if done accurately, gives the player more time to make the correct next decision.

- ❑ Keep your eye on the ball at all times.
- ❑ On contact with the ball, withdraw the foot slightly to take the momentum out of the ball (this is known as "cushioning").
- ❑ Aim to contact the middle of the ball to ensure that it stays close to the ground and does not bounce up.
- ❑ Once under control, move the ball out of your feet to allow the next decision to be made.

Block tackle

The block tackle is an essential skill for winning the ball back in football. It is mainly used when confronting an opponent head on and it is important to complete it with good timing and technique to prevent injury or fouls.

- ❑ Close down your opponent quickly but do not rush uncontrolled at them.
- ❑ Try to reduce any space around you and monitor for passing options.
- ❑ Stay on the balls of your feet, arms slightly out to jockey your opponent.
- ❑ Keep your eye on the ball and wait for a clear view of the ball.
- ❑ When you can see most of the ball, transfer your weight from your back to front foot and move the inside of your foot towards the ball.
- ❑ Maintain a strong body position.

Throw-in

The throw-in is the legal way to restart the game if the ball has gone out of play from either of the side-lines.

- ❑ Hold the ball with both hands and ensure that the thumbs are behind the ball and fingers are spread.
- ❑ Hold the ball behind the head with relaxed arms and elbows bent.
- ❑ Keep your feet shoulder-width apart.
- ❑ Face your target.
- ❑ Lean back with both feet in contact with the ground.
- ❑ Slightly bend your knees and arch your head, neck, shoulders and trunk.
- ❑ When ready, propel yourself forward and release the ball just as it passes your head.
- ❑ Once the ball is released, bring your strongest leg forward and out in front of you for balance.

Heading

The header can be an attacking or defensive skill and is used to try and win the ball when it is in the air.

- ❑ Keep your eyes on the ball.
- ❑ Use your forehead to make contact with the bottom of the ball for a defensive header or the top of the ball for an attacking header.
- ❑ For a defensive header it is importing to get good height and distance but for an attacking header you need power and accuracy.
- ❑ You can also use flick headers to pass to a team mate.

Subject Knowledge Organiser

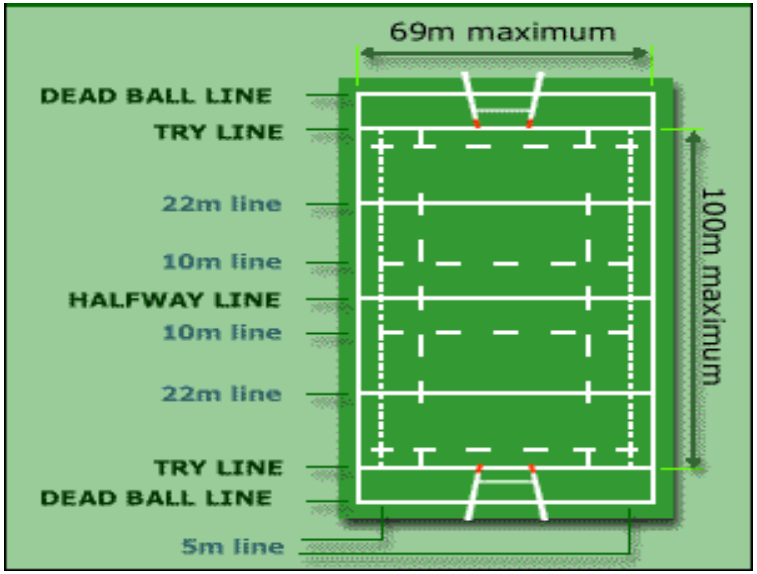
Rugby – Laws, Player Positions & Pitch Dimensions

Laws

- ❑ The rugby game is broken down into two 40-minute halves with a 10-minute rest period in between.
- ❑ The time during a game can be stopped for an incident. Therefore, the game stops on exactly 80 minutes.
- ❑ The game must have one referee and two touch judges.
- ❑ The game is stopped if a player is fouled and there is no subsequent advantage. Unlike most sports, a referee can wait to see how an incident unfolds before deciding whether the attacking had an advantage.
- ❑ A tackle cannot be made above the nipple line or by tripping a player with your feet.
- ❑ A lineout is called if the ball travels past the side-line.
- ❑ A lineout consists of up to seven players and players can be lifted in order to catch the ball.
- ❑ At a lineout, both teams can compete to win the ball.
- ❑ To successfully covert a kick, the ball must travel the top section of the goal.
- ❑ If a ball, when kicked, hits the post and bounces in field, then play can continue.
- ❑ In order to stay onside in rugby, the attacking players must remain behind the ball of the player passing to them.
- ❑ A referee may award a foul if they believe an unfair act is committed by a player. A foul contravenes the laws of the game and can be for a range of offences (kicking the player, offside, dropping the ball).
- ❑ In cases of foul play, a referee can award players with either a yellow or red card. A yellow card provides a player with a warning about their conduct (sin binned for 10 minutes) and a red card requires them to leave the pitch immediately.

Player Positions

Pitch Dimensions



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Subject Knowledge Organiser

Rugby – Tackle, Grubber Kick, Spin Pass & High Ball Catch

Tackle

- ❑ The tackle is an essential skill for winning the ball back in rugby or stopping an attacking player. It is very important to complete it with good timing and technique to prevent injury or accidents.
- ❑ Position your body to the opponent's right-hand side (safe side).
- ❑ Position your left foot forward into a slight opposition.
- ❑ Make contact by putting your right shoulder into the opponent's mid-right thigh.
- ❑ Make sure your head is on the other side of the ball carrier so their body is between your shoulder and head.
- ❑ Bring your arms up and wrap them around the ball carrier, just above their knees (do not lock your hands together).
- ❑ Squeeze your arms and pull the ball carrier into your body.
- ❑ As you squeeze, push your shoulder into the ball carrier, as though you are trying to push him away with your head.
- ❑ Continue pushing until both you and the ball carrier fall to the ground.
- ❑ Keep your head as close as you can to their thigh throughout.

Grubber Kick

- ❑ The grubber kick is a simple low kick that aims to move the ball past defences for attacking players to try and retrieve. It is very good at breaking defensive positions and forces defenders to turn around and chase.
- ❑ Stand in opposition on the balls of your feet, with the non-kicking foot in front.
- ❑ Lean forward so the head and chest should be comfortably over the ball.
- ❑ Hold the ball vertically at waist height, with hands either side of the ball.
- ❑ Extend arms fully so the ball is half a metre out in front.
- ❑ Drop the ball and point toes towards the ground.
- ❑ Keep the knee bent and over the ball.
- ❑ Strike the upper half of the ball with the laces, just before it bounces.
- ❑ Extend the leg through so it is straight, with toes pointing at the target.

Spin pass

- ❑ A spin pass enables a team to quickly pass a ball and help maintain possession.
- ❑ Stand on balls of feet in opposition (left foot forward), knees slightly bent with body facing forward.
- ❑ Hold the ball out in front of you with extended arms.
- ❑ Put the right hand on the bottom half of the right hand side of the ball.
- ❑ Point the thumb up along the seam of the ball and spread the fingers around the side of the ball.
- ❑ Put the left hand on the top half of the left hand side of the ball.
- ❑ Point the thumb up along the seam of the ball and spread the fingers around the side of the ball.
- ❑ Bring the ball in towards your waist and flex your elbows at a 90° angle.
- ❑ Rotate your shoulders round until your left shoulder is pointing forward.
- ❑ Draw the ball back across to the right hip, keeping your elbows slightly bent.
- ❑ Sweep the ball across your body, keeping the elbows close to your body and shift your weight from your back leg to your front foot.
- ❑ Release the ball when arms are nearly fully extended with a flick of the wrists and fingers.
- ❑ Follow through with your fingers pointing to the target.

High ball catch

- ❑ A high ball catch is an attacking and defending skill. It is useful for attackers when completing an up and under kick or as a defender to stop an attacking team's momentum by safely winning possession back.
- ❑ Call for the ball.
- ❑ Get in line with the ball's path and keep your eyes on the ball at all times.
- ❑ Move towards the ball and extend your arms out in front of you at chest height.
- ❑ Slightly bend your elbows and have your palms facing up and fingers spread.
- ❑ Jump up off one foot.
- ❑ As you are about to catch the ball, turn slightly to one side, so the side of the body is pointing downfield.
- ❑ Raise the other knee up towards the waist to generate additional upward momentum.
- ❑ Catch the ball with the hands at or above eye level.
- ❑ Bring the ball into your body.
- ❑ Secure the ball against your body as you land on the ground.
- ❑ Land on one to two feet.

https://www.bbc.com/bitesize/topics/zp2m7hv

Subject Knowledge Organiser

Netball – Rules, Officials, Scoring, Player Positions & Court Dimensions

Rules

- ❑ Players are not allowed to travel with the ball.
- ❑ A team can have up to 12 players but only seven are allowed to play on court.
- ❑ Defending players are unable to snatch or hit the ball out of another player's hands.
- ❑ A defending player is only allowed to stand beside the player with the ball until it has left their hands.
- ❑ A defending player must stand three feet away from the person with the ball.
- ❑ An attacking player is unable to hold the ball for more than three seconds.
- ❑ Players must remain within their designated zones.
- ❑ The team retaining possession after the ball goes out of play have three seconds at the side-line to get the ball back into play.

Officials

During a competitive game of netball there are two referees and up to two scorekeepers and timekeepers officiating.

Scoring

In a game of netball there are two clear ways to score points:

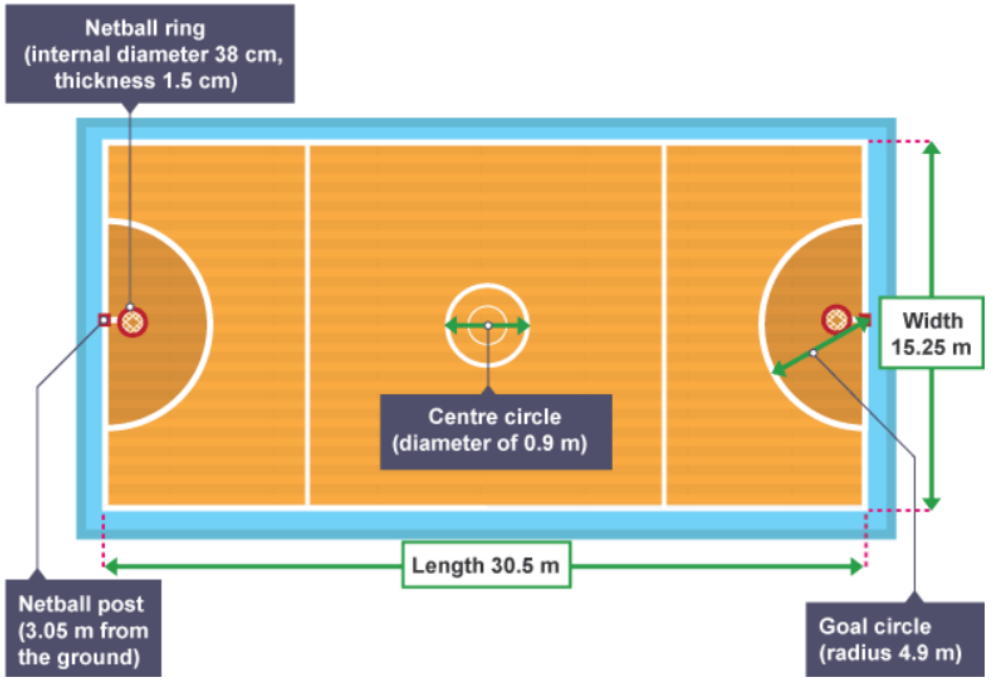
1.In open play, if a shot is successfully scored from inside the goal circle, the team gains one point.

2.If the team is awarded a technical foul then they will receive a free shot at the net. A successful shot will be awarded with one point.

Player Positions

GS	Goal shooter	GA	Goal attack	WA	Wing attack
C	Centre	WD	Wing defence	GD	Goal defence
GK	Goal keeper				

Court Dimensions



Subject Knowledge Organiser

Netball – Bounce Pass, Chest Pass, Shoulder Pass & Pivoting

Bounce Pass

A bounce pass is a short pass that enables the player to find a teammate in a crowded area. The height of the ball makes it difficult for the opposition to reach and intercept.

Stage one

Feet shoulder-width apart in opposition, with knees bent. Place hands each side and slightly behind the ball, with the fingers comfortably spread. Hold the ball at waist level, with elbows tucked in.

Stage two

Step in the direction of the pass, through extending your legs, back and arms. The wrist and fingers should be forced through the ball releasing it off the first and second fingers of both hands. Follow through with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Chest Pass

A chest pass is a very fast and flat pass which enables a team to move quickly up a court in a precise and accurate fashion.

Stage one

Stand with feet shoulder width apart and on the balls of your feet, with back straight and knees slightly bent. Place hands on the sides of the ball with the thumbs directly behind the ball and fingers comfortably spread.

Stage two

The ball should be held in front of the chest with the elbows tucked in. Step in the direction of the pass, by extending their legs, back, and arms. Push the ball from the chest with both arms (not from one shoulder). Fingers are rotated behind the ball and the thumbs are turned down.

Stage three

The back of the hands face one another with the thumbs straight down. Make sure the ball is released off the first and second fingers of both hands. Follow through to finish up with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Shoulder Pass

A shoulder pass is a very dynamic, fast and long pass which enables a team to switch positions on court very quickly to either find a player in space or break defensive screens.

Stage one

Player's feet should be shoulder width apart in opposition. Opposite foot forward to throwing arm. Stand on balls of feet with toes pointing toward target, and knees slightly bent. Hold the ball at head height, slightly behind your head. Elbow should be at a 90° angle. Fingers spread behind the ball.

Stage two

Step in the direction of the pass by transferring your body weight from back foot to front foot. Pull the arm through with the elbow leading. To follow through, fully extend your arm and wrist. Point your fingers in the same direction as the pass, with palms facing down.

Pivoting

The pivoting action is a swivel movement that allows the player to move on a fixed axis to either pass or shoot.

Stage one

Run towards the ball and jump by extending the legs and ankles. Keep your eyes firmly fixed on the ball. Bring your hands out in front of your body at chest height with fingers spread open and pointing up.

Stage two

In the air catch the ball with thumbs an inch or two apart making a 'W' shape. Land on the ball of one foot on the ground. Flex your knee and ankle as your foot hits the floor.

Stage three

Stand with knees slightly bent and your feet shoulder width apart. Bring the ball into your body to protect it. Pivot by rotating yourself on the ball of your landing foot. Keep your upper body straight and head up. Make sure the hip of your pivoting leg is pointing in the direction you are aiming to pass the ball in. You can move or step with the other foot any number of times. You are not allowed to lift the foot you are pivoting on before you release the ball.

Subject Knowledge Organiser

Basketball – Rules, Scoring, Officials, Court Dimensions & Player Positions

Rules

- ❑ A basketball team can have a maximum of five players on the court.
- ❑ Player substitutions can be made at any time and there is no restriction on the number of substitutions made.
- ❑ A ball can travel through dribbling or passing.
- ❑ A player is no longer able to dribble with the ball once the player puts two hands on the ball. At this point, a player must either pass or shoot.
- ❑ If a team wins possession back in their own half, they have ten seconds to get it into their opponent's end or a foul will be called.
- ❑ An attacking team has 24 seconds from gaining possession of the ball to shoot
- ❑ After the shot is taken, the clock is restarted for another 24 seconds.
- ❑ After a team scores a basket, the ball is returned back to the opposition to start again.
- ❑ All fouls that are committed throughout a game are to be accumulated and when a certain number is reached, the umpire will award a free throw.
- ❑ Depending on where a technical foul is committed, the umpire may award a number of free throws a player will receive.
- ❑ Violations can be awarded by the officials in basketball for player handling errors. These include travelling, double dribble, goal-tending and back court violation.

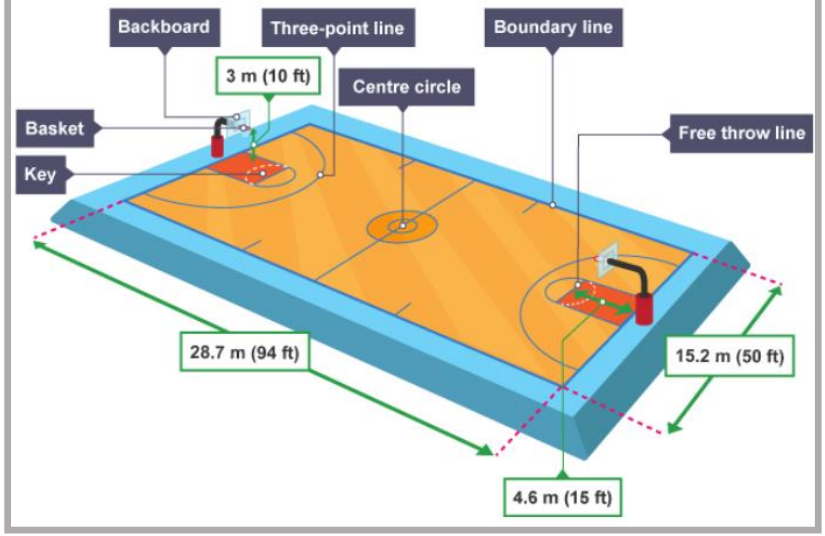
Scoring

In a game of basketball there are three clear ways to score points. If a shot is successfully scored from outside of the three-point line, three points are awarded. If a shot is successfully scored from inside of the three-point line, two points are awarded. If a team is awarded a technical foul then they will receive between one and three free shots. Each shot scored will be awarded with one point.

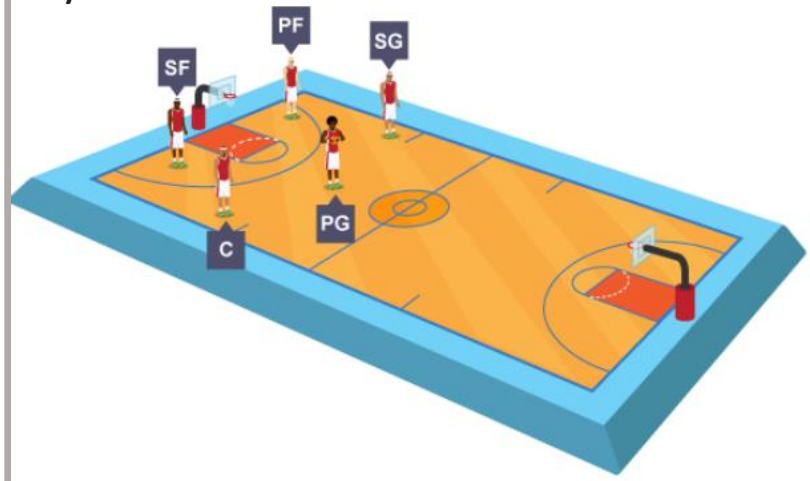
Officials

During a competitive game of basketball there are two referees, a scorekeeper, timekeeper and a shot clock operator. To ensure that everybody is aware of a decision made, the referees perform a series of hand and arm signals.

Court Dimensions



Player Positions



SF	Small forward	PF	Power forward	SG	Shooting guard
C	Centre	PG	Point guard		

Subject Knowledge Organiser

Basketball – Bounce Pass, Chest Pass, Jump Shot & Lay-up

Bounce Pass

A bounce pass is a short pass that enables the player to find a teammate in a crowded area. The height of the ball makes it difficult for the opposition to intercept.

Stage one

Feet shoulder width apart in opposition, with knees bent. Place hands each side and slightly behind the ball, with the fingers comfortably spread. Hold the ball at waist level, with elbows tucked in.

Stage two

Step in the direction of the pass, through extending your legs, back and arms. The wrist and fingers should be forced through the ball releasing it off the first and second fingers of both hands. Follow through with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Chest Pass

A chest pass is a very fast and flat pass. This enables a team to move quickly up a court in a precise and accurate fashion.

Stage one

Stand with feet shoulder width apart, on the balls of your feet with back straight and knees slightly bent. Place hands on the sides of the ball with the thumbs directly behind the ball and fingers comfortably spread. The ball should be held in front of the chest with the elbows tucked in.

Stage two

Step in the direction of the pass by extending your legs, back and arms. Push the ball from the chest with both arms (not from one shoulder). Fingers are rotated behind the ball and the thumbs are turned down. The back of the hands face one another with the thumbs straight down.

Stage three

Make sure the ball is released off the first and second fingers of both hands. Follow through to finish up with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Jump shot

The purpose of the jump shot is to allow the shooter to take aim from a higher position and therefore prevent a defender from blocking it.

Stage one

Place feet shoulder width apart, toes pointing straight ahead, and knees bent. Place non-shooting hand on the side of the ball and the shooting hand at the back of the ball, with the elbow tucked in. Hold the ball at chest height.

Stage two

Extend the legs/ankles by jumping straight up. Whilst in flight, extend back, shoulders and elbow. Flex the wrist and fingers forwards and release the ball at the highest point. After release, fingers should be pointed at the target, with the palm facing down.

Lay-up

A lay-up provides a player with the opportunity to drive at the opponent's basket, jump close to the target and release the ball safely at the backboard. When used effectively it has the highest percentage chance of scoring points.

Stage one

Dribble to the side of net. When a few metres away from the basket, hold the ball with both hands on the shooting hands side of the body. Place the non-shooting hand on the side of the ball, and shooting hand on top of the ball.

Stage two

The last step before the lay-up jump should ensure that take off foot is opposite to the shooting hand (left foot/right hand). Flex the knee at take-off.

Stage three

Whilst jumping, extend the shooting knee and raise the ball up. Bring the ball between the shoulder and ear. Direct the wrist and fingers straight at the basket and release the ball at the highest point. Complete the follow through with the arm up and palm facing down, and hold until the ball has reached the basket.

Subject Knowledge Organiser
Dodgeball – Rules & Court Dimensions

Rules

Players

There are 6 players on a team and a maximum of 10 players in a squad.

Timings

Each match is 2 halves of 3 sets (6 sets in total), with each set lasting 2 minutes.

Winning a set

In order to win a set, you must eliminate all opposing players or have more players remaining on your side at the end of a set.

Winning a match

A team wins a match if they have more points (2pts = set won, 1pt = set drawn, 0pts = set lost).

Start of play

5 balls are placed along the centre line. The 2 balls on a team's left are their designated balls. The centre ball is the only contested ball. A ball is not live until it is passed back beyond the return line.

Eliminating opposing players

A ball is live until it hits a floor, wall or any other surrounding surface.

Hits

Any player struck with a live ball by an opposing player will be called out. Face shots do not count unless a player's face stops the ball from hitting their body

Catches

Any catch on a live ball will be valid. The player who threw the caught ball will be called out and the catching team will gain one player from the outbox.

Blocking

Players are able to use a ball in their possession to block an incoming ball. If the ball they are holding is knocked from their possession, they will be called out.

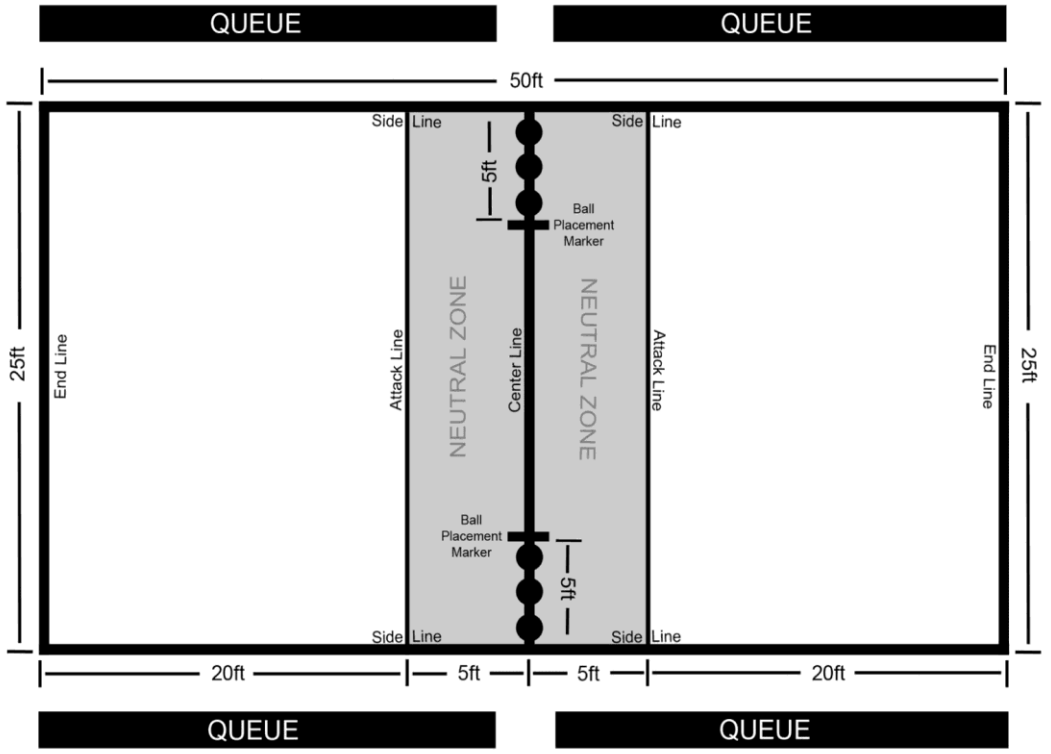
Stalling

Players should not intentionally stall the game. When a referee calls 'play ball', a team has 5 seconds to throw. if they do not then players holding balls will be called out. Teams can keep one ball after 'play ball' has been called, and must throw the rest.

Multiple play

A player will be called out if they are hit by a ball that has deflected off a teammate whilst it is still live. A catch is valid if it has deflected off a teammate whilst it is still live.

Court Dimensions



Subject Knowledge Organiser
Dodgeball – Throwing Strategies & Dodging Strategies

Throwing Strategies

Aim at a single target
Players are usually numbered 1-6 from left to right as you look at them — the player on your team that stands on the far left calls out the target. Then countdown from 3 in your head before releasing.

Throw together
Three balls thrown at once are much harder to dodge or catch than single throws which can be spotted from range.

Spread out
If all the balls are coming from the same part of the court, they are easier to dodge because all throwers are in your eye line. By spreading out on the court and throwing at the same person from different angles, the target may be blindsided and unable to dodge.

Get close
Throw as close to the neutral zone as possible. This makes your throw much harder to catch or dodge.

Aim low
It is not the hardest throw that takes someone out, but the smartest. Aim at the chest. Get your shots in low and together. Aim your hits between the thigh and shin. If you miss, at least you won't get caught.

Throw at the strongest players first
When the court is more crowded, players have less room to dodge. They also haven't had time to get their eye in. Whilst it may be tempting to take out weaker players, this will hurt you in the long run; the longer the stronger players stay in, the more time they have to hit you with a good throw or catch.

Dodging Strategies

Spread out, stay back
Under no circumstances should you stand behind a teammate. If they dodge a ball, you won't see it coming and will be eliminated. If you see two opponents standing one behind the other, throw a ball at them. You must also maximise your distance from your opponents. Don't stand back to the wall, or failed catches will end up eliminating you when they hit the wall—aim for a few feet of space behind you.

Jump
Split jumps or jumps with high legs are your best bet. Most players are aiming between thighs and shins, so a high jump will clear this safely. Only as a last resort should you hit the deck—this leaves you vulnerable and should only be attempted in countering one-on-one situations.

Watch the court
Don't stray too close to the boundaries. Make sure you have room to dodge on both sides, and behind you.

Spread out
As the numbers on your team reduce, keep equally spaced out. Don't clump together; your team will just be a larger, easier, less mobile target.

https://britishdodgeball.org/wp-content/uploads/2019/05/Quick-Start-High-School-Rules.pdf

Subject Knowledge Organiser

Gymnastics - Key Components of Fitness, Key Terms & Chronology

Key Components of Fitness for Gymnasts

A gymnast requires **flexibility** at the joints to allow for a larger range of motion around a joint.

A gymnast requires **muscular strength** to be able to balance on certain body parts. This is exerting their body against a given force.

A gymnast requires **power** in their arms and legs, which is speed x strength.

A gymnast requires **agility** to change direction at speed.

A gymnast requires **muscular endurance** to keep using the same muscle groups over and over again when performing a skill such as a forward roll.

A gymnast requires a certain levels of **speed** as they slow down their speed and increase their speed depending on the sequence they are performing.

Gymnastics Key Terms

Apparatus The equipment used in gymnastics.

Balance Position A static position, holding a distinct shape.

Dismount To leave an apparatus at the end of a routine.

Equilateral Triangle A triangle in which all three sides have equal length.

Jeté A move where the gymnast springs from one foot to the other.

Pike Body position where the body is bent forward 90 degrees at the waist with the legs kept straight.

Pivot A turn on the ball of the foot.

Plié Feet angled at 90 degrees.

Routine A combination of moves and sequences performed on one apparatus.

Spotting Spotting a landing before take off.

Supporting When a second person assists the gymnast through a move and prepares to cushion them to avoid injury in the event of a fall.

Tuck A position where the knees are bent into the chest, with the body folded at the waist.

Walkovers A move where a gymnast transfers from a standing position to a handstand to a standing position.

Gymnastics Chronology

2000 BC Gymnastics activities are depicted on Egyptian artefacts

1804 The Crown Prince of Denmark believes gymnastics to be useful for military training and creates the Military Gymnastic Institute in 1804.

1928 The first women's Olympic competition (synchronised calisthenics) is held in Amsterdam.

1964 The first Trampolining World Championships are held in London, Uk.

1984 Rhythmic gymnastics is introduced as an Olympic sport in Los Angeles, USA.

2001 The traditional vaulting horse is replaced with a new apparatus, known as a tongue or table, which is ultimately more stable and therefore safer.

2008 Louis Smith is the first British Individual gymnastics medalist in a century, at the 2008 Beijing Olympics, claiming bronze in the pommel horse final.

https://www.livestrong.com/article/497802-5-components-of-fitness-in-gymnastics/

Subject Knowledge Organiser

Gymnastics – Travelling, Jump, Roll, Weight on Hands, Balance & Vault

Travelling

Travelling in floor gymnastics is being able to move around the mat using different movements such as rolls, steps, turns, jumps, cartwheels, walkovers, handsprings, and being as creative as possible.

Standing Upward Jump

Bending your legs slightly, jump up while raising your arms forwards and upwards above your head. Keep your arms slightly in front of your body. As you land, it is important to keep your arms raised above your head, and place your feet slightly apart in the 'plie' position at an angle of 45 degrees, with your knees bent. As you make contact with the floor continue to bend the knees to absorb the downward force of landing. Bring your arms down sideways to stabilise the landing, without taking a step.

Forward Roll

From standing, crouch down. Place your hands on the floor in front of you, shoulder-width apart with your fingers facing forwards, while simultaneously placing your chin on your chest. This will ensure your hips of raised high enough and your spine is rounded so you can roll on to your back. Bend your arms as you place your neck on the floor, slightly extending the legs and pushing on the floor with your feet until the roll commences and you roll on to your back. Try to keep your legs straight as you commence the roll forwards. In the last part of the roll, bend your legs tightly so that your heels are close to your bottom. At the point where your feet contact the floor, stretch forwards with your arms so that your head and chest move over your feet. Once your body weight is in a position of balance you will be able to stand.

Cartwheel

Raise your hands above your head and place your leading leg forward. Reach forward to place the first hand (the hand on the same side as the leading leg) on the floor by bending your front leg and bending at the waist. When the first hand contacts the floor, straighten your front leg while kicking upward with your back leg over your head. Continue the movement by rocking over from your first to your second hand (which is still extended above your head). To do this, push strongly against the floor with your first hand, keeping your arms stretched up over your head. As your body rocks over your second hand, bring your second leg down to the ground and place it close to your second hand.

Headstand

Crouch down and place your hands and forehand on the floor to form and equilateral triangle. Your head should be approximately 30cm in from of your hands and your arms bent at an angle of 90 degrees. Extend your legs so that your pointed toes are resting on the floor. By pressing with your hands, slowly move your bottom over your forehead into a balanced position. Maintain the equilibrium by continually pressing with your hands. By exerting more pressure you will reach a point at which you can lift your feet from the floor. Continue to raise your legs above your head by pressing constantly against the floor with your hands. Make sure that your back is kept straight at all times by tightening your bottom and stomach muscles.

Headspring

To obtain the necessary height and rotation, a fast but controlled approached run is required. On take-off, drive your arms upwards and extend the body. Think of the lower body rotating over the upper body. You must still be moving upwards at the point when your hands strike the vault. In the strike phase, the angle of the body and the vault should be between 60 and 80 degrees to the vertical. Your hands should leave the box just before your body reaches the vertical. To achieve this the strike phase must be short and extremely powerful. During post-flight, keep the body as straight as possible. Just before landing, bend the knees.

https://gymnasticshq.com/gymnastics-skills-list-floor/

Subject Knowledge Organiser

HRF – Health, Fitness and Exercise, Consequences of a SL, Lifestyle choices & CoF

Health, Fitness and Exercise

Health can be defined as 'complete physical, mental and social wellbeing and not only the absence of illness or infirmity'. Fitness can be defined as 'the ability to meet the demands of the environment'. Exercise can be defined as 'a form of physical exercise done to improve health or fitness or both'. *Adults* - five sessions of thirty minutes activity per week. The activity should be physical enough to cause the adult to breathe more deeply and to begin to sweat. *Children and young people* - seven sessions of sixty minutes per week. At least two of these sessions should be of high intensity exercise such as running, jumping or cardiovascular based sports.

Consequences of a sedentary lifestyle

If a person does not take part in regular physical activity, exercise or sport then they are at risk of a number of illnesses and negative effects such as weight gain or obesity; heart disease; hypertension (high blood pressure); diabetes; depression; increased risk of osteoporosis and loss of muscle tone.

Lifestyle choices

Other lifestyle choices can affect a person's health in either a positive or negative way. For example, eating a balanced diet means a person is less likely to become ill or put on excess body fat; getting enough sleep is important for the body to rest and brain to function optimally; not smoking as this causes illnesses such as bronchitis and lung cancer and not taking recreational drugs such as alcohol as in the short term it can lead to disorientation and poor decision-making and in the long term can lead to disease.

Component of Fitness

	Definition	Example
Body composition	The percentage of body weight which is fat, muscle and bone	The gymnast has a lean body composition to allow them to propel themself through the air when performing on the asymmetrical bars
Cardiovascular fitness	The ability of the heart, lungs and blood to transport oxygen	Completing a half marathon with consistent split times across all parts of the run
Flexibility	The range of motion (ROM) at a joint	A gymnast training to increase hip mobility to improve the quality of their split leap on the beam
Muscular endurance	The ability to use voluntary muscles repeatedly without tiring	A rower repeatedly pulling their oar against the water to propel the boat towards the line
Strength	The amount of force a muscle can exert against a resistance	Pushing with all one's force in a rugby scrum against the resistance of the opposition pack
Agility	The ability to change the position of the body quickly and control the movement	A badminton player moving around the court from back to front and side to side at high speed and efficiency
Balance	The ability to maintain the body's centre of mass above the base of support	A sprinter holds a perfectly still sprint start position and is ready to go into action as soon as the gun sounds
Coordination	The ability to use two or more body parts together	A trampolinist timing their arm and leg movements to perform the perfect tuck somersault
Power	The ability to perform strength performances quickly	A javelin thrower applies great force to the spear while moving their arm rapidly forward
Reaction time	The time taken to respond to a stimulus	A boxer perceives a punch from their left and rapidly moves their head to avoid being struck
Speed	The ability to put body parts into motion quickly	A tennis player moving forward from the baseline quickly to reach a drop shot close to the net

Subject Knowledge Organiser

HRF – Training Methods, Advantages/Disadvantages of TM & Training Zones

Training Methods

Training can be aerobic or anaerobic. In aerobic exercise, which is steady and not too fast, the heart is able to supply enough oxygen to the muscles. Aerobic training improves cardiovascular fitness. Anaerobic exercise is performed in short, fast bursts where the heart cannot supply enough oxygen to the muscles. Anaerobic training improves the ability of the muscles to work without enough oxygen when lactic acid is produced.

Specific training methods can be used to improve each fitness factor. Circuit training involves performing a series of exercises in a special order called a circuit. Each activity takes place at a 'station'. It can be designed to improve speed, agility, coordination, balance and muscular endurance. Continuous training involves working for a sustained period of time without rest. It improves cardio-vascular fitness. Cross training involves using another sport or activity to improve your fitness. It happens when an athlete trains in a different environment. For example a volleyball player uses the power training for that sport to help with fitness for long jump. Fartlek training or 'speed play' training involves varying your speed and the type of terrain over which you run, walk, cycle or ski. It improves aerobic and anaerobic fitness. Interval training involves alternating between periods of hard exercise and rest. It improves speed and muscular endurance. Weight training uses weights to provide resistance to the muscles. It improves muscular strength (high weight, low reps), muscular endurance (low weight, high reps, many sets) and power (medium weight and reps performed quickly).

Advantages and Disadvantages of Training Methods

Continuous Training

Good for aerobic fitness, lose weight accessible, health benefits, good for beginners of all ages, little equipment

Boring, not always sport specific, risk of injury does not improve anaerobic fitness

Fartlek Training

Good for team sports, less boredom, easy to use, can mimic the sport, god for team sports

Too easy to cheat, can be difficult

Circuit Training

Less boring, easily adapted for fitness/skill, easily adapted to sports, stations can target specific muscle groups

Take time to set up, requires equipment

Interval Training

Can be both aerobic and anaerobic, less technical, can mimic a sport, good for sports that require a change of pace

Can be boring, easy to cheat hard aspects,

Free weights

Full range of sporting movement, large muscle groups can be worked

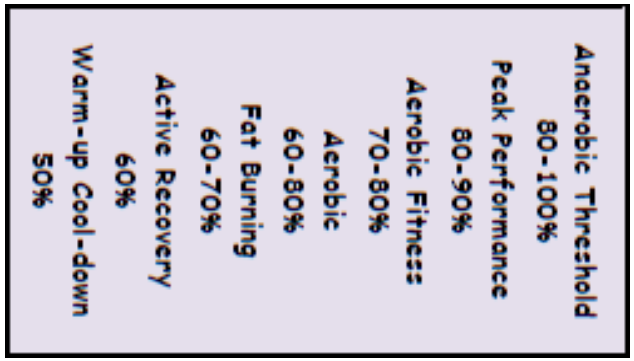
Risk of injury, need a spotter, more suitable for advance performers, requires good knowledge

Resistance machines

Safer, good for beginners, good for injury rehabilitation

Expensive, no functional everyday movements, only focuses on one muscle group

Training Zones

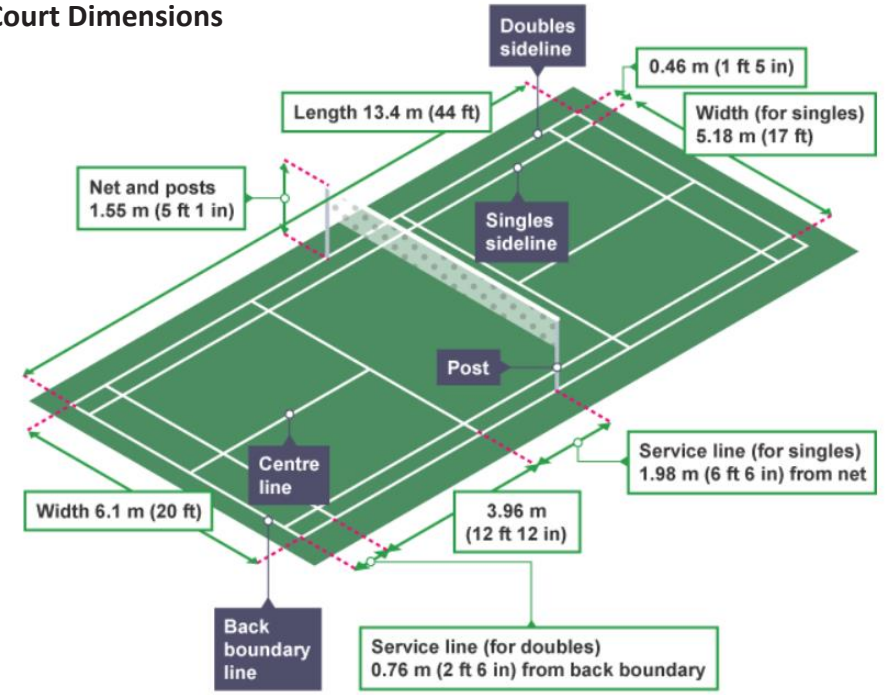


Subject Knowledge Organiser
Badminton – Rules, Scoring & Officials

Rules

- ❑ A match consists of the best of three games of 21 points.
- ❑ The player/pair winning a rally adds a point to its score.
- ❑ At 20-all, the player/pair which first gains a 2-point lead wins that game.
- ❑ At 29-all, the side scoring the 30th point wins that game.
- ❑ The player/pair winning a game serves first in the next game.
- ❑ A badminton match can be played by two opposing players (singles) or four opposing players (doubles).
- ❑ A competitive match must be played indoors utilising the official court dimensions.
- ❑ A point is scored when the shuttlecock lands inside the opponent's court or if a returned shuttlecock hits the net or lands outside of the court the player will lose the point.
- ❑ At the start of the rally, the server and receiver stand in diagonally opposite service courts.
- ❑ A legal serve must be hit diagonally over the net and across the court.
- ❑ A badminton serve must be hit underarm and below the server's waist height with the racquet shaft pointing downwards, the shuttlecock is not allowed to bounce. After a point is won, the players will move to the opposite serving stations for the next point.
- ❑ The rules do not allow second serves.
- ❑ During a point a player can return the shuttlecock from inside and outside of the court.
- ❑ A player is not able to touch the net with any part of their body or racket.
- ❑ A player must not deliberately distract their opponent.
- ❑ A player is not able to hit the shuttlecock twice.
- ❑ A 'let' may be called by the referee if an unforeseen or accidental issue arises.
- ❑ A game must include two rest periods. These are a 90-second rest after the first game and a 5-minute rest after the second game.

Court Dimensions



Scoring

In recent years, badminton has changed how players can score a point. In 2006, the rules were changed to a rally point system and this now allows both players to score a point during a rally, regardless of who served.

In competitive adult matches, all games are played to a best of three games. To win a game, a player must reach 21 points. However, if the game is tied at 20-20 (or 20-all) then you are required to win by two clear points. Unlike most sports, however, if the score becomes 29-29 (or 29-all), the player or team to score the 30th point will win the game.

Subject Knowledge Organiser

Badminton – Forehand Clear, Forehand Drop Shot & Forehand Smash

Forehand Clear

The forehand clear shot enables players to move their opponent to the back of the court, creating space in the mid and front court to exploit.

Stage one

Stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. The left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttle with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow quickly towards the shuttlecock, with the non-racket arm rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact, to allow for a 'whip' action. Drive the shuttlecock with a high trajectory towards the back of the court.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through finishing to the left hand side of your body. Return back to ready position for the next shot.

Forehand Drop Shot

The forehand drop shot enables players to move their opponent to the front court to either win a point or create space in the mid and back court to exploit.

Stage one

As the shuttlecock is returned, stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. The left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttlecock with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow towards the shuttlecock, with non-racket shoulder rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact. Slice across the shuttlecock with the face of the racket slightly open, or just before contact, slow the speed of the racket down, tapping the shuttle gently over the net. Hit the shuttlecock at a flat trajectory, allowing it to drop just over the net.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through, finishing to the left hand side of your body. Return back to ready position.

Forehand Smash

The forehand smash shot is hit with power and speed downward into the opponent's court. The angle/steepness of the shuttlecock's trajectory make it hard for the opponent to return.

Stage one

As the shuttlecock is returned, stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. Left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttle with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow quickly towards the shuttlecock, with the non-racket elbow extended and shoulder rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact, to allow for a 'whip' action. Drive the shuttlecock downwards towards the floor of your opponent's court with a low trajectory.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through, finishing to the left hand side of your body. Return back to ready position for the next shot.

Subject Knowledge Organiser

Table Tennis – Rules, Scoring, Officials & Table Dimensions

Rules

- ❑ To start a point, the server must stand at the back of the table and can serve either forehand or backhand. The ball must be thrown up either equal to or above the height of the net before striking the ball and the ball must be thrown from an open palm to stop finger spin.
- ❑ If the ball hits the net on a serve but continues over the other side then a 'let' is played.
- ❑ Players are allowed to hit the ball around the side of the net.
- ❑ The ball must bounce on a player's side of the table before playing their shot.
- ❑ During play, competitors are not allowed to touch the table with their non-bat hand. If they do, the point is conceded.
- ❑ Players must swap ends at the end of a game, and in the final match players will switch ends after five points.

Scoring

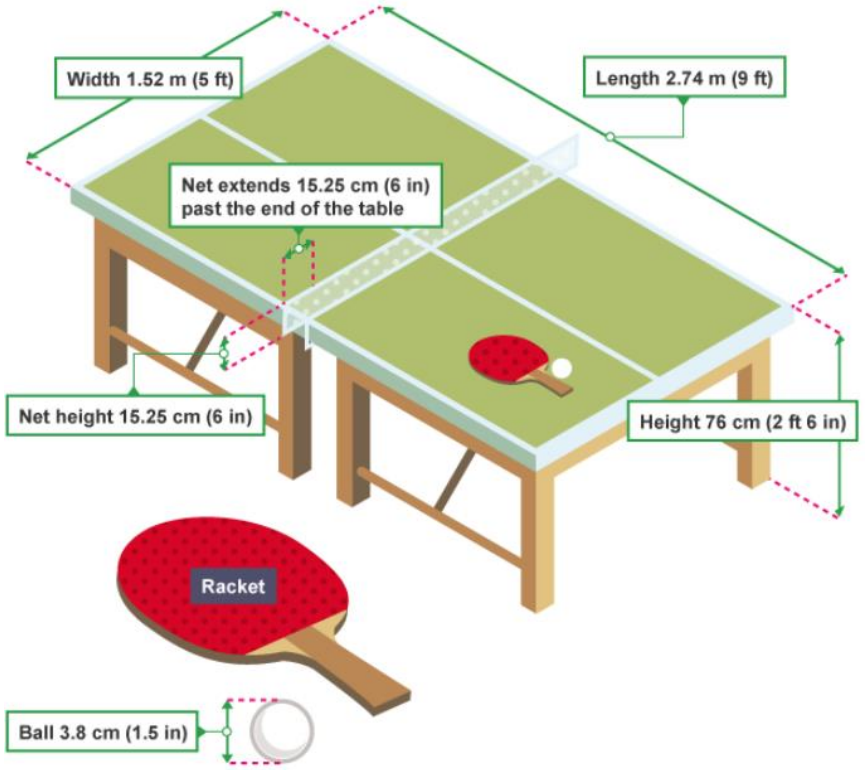
A competitive game of table tennis is played to the best of five or seven games. The first player to get to 11 points in a game is the winner. However, if a game is tied at 10-10, a player must win a game by two clear points. You do not lose service if you lose a point - each player must serve for two points in a row before handing the service over to their opponent.

Officials

For every table tennis competition, a referee is appointed with a deputy who can act on their behalf. The referee is required to be present at the venue throughout a tournament and is required to uphold the rules. During a table tennis match, an umpire is appointed to decide on the result of each point or rally. The umpire is required to use their judgement when applying the laws and regulations of the ITTF. Where the umpire is officiating alone, their decision is final and they should be seated about 2–3 metres from the side of the table and in line with the net.

Table Dimensions

A competitive table tennis table should measure 2.74 m (9 ft) long, 1.525 m (5 ft) wide and be 76 cm (2 ft 6 in) high. The surface of a table tennis table must be the same dark colour across the court and be of a matt appearance.
The net is 15.25 cm (6 in) high and extends 15.25 cm (6 in) past the end of the table. A competitive table tennis ball should bounce 23 cm high when dropped from a height of 30 cm. In all competitions, the playing area for a full size table should be 8 m long by 4 m wide. This is essential to safely allow the players to chase around the table after well-placed shots.



Subject Knowledge Organiser

Tennis Tennis – Serve, Forehand Drive, Forehand Push, Forehand Smash & Block

Forehand Serve

The tennis serve is the shot selected to begin a point in tennis. A table tennis serve can be hit either forehand or backhand. It must be thrown up from a flat palm into the air to a minimum height of six inches and visible to their opponent at all times.

Stage one

Stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Hold the ball in front of your body with left hand, right hand held back. Body weight should be on the back foot. Keep low.

Stage two

Throw the ball gently into the air (about 6 inches) with the palm of your hand. As the ball begins to drop, hold a forward stance and strike the ball flat with a fast arm in the middle of the ball. Transfer body weight from back to front foot.

Stage three

Follow through with the bat pointing towards the intended target. Return back to ready position for the next shot.

Forehand Drive

A forehand drive in table tennis is an offensive stroke that is used to force errors and to set up attacking positions. A successful shot should land close to your opponent's baseline or side-line.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Body weight should be on the back foot.

Stage two

When ready to strike the ball, point your free arm towards the ball. At impact, rotate your body quickly to face forwards. Aim to hit the ball at its highest point. Transfer body weight from back to front foot.

Stage three

Follow through with the bat pointing towards the intended target. Return back to ready position for the next shot.

Forehand Push

A forehand push is a difficult defensive shot that requires the player to strike downwards on the back and underneath the ball to create backspin. When performed correctly, a forehand push is used to change the pace of an exchange or to return the ball in a very low manner.

Stage one

Stand square to the table in slight position and keep your feet shoulder width apart. Slightly flex your knees, leaning forward and hold your arms out in front. Keep close to the table.

Stage two

When ready to strike the ball, draw the bat backwards to the side of the body (strongest side). Hold the bat in an open angle with a straight wrist and your playing arm just in front of the body.

Stage three

On impact, bring the arms forward and ensure that power comes from the elbow and forearm (it is not a swing shot). Aim to hit the ball at its highest point. Transfer body weight from back to front foot.

Stage four

After impact, point the bat to where you want to hit the ball. Ensure that your arm does not swing across your body to the left. Return back to ready position for the next shot.

Forehand Smash

The forehand smash is a fast, hard and powerful stroke that aims to force the opponent away from the table or to win a point outright. However, the shot is not always about force and requires the player to use good timing, technique and precision simultaneously.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Body weight should be on the back foot.

Stage two

When ready to strike the ball, point your free arm towards the ball. Raise the racket to a high position to generate downwards and forwards power.

Stage three

As the ball bounces off the table, rotate your body quickly to face forwards. Aim to hit the ball at its highest point. Transfer body weight from back to front foot. Return back to ready position for the next shot.

Block

The block shot is a defensive stroke that allows a player to use the speed of their opponent's shot against them. It needs to be completed straight after the bounce to ensure that the player maintains control of the ball.

Stage one

Stand square to the table in slight position and keep your feet shoulder width apart. Slightly flex your knees, leaning forward and hold your arms out in front. Keep close to the table.

Stage two

When ready to strike the ball, draw the bat backwards to the side of the body (strongest side). Hold the bat in an open position with a straight wrist and your playing arm just in front of the body.

Stage three

On impact, bring the arms forward and ensure that power comes from the elbow and forearm (it is not a swing shot). Aim to hit the ball at its highest point. Transfer bodyweight from back to front foot.

Stage four

After impact, point the bat to where you want to hit the ball. Ensure that your arm does not swing across your body to the left. Return back to ready position for the next shot.

Subject Knowledge Organiser

Volleyball – Rules, Scoring, Officials, Court Dimensions & Player Positions

Rules

- ❑ An official volleyball court is 18 m × 9 m.
- ❑ To start a point, the server can serve from anywhere behind the end line, either overarm or underarm, into the opposing team's side of the court.
- ❑ The opposing team is allowed a maximum of three touches on their side of the court before sending the ball back over the net.
- ❑ A player is not allowed to touch the ball twice in a row. However, they could hit the ball on the first and third contact.
- ❑ The ball must be hit - not caught.
- ❑ In side out scoring, the serving team scores a point when the opponents fail to return the ball over the net, hit the ball out of bounds or commit an infraction.
- ❑ Whichever team wins the point then goes on to serve.
- ❑ Every time a team wins the serve from the other team, the players rotate their position on court clockwise so that everyone gets a chance to serve.

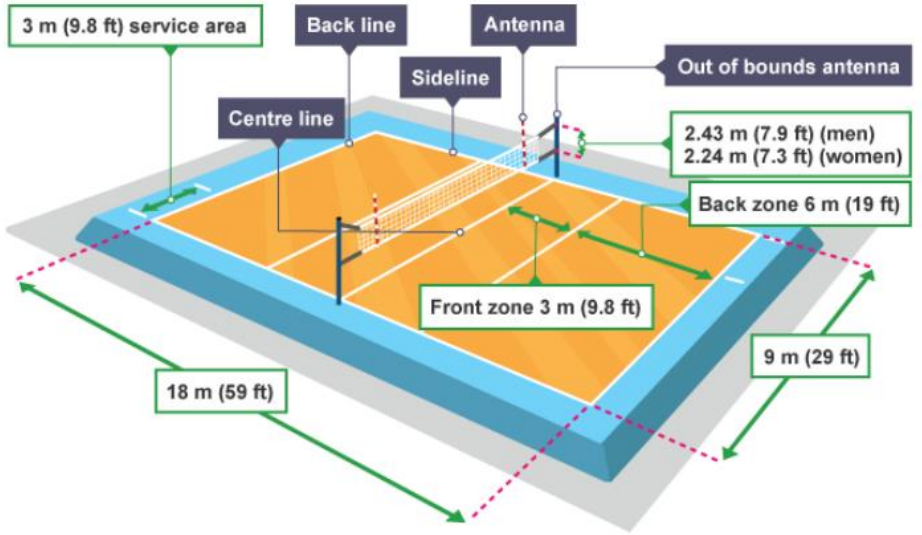
Scoring

In competitive adult matches all games are played to a best of five sets. Volleyball is very different to most sports as the first four sets are played to 25 points, but if the match goes to a fifth set this game is only played to 15 points. In order to win a set, a team must win by two clear points.

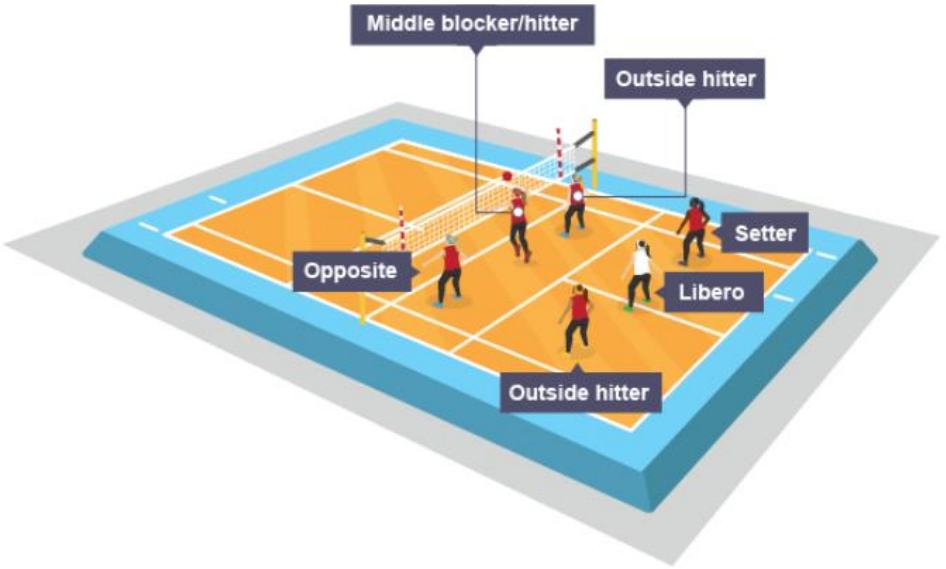
Officials

A first (or main) referee, second referee, a scorer and two line judges are required to umpire an official game of volleyball. Just like most sports, the main referee upholds the rules throughout the whole game and their decision is final. However, unlike football, a volleyball team is allowed to make a formal protest with the scorer. The second referee stands opposite the main referee and is responsible for all substitutions, timeouts and the actions of the scorer's table.

Court Dimensions



Player Positions



Subject Knowledge Organiser
Volleyball – Serve, Dig, Set & Block

Serve

A volleyball serve can be hit either overarm or underarm. A player is allowed to travel with the ball and jump whilst serving, and providing it reaches the opponent's court, it is deemed legal.

Stage one
Stand in position on the balls of your feet, with knees slightly flexed.
Face forwards with your chest facing towards the target. Hold the ball in front of your body with left hand, right hand held back. Body weight should be on the back foot.

Stage two
Throw the ball gently into the air, swing the straight arm forward to strike underneath the ball with the heel of the hand, with your fingers clenched. Transfer bodyweight from back to front foot.

Stage three
Follow through with the fist pointing towards the intended target or the sky.

Dig

The dig shot requires players to get low and to stop the ball touching the ground. When completed successfully the shot provides accurate and consistent passing, which is essential to create a multiple attack.

Stage one
Stand in position on the balls of both feet, with knees slightly flexed. Drive off from legs to get towards the path of the ball.

Stage two
Keep both eyes on the ball. Place the back of the right hand on top of the palm of the left hand. Bring both thumbs together and place them side by side. Keep fingers and thumbs close together. Lock your elbows together.
Hold arms out straight in front.

Stage three
Hands start low in front of the body and swing up to strike the ball upwards. Strike the ball with the lower forearms. Follow through with the hands pointing towards the intended target or the sky.

Set

The set shot is a delicate attacking shot that is an important part of the pass-set-spike sequence required for a successful attack.

Stage one
Stand in position on the balls of your feet, with knees slightly flexed. Drive off from legs to get towards the path of the ball. Call for the ball. Get in line with the ball's path. Keep your eyes on the ball at all times.

Stage two
Move towards the ball. Extend your elbows so that your arms are out in front of you at head height. Slightly flex your elbows. Have your palms facing up and fingers spread. Keep your eyes on the ball.

Stage three
Watch the ball. Face the ball in ready position with knees slightly flexed. Hands are held above the head, palms up. Move body underneath the ball and push the ball into the air with your fingertips. Extend knees to help with the push into the air. Follow through with fingers pointing at the sky.

Block

The block is not technically a maintaining possession shot, but a well-timed and effective block diffuses an offensive attack.

Stage one
Stand in position on the balls of your feet, with knees slightly flexed. Drive off from legs to get towards the path of the ball. Get in line with the ball's path. Keep your eyes on the ball at all times.

Stage two
Move towards the ball. Extend arms up above head. Have your palms facing forward and fingers spread. Keep your eyes on the ball.

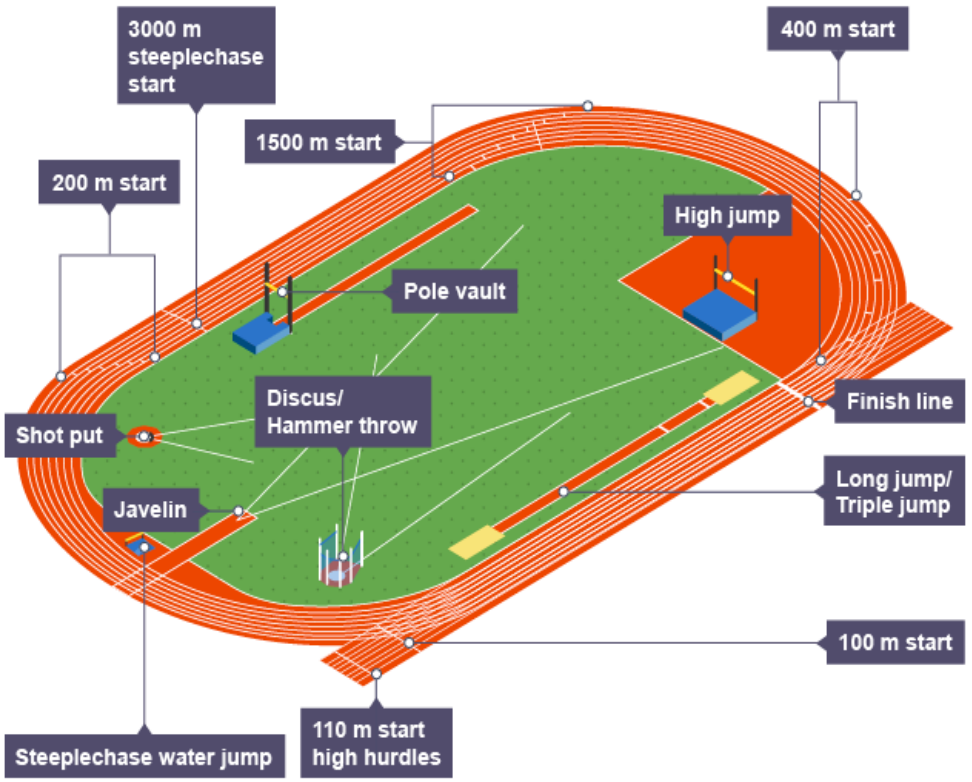
Stage three
Upon contact, try to angle the ball downwards. Begin to land move arms outwards for balance. Flex knees to help cushion landing. Get back into position to regain formation.

Subject Knowledge Organiser
Athletics – Competition, Scoring & Officials

Competition

Athletics is a collection of sporting events that consist of the three major areas of running, jumping and throwing. The running events include sprints, middle and long-distance events and hurdling. Jumping events include the long jump, high jump, triple jump and pole vault, while the throwing events include the discus throw, hammer throw, javelin throw and shot put. There are also combined events, such as the decathlon for men, which consists of ten events, and the heptathlon for women, which consists of seven events.

Shown below is a typical competition area for athletics.



Scoring

Success in athletics is judged on times and distances rather than points or goals.

Track events – These races are started with an electronic pistol which is only sounded again on a false start. In races that are very close, officials use a digital line-scan camera across the finish line to give them a photo finish picture. The clock stops when an athlete has passed through the finish line.

Jumping events – These events are measured from the front edge of the take-off board to the first mark made in the sand by the athlete. The distance is always measured to the nearest centimetre and athletes will always be given a minimum of three jumps.

Throwing events – These events are measured from the front edge of the throwing line to the first mark made in the ground by the implement. The distance is always measured to the nearest centimetre and athletes will always be given a minimum of three attempts.

Officials

An athletics competition requires a wide range of officials. These include:

Starter – Starts all track events.

Starter's marshals – Line up competitors in correct order ready for starting.

Timekeepers – Provide official times for all track competitors.

Place judges – Ensure the correct order of positions are given.

Field event judges – Measure, record and let athletes know when it is safe to compete.

Relay judges – Make sure runners at change-overs are in the correct lane and within the change-over box.

Subject Knowledge Organiser
Athletics – Track, Jump & Throw

Sprint
This track event is a short running race. There are generally three different sprint distances: 100m, 200m, and 400m.

Drive phase
The drive is where you are looking to cover as much ground as possible through each stride, pushing with the leg that is in contact with the ground and driving the free leg through. In this phase the head must follow the body.

Transition phase
This transition phase is when you smoothly and gradually come upright into your stride. This is when you start move at a slightly faster tempo and begin to reach top speed.

Fly phase
The fly phase is when you are fully upright and at top speed. The key to maintaining as much top end speed as possible is a relaxed upper body and a quick foot contact and tempo.

High jump
This jumping event requires athletes to jump over the bar using the Fosbury Flop technique.

Stage one
Start 8-10 strides away from the barrier. Run in a curve with controlled speed. Lean your torso into the curve, the opposite side to the barrier. Keep your shoulder as high as possible.

Stage two
You are ready to jump at approximately one metre past the first post and an arm's length away from the mat. At this point, plant the take-off foot down. At the same time, drive your lead leg and arms upwards and shoulders high.

Stage three
In the air, keep driving upwards and bring your lead knee across the body to get shoulders parallel with the bar. Bring the arms forwards and back into the body. As your hips cross the barrier, flick your feet upwards and high over the barrier. Maintain balance and land safely.

Shot put
This throwing event requires athletes to throw a heavy metal ball called a shot as far as possible.

Stage one
Hold the shot at the bottom and place the thumb and little finger each side of the shot. Place the shot under the chin and touching the neck. Keep the throwing arm elbow high and the arm parallel to the floor. Stand on the balls of your feet with your knees bent and non-throwing shoulder pointing towards the throwing area.

Stage two
Lean backwards and place your weight on the back foot. Transfer the weight from the back leg to the front leg. Explode upwards, bring the hips around and forwards to face throwing area. Extend the throwing arm up quickly and powerfully. Finish with chest and head up.

Subject Knowledge Organiser
Cricket – Players, Scoring & Rules

Players
A cricket team consists of 11 players per side and one team bats while the other fields. Unique to cricket, the captain of the fielding team has complete control of their team's fielding positions. In all, there are 35 different fielding positions and the captain can utilise every one to try to stop the batter from scoring runs or to try to get them out.

The fielding positions are:

Scoring
The aim for the batter in cricket is to try to score as many runs as possible throughout their innings. To score a run requires the batter to strike the ball and run to the opposite end of the pitch while their batting partner runs in the other direction. In situations where the fielding team has not recovered the ball, the batters can return back to score two or more runs. It is also possible to score runs without running the length of the pitch, if a batter can hit the ball past the boundary line (four runs) or over the line without bouncing (six runs).

Rules
- ❑ The winning team in cricket is the side that scores the most runs, although in some situations a draw is recorded if they both get the same number of runs.
- ❑ A cricket team consists of 11 players and they take it in turns to bat and bowl.
- ❑ The bowler must bowl the ball overarm at the stumps.
- ❑ A wide ball will be called if the batsman, playing a normal stroke, is unable to reach the ball. This can apply to a bouncer above head height.
- ❑ A no ball will be called if the heel of the bowler's front foot lands in front of the popping crease or a full toss is bowled – waist height for a seam bowler and shoulder height for a spin bowler.
- ❑ A batter is declared out if the bowler knocks off the bails of the stumps with a delivery.
- ❑ A batter is declared out if a fielder or wicketkeeper catches the ball directly off the bat and before it hits the ground.
- ❑ A batter is declared out if the umpire believes that the bowler's ball would have hit the stumps if the batter had not obstructed the ball with their pads. This is known as leg before wicket (LBW).
- ❑ A batter is declared run-out when they are going for a run but do not make the batting crease before fielding team knocks off the cricket stumps.
- ❑ A batter is declared out if the wicketkeeper stumps them.
- ❑ There are other, less common ways of being out in cricket, but these are rare.
- ❑ The end of an innings is called when 10 of the 11 batting team are given out. At this point, both teams swap over.

Subject Knowledge Organiser
Cricket – Bowling, Batting & Fielding

Overarm bowl
An overarm bowl is the legal way to deliver a ball in a competitive game of cricket.

Stage one
As you run in towards the wicket, keep your arms close to your body, your head steady and your eyes fixed on the batter.

Stage two
As you approach the crease, start turning your body so your shoulder is facing towards the wicket and lean back slightly.

Stage three
On arrival at the release point, keep the ball close to your chin and your non-bowling arm up with your elbow pointing towards the target. As your back foot lands before the popping crease line, keep your body upright and raise your front foot pointing your knee towards the target. As your front foot lands, your toes should be pointing to the batsperson.

Stage four
On releasing the ball, rotate your shoulders and push your bowling arm forward and down from the coil position. The non-bowling arm should be pointing to the batter. Your arms should then rotate through with the ball and release it at the top of the delivery arc. Continue to follow through and maintain a visual on the batsperson.

Straight drive
A straight drive is a deliberate shot that aims to hit the ball along the ground to prevent being caught out.

Forward defensive
A forward defensive is a deliberate shot that aims to prevent the ball from hitting the wicket or the player's pads.

Overarm throw
An overarm throw is the fastest and most accurate way to pass a ball.

Stage one
Stand shoulder width apart, sideways on to the target, on the balls of your feet with the weight transferred to the back foot. The throwing arm is taken back behind the head at a 90° angle.
Point the non-throwing arm at the target.

Stage two
Transfer the weight from your back foot to your front foot by rotating your hips and torso toward the target. Pull the throwing arm through toward the target leading with your elbow and your forearm and wrist following last and fast. Release the ball just in front of your head with both feet on the ground and the chest facing the target.

Long barrier
The long barrier is the safest technique to control a cricket ball travelling along the ground.

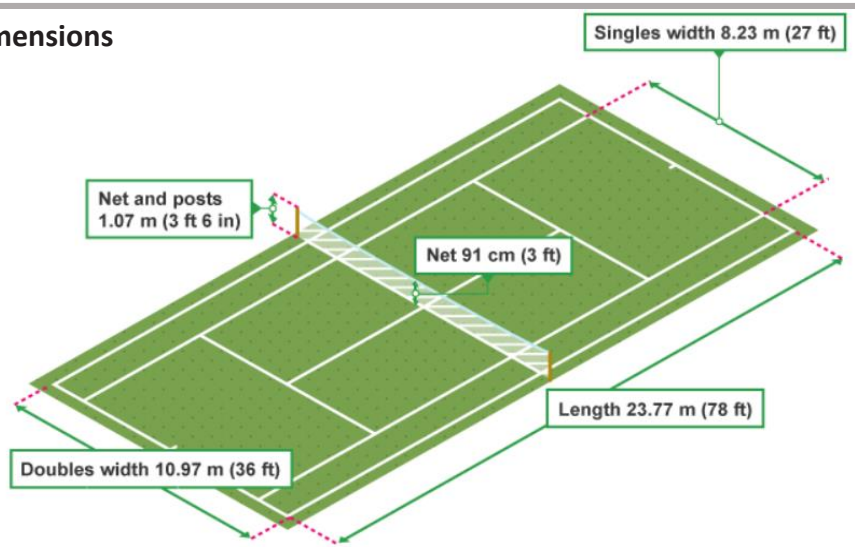
Stage one
Get in line with the ball and get your whole body behind the ball. As quickly as possible bend both knees and twist sideways so that the knee of your strong leg touches the ground and touches the back of the heel of the other leg. Extend arms downwards, spread hands wide with little fingers touching each other. Pick up the ball.

Subject Knowledge Organiser
Tennis – Rules, Court Dimensions & Scoring

Rules

- ❑ A match must start with a coin toss to decide who serves first and which side they want to serve from.
- ❑ After each point, the server will alternate either side on the baseline.
- ❑ The server must hit their serve from behind their baseline.
- ❑ If the first serve is called out, then the server may take advantage of a second serve. If the second serve fails then a 'double fault' is called and the point is lost.
- ❑ If the serve hits the net but travels over and into the service area, then a 'let' is called and the server may take the serve again without penalty.
- ❑ To receive a serve, the player is allowed to stand where they wish but they must allow the ball to bounce once first.
- ❑ If a player touches the net, distracts their opponent or impedes them in any way, the umpire will award the point to the other player.
- ❑ Throughout a game, the ball is allowed to hit the lines to be awarded in. Anything outside of the lines and the ball is out.
- ❑ In competitive games, new tennis balls are introduced after the first seven games and then every nine games after that.

Court Dimensions



Scoring

At the beginning of a game both players begin with 'love' (zero) points. The points follow the set system below:

No points *– 'Love'*
First point *– '15'*
Second point *– '30'*
Third point *– '40'*
Fourth point – *'Game'*

To win a game, a player must beat their opponent by two clear points. However, it is very common for both players to reach 40-40 (40-all) - this is called "deuce". At deuce, a player is still required to win by two more points. Therefore, if the server wins the next point the score is "advantage server". If the player with "advantage" wins the next point they win the game, but if the player without "advantage" wins the next point, the score reverts to "deuce". There is no limit to the number of times a game can go to deuce and, as a result, a game can go on for an extended period of time. A tennis match is played up to five sets for men and three sets for women in a 'Grand Slam' event. The Grand Slam events are considered the most prestigious annual tennis events and offer the most ranking points, prize money, public and media attention, and hence the biggest field of competitors. In all other competitive matches, both men and women play to three sets. The first player to win six games will be awarded a set, but if both players have five games each, a set can be extended to seven games. If players are tied at six games each (or six games-all), then the set goes into a tie-break system. In most matches, if a game is tied 6-6 all in the final set then a player must win by two clear games.

Subject Knowledge Organiser

Tennis – Serve, Forehand, Backhand & Drop Shot

Serve

The tennis serve is the shot selected to begin a point in tennis.

Stage one

Stand in position on the balls of your feet, with slightly bent knees. Face sideways with your left foot forward at a 45° angle to the baseline, right foot parallel to the baseline and left shoulder pointing towards the target. Fully extend your right elbow downward, so the racket is pointing towards the floor but also toward the target. Fully extend your left elbow downwards and hold the ball in the palm of your hand facing up, in line with the 'V' of your racket.

Stage two

Separate your arms in unison and bring them back up in different directions, by extending your right elbow backwards and your left elbow upwards. Transfer your body weight from front to back foot, lifting the toe of your front foot.

Stage three

The racket continues going back and upwards. The left elbow is extended and to throw the ball, released at the highest point, with fingers pointing upwards and arm straight. The ball should be slightly in front of you, thrown about six inches above your outstretched racket. Keep your eyes on the ball.

Stage four

Your right shoulder flexes to move the arm upwards into a throwing position. When the ball reaches the highest point, accelerate the racket head at the ball in a throwing action led by the elbow. Strike the ball as your elbow is fully extended and hit the ball downwards. Transfer your weight from your back to your front foot and rotate the shoulders and hips to point towards the target. The racket head will follow through down to the left hand side of your body.

Forehand

The forehand can be an aggressive and powerful attack shot that is used to return an opponent's shot and, when executed correctly, will manoeuvre an opponent around the court or win a point.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly bent. Face sideways with your shoulder and arm pointing towards the opponent. The racket arm should be at a 45° angle with the face of the racket at head height. Body weight should be on the back foot. Keep your eyes on the ball.

Stage two

When ready to strike the ball, transfer body weight from back to front foot. Rotate your body quickly to face forwards. Drop the racket head lower as you start to accelerate forwards. The forward swing should travel from low to high, aiming to hit the ball at its highest point. Keep your eyes on the ball.

Stage three

Make contact with the ball at around waist height.

Begin to rotate the racket at impact, so the strings point down towards the ground. The racket will follow through, finishing to the left of the shoulder. Return back to ready position for the next shot.

Backhand

The backhand can be an aggressive and powerful attack shot that is used to return an opponent's shot and, when executed correctly, will manoeuvre an opponent around the court or win a point.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly bent. Place your weaker hand on the top of the racket handle, in a chopper forehand grip. Hold racket at waist height. Turn hands and trunk to the side so that the shoulder of your right arm is pointing towards the ball and racket head is pointing behind. Your right elbow should be fully extended and left elbow slightly flexed. Transfer body weight from front to back foot. Keep your eyes on the ball.

Stage two

Rotate your body quickly to face forward, transferring weight from back to front foot. Drop the racket head lower as you start to accelerate forwards. The forward swing should travel from low to high, aiming to hit the ball at its highest point. Keep your eyes on the ball.

Stage three

Make contact with the ball at around waist height. Begin to rotate the racket at impact, so the strings point down towards the ground. The racket will follow through finishing to the right of the shoulder. Return back to ready position for the next shot.

Drop Shot

The drop shot enables players to move their opponent to the front court to either, win a point or create space in the mid and back court to exploit.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly bent. Face sideways with your shoulder and arm pointing towards the opponent. The racket arm should be at a 45° angle with the face of the racket at head height. Body weight should be on the back foot. Keep your eyes on the ball.

Stage two

When ready to strike the ball, transfer body weight from back to front foot. Rotate your body quickly to face forwards. Step forwards as you chop down on the ball. The forward swing should travel from high to low, aiming to slice down on the ball. Keep your eyes on the ball.

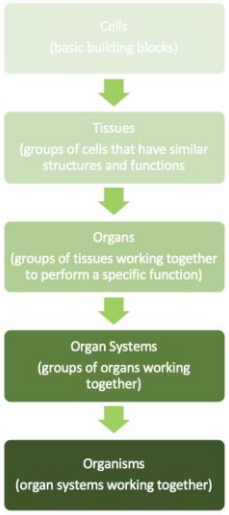
Stage three

Make contact with the ball at around waist height. On impact, have firm wrists to take the power out of your opponent's shot. The racket should almost immediately stop after contact and point towards the ground.

Cells and Organisation 2B – Science – Year 9
Knowledge Organiser

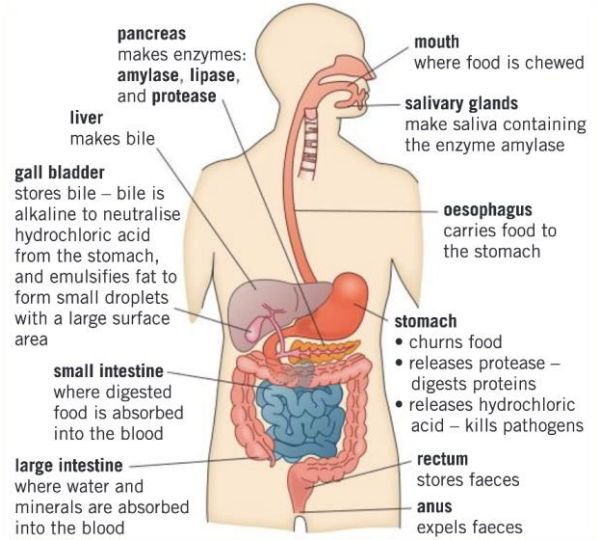
Organisation of living things

There are five levels of organisation in living organisms:



The Digestive System

The role of the digestive system is to break large insoluble molecules into smaller soluble molecules. Here are the organs that make up the digestive system and their roles in digestion.

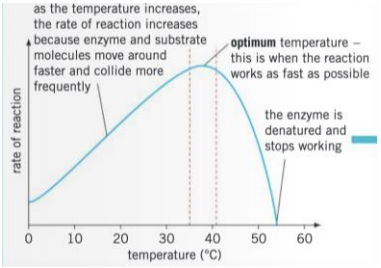


Digestive Enzymes

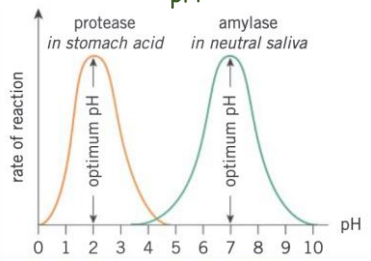
Enzyme	Sites of production	Reaction catalysed
Amylase	salivary glands pancreas small intestine	Starch → glucose (a simple sugar)
Proteases	stomach pancreas small intestine	Proteins → amino acids
Lipases	pancreas small intestine	Lipids → fatty acids and glycerol

Factors affecting enzymes

Temperature



pH



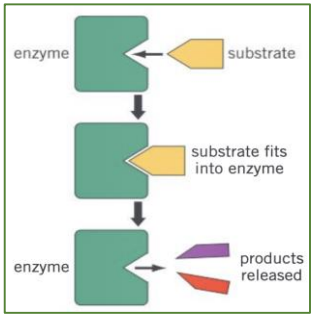
Enzymes

Enzymes are large proteins that catalyse (speed up) reactions. They are not changed in the reactions they catalyse.

Lock and Key Model

This is a simple model of how enzymes work:

1) The enzyme's active site (where the reaction occurs) is a specific shape.
2) The enzyme (the lock) will only catalyse a specific reaction because the substrate (the key) fits into its active site.
3) At the active site, enzymes can break molecules down into smaller ones or bind small molecules together to form larger ones.
4) When the products have been released, the enzyme's active site can accept another substrate molecule.



Denaturation

At extremes of pH or at very high temperatures the shape of an enzyme's active site can change. The substrate can no longer bind to the active site, so the enzyme cannot catalyse the reaction – the enzyme has been denatured.

Metabolism

Metabolism is the sum of all the reactions in the body.

The energy released by respiration in cells is used for the continual enzyme-controlled processes of metabolism that produce new molecules.

Metabolic processes include the synthesis and breakdown of:

Carbohydrates
- synthesis of larger carbohydrates from sugars (starch, glycogen and cellulose)
- breakdown of glucose in respiration to release energy

Proteins
- synthesis of amino acids from glucose and nitrate ions
- amino acids used to form proteins
- excess proteins broken down to form urea for excretion

Lipids
- synthesis of lipids from one molecule of glycerol and three molecules of fatty acid

Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

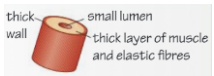
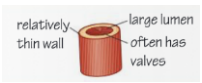
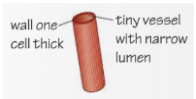
Cells and Organisation 2B – Science – Year 9
Knowledge Organiser

The blood

The blood is a tissue made up of four main components:

1. **Red blood cells** – bind to oxygen and transport it around the body.
2. **Plasma** – transports substances and blood cells around the body.
3. **Platelets** – form blood clots to create barriers to infections.
4. **White blood cells** – part of the immune system to defend the body against pathogens.

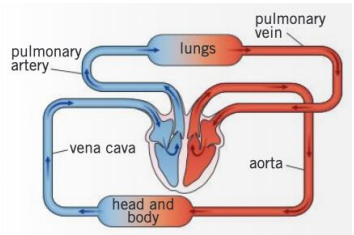
The blood vessels

Vessel	Function	Structure	Diagram
artery	carries blood away from the heart under high pressure	- Thick, muscular and elastic walls - Walls that stretch to withstand high pressure - Small lumen	
vein	carries blood to the heart under low pressure	- Have valves to stop blood flowing the wrong way - Thin walls - Large lumen	
capillary	carries blood to tissues and cells and connects arteries and veins	One cell thick – short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out) - Very narrow lumen	

Double circulatory system

The human circulatory system is described as a double circulatory system because blood passes through the heart twice for every circuit around the body:

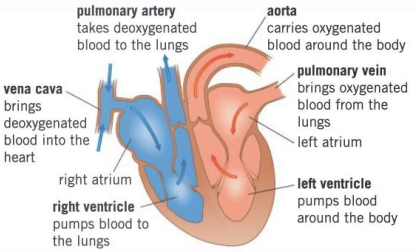
- The right ventricle pumps blood to the lungs where gas exchange takes place
- The left ventricle pumps blood around the rest of the body.



The Heart

The heart is an organ that pumps blood around your body. It is made from **cardiac** muscle tissue, which is supplied with oxygen by the **coronary artery**.

Heart rate is controlled by a group of cells in the right **atrium** that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.



Coronary heart disease

Coronary heart disease (CHD) occurs when the coronary arteries became narrowed by the build-up of layers of fatty material within them.
This reduces the flow of blood, resulting in less oxygen for the heart muscle, which can lead to heart attacks.

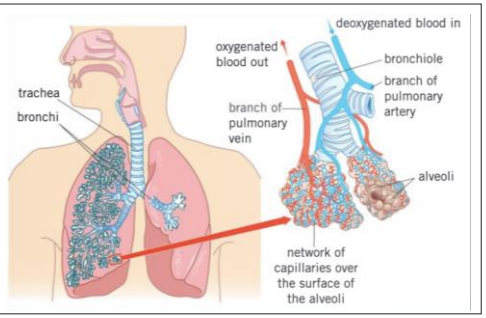
	Description	Advantages	Disadvantages
Stent	Inserted into blocked coronary arteries to keep them open.	- Widens the artery – allows more blood to flow - Less serious surgery	- Can involve major surgery – risk of infection, blood loss and blot clots - Risks from anaesthetic
Statins	Drugs that reduce blood cholesterol levels, slowing down the deposit of fatty material in the arteries	- Effective - No need for surgery - Can prevent CHD from developing	- Possible side effects such as muscle pain, headaches and sickness - Cannot cure CHD, so patient will have to take tablets for many years.
Replacement heart valves	Heart valves that leak or do not open fully, preventing control of blood flow though the heart, can be replaced with biological or mechanical valves.	- Allows control of blood flow through the heart - Long-term cure for faulty heart valves	Risks related to surgery (as with stents)
Transplants	If the heart fails a donor heart, or heart and lungs, can be transplanted. Artificial hearts can be used to keep patients alive whilst waiting for a transplant, or to allow the heart to rest during recovery.	- Long-term cure for the most serious heart conditions - Treats problems that cannot be treated in other ways.	- Transplants may be rejected if the donor is not a match. - Lengthy process - Risks related to surgery (as with stents)

The lungs

When breathing in air moves:

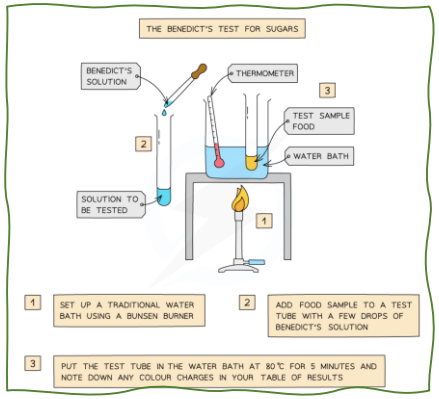
1) Into the body through the mouth and nose
2) Down the **trachea**
3) Into the **bronchi**
4) Into the **bronchioles**
5) Into the **alveoli** (air sacs).

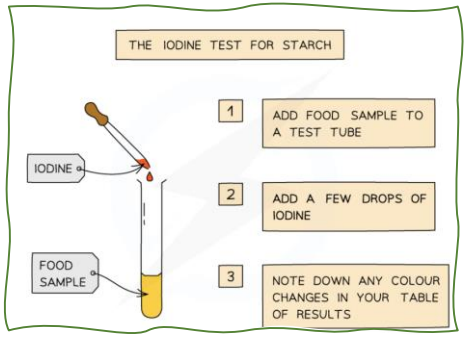
Oxygen then diffuses into the blood in the network of capillaries over the surface of the alveoli.

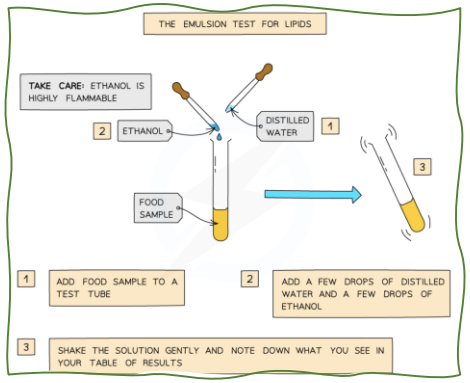


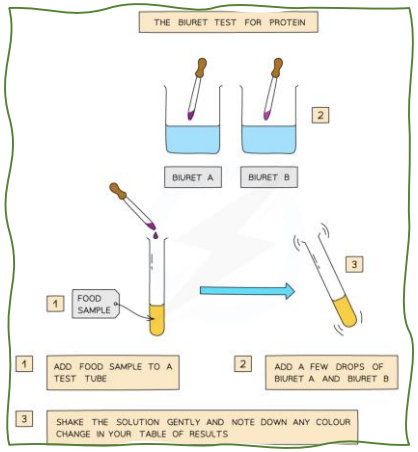
Cells and Organisation 2B – Science – Year 9
Knowledge Organiser

Testing Foods







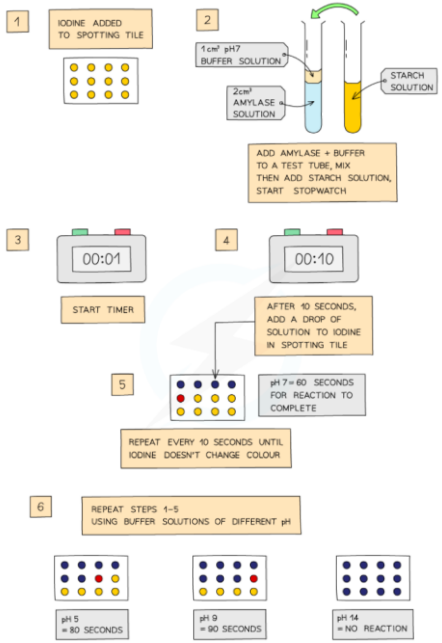


Food Test	Colour of reagent	Positive test result	Negative test result
Iodine for starch	orange–brown	blue–black	orange–brown (no change)
Benedict's for sugar	light blue	green to brick–red	light blue (no change)
Ethanol for lipid	colourless	cloudy emulsion	colourless (no change)
Biuret for protein	blue	lilac–purple	blue (no change)

Investigating Enzymes

Method

- Place single drops of iodine solution in rows on the tile
- Label a test tube with the pH to be tested
- Use the syringe to place 2cm3 of amylase in the test tube
- Add 1cm3 of buffer solution to the test tube using a syringe
- Use another test tube to add 2cm3 of starch solution to the amylase and buffer solution, start the stopwatch whilst mixing using a pipette
- After 10 seconds, use a pipette to place one drop of the mixture on the first drop of iodine, which should turn blue-black
- Wait another 10 seconds and place another drop of the mixture on the second drop of iodine
- Repeat every 10 seconds until iodine solution remains orange-brown
- Repeat experiment at different pH values – the less time the iodine solution takes to remain orange-brown, the quicker all the starch has been digested and so the better the enzyme works at that pH



Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

Cells and Organisation 2B – Science – Year 9
Knowledge Organiser

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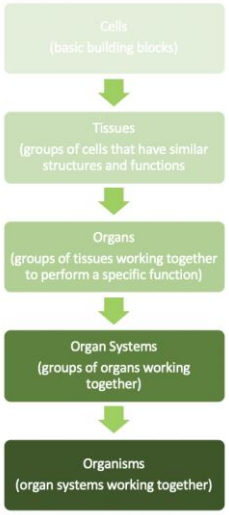

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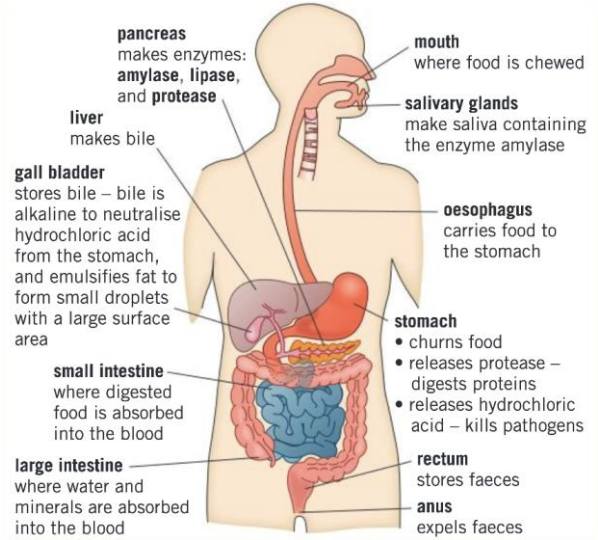

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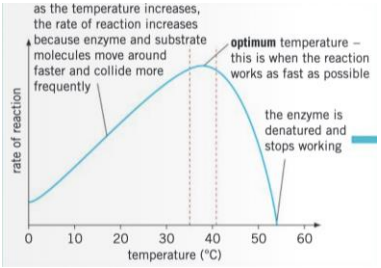
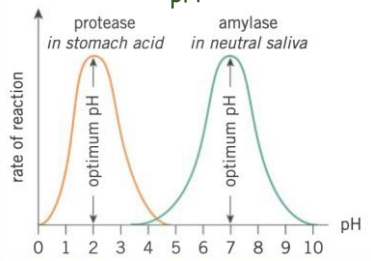
Factors affecting enzymes

Temperature



pH



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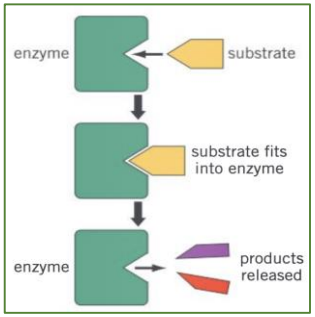

Denaturation

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Metabolism

Metabolism is the sum of all the reactions in the body.

The energy released by respiration in cells is used for the continual enzyme-controlled processes of metabolism that produce new molecules.

Metabolic processes include the synthesis and breakdown of:

Carbohydrates
- synthesis of larger carbohydrates from sugars (starch, glycogen and cellulose)
- breakdown of glucose in respiration to release energy

Proteins
- synthesis of amino acids from glucose and nitrate ions
- amino acids used to form proteins
- excess proteins broken down to form urea for excretion

Lipids
- synthesis of lipids from one molecule of glycerol and three molecules of fatty acid

Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

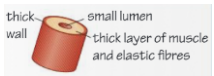
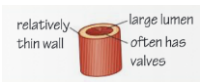
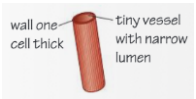
Cells and Organisation 2B – Science – Year 9
Knowledge Organiser

The blood

The blood is a tissue made up of four main components:

1. **Red blood cells** – bind to oxygen and transport it around the body.
2. **Plasma** – transports substances and blood cells around the body.
3. **Platelets** – form blood clots to create barriers to infections.
4. **White blood cells** – part of the immune system to defend the body against pathogens.

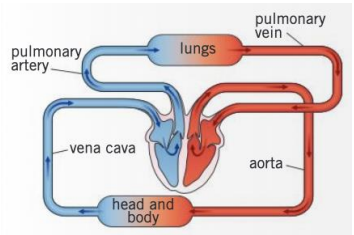
The blood vessels

Vessel	Function	Structure	Diagram
artery	carries blood away from the heart under high pressure	- Thick, muscular and elastic walls - Walls that stretch to withstand high pressure - Small lumen	
vein	carries blood to the heart under low pressure	- Have valves to stop blood flowing the wrong way - Thin walls - Large lumen	
capillary	carries blood to tissues and cells and connects arteries and veins	One cell thick – short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out) - Very narrow lumen	

Double circulatory system

The human circulatory system is described as a double circulatory system because blood passes through the heart twice for every circuit around the body:

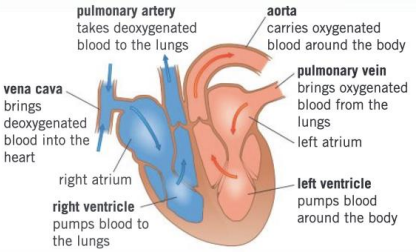
- The right ventricle pumps blood to the lungs where gas exchange takes place
- The left ventricle pumps blood around the rest of the body.



The Heart

The heart is an organ that pumps blood around your body. It is made from **cardiac** muscle tissue, which is supplied with oxygen by the **coronary artery**.

Heart rate is controlled by a group of cells in the right **atrium** that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.



Coronary heart disease

Coronary heart disease (CHD) occurs when the coronary arteries became narrowed by the build-up of layers of fatty material within them.
This reduces the flow of blood, resulting in less oxygen for the heart muscle, which can lead to heart attacks.

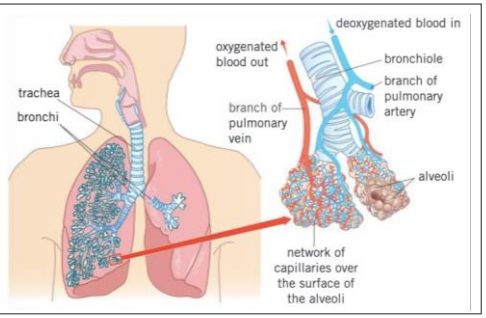
	Description	Advantages	Disadvantages
Stent	Inserted into blocked coronary arteries to keep them open.	- Widens the artery – allows more blood to flow - Less serious surgery	- Can involve major surgery – risk of infection, blood loss and blot clots - Risks from anaesthetic
Statins	Drugs that reduce blood cholesterol levels, slowing down the deposit of fatty material in the arteries	- Effective - No need for surgery - Can prevent CHD from developing	- Possible side effects such as muscle pain, headaches and sickness - Cannot cure CHD, so patient will have to take tablets for many years.
Replacement heart valves	Heart valves that leak or do not open fully, preventing control of blood flow though the heart, can be replaced with biological or mechanical valves.	- Allows control of blood flow through the heart - Long-term cure for faulty heart valves	Risks related to surgery (as with stents)
Transplants	If the heart fails a donor heart, or heart and lungs, can be transplanted. Artificial hearts can be used to keep patients alive whilst waiting for a transplant, or to allow the heart to rest during recovery.	- Long-term cure for the most serious heart conditions - Treats problems that cannot be treated in other ways.	- Transplants may be rejected if the donor is not a match. - Lengthy process - Risks related to surgery (as with stents)

The lungs

When breathing in air moves:

1) Into the body through the mouth and nose
2) Down the **trachea**
3) Into the **bronchi**
4) Into the **bronchioles**
5) Into the **alveoli** (air sacs).

Oxygen then diffuses into the blood in the network of capillaries over the surface of the alveoli.



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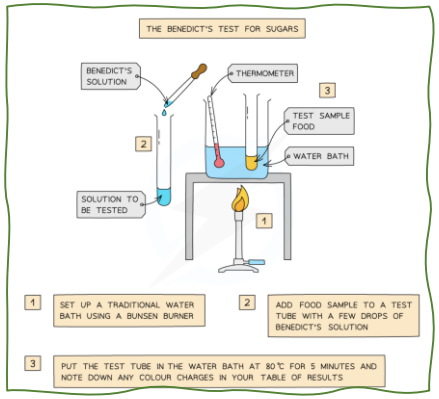
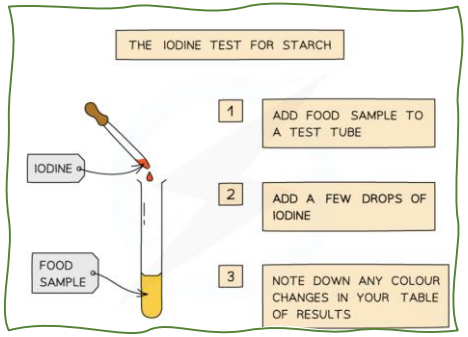
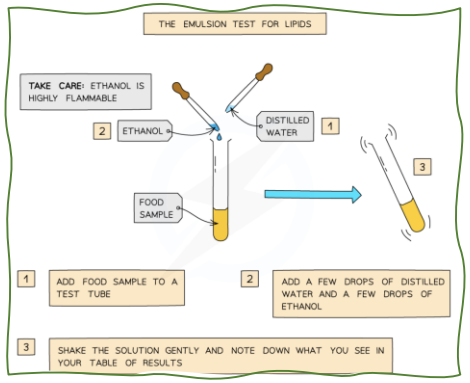
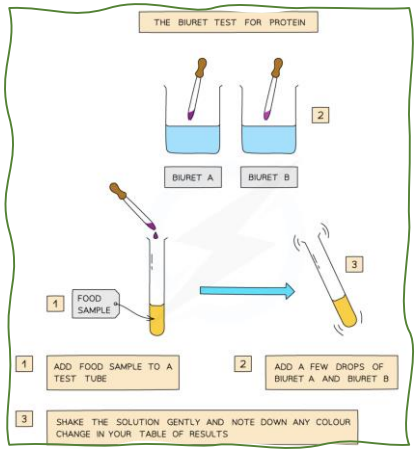
Testing Foods







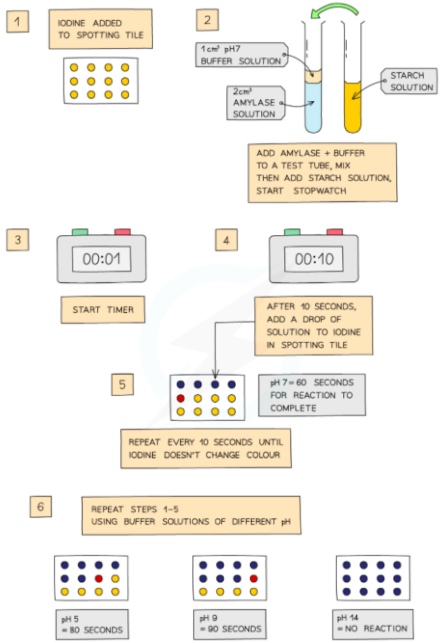


Food Test	Colour of reagent	Positive test result	Negative test result
Iodine for starch	orange–brown	blue–black	orange–brown (no change)
Benedict's for sugar	light blue	green to brick–red	light blue (no change)
Ethanol for lipid	colourless	cloudy emulsion	colourless (no change)
Biuret for protein	blue	lilac–purple	blue (no change)

Investigating Enzymes

Method

- Place single drops of iodine solution in rows on the tile
- Label a test tube with the pH to be tested
- Use the syringe to place 2cm3 of amylase in the test tube
- Add 1cm3 of buffer solution to the test tube using a syringe
- Use another test tube to add 2cm3 of starch solution to the amylase and buffer solution, start the stopwatch whilst mixing using a pipette
- After 10 seconds, use a pipette to place one drop of the mixture on the first drop of iodine, which should turn blue-black
- Wait another 10 seconds and place another drop of the mixture on the second drop of iodine
- Repeat every 10 seconds until iodine solution remains orange-brown
- Repeat experiment at different pH values – the less time the iodine solution takes to remain orange-brown, the quicker all the starch has been digested and so the better the enzyme works at that pH



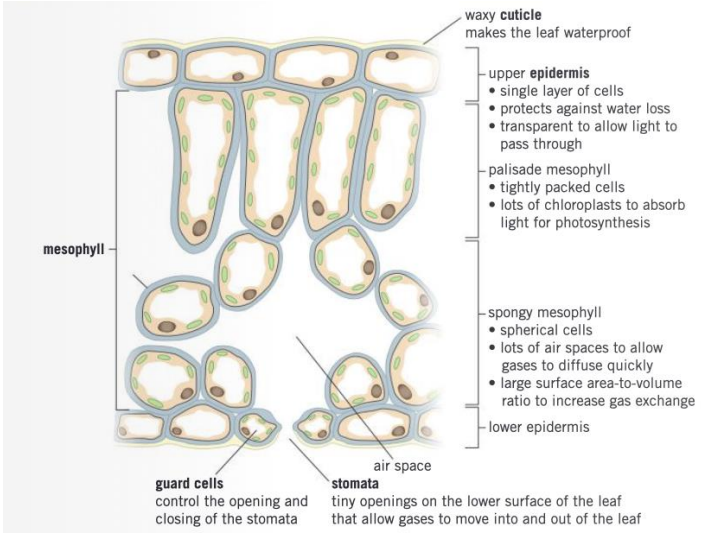
Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

Photosynthesis and cellular respiration
Knowledge Organiser – Science – Year 9

Tissues in a leaf

Leaves are organs because they contain many tissues that work together to perform photosynthesis.



Stomata

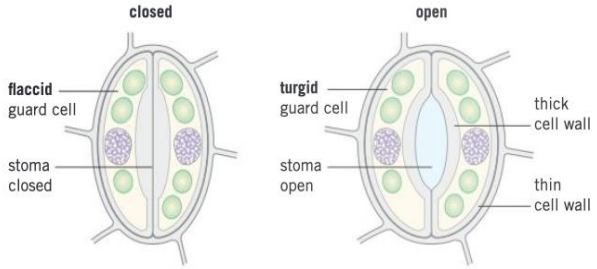
Stomata are tiny openings in the undersides of leaves – this placement reduces water loss through evaporation.

They control gas exchange and water loss from leaves by:

- Allowing diffusions of carbon dioxide into the plant for photosynthesis
- Allowing diffusion of oxygen out of the plant

Guard cells are used to open and close the stomata.

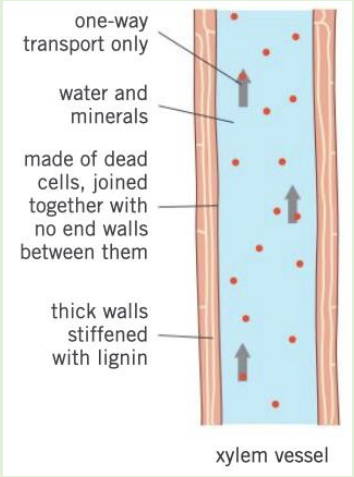
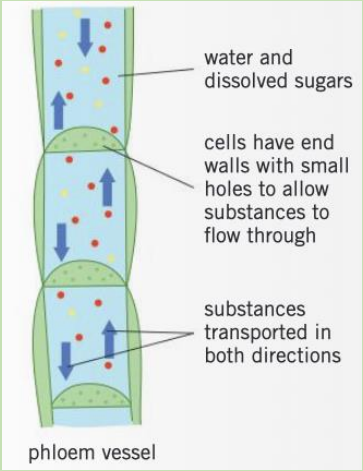
When a plant has plenty of water, the guard cells become turgid. The cell wall on the inner surface is very thick, so it cannot stretch as much as the outer surface. So as the guard cells swell up, they curve away from each other, opening the stoma.



Key terms

cuticle epidermis flaccid mesophyll stomata phloem xylem turgid translocation transpiration guard cell

Transportation in plants

	Transpiration	Translocation
Description	Water is lost through the stomata by evaporation. This pulls water up from the roots through the xylem and is called transpiration. The constant movement of water up the plant is called the transpiration stream.	The movement of dissolved sugars from the leaves to the rest of the plant through the phloem.
Importance	Provides water to cells to keep them turgid. Provides water to cells for photosynthesis Transports mineral ions to leaves.	Moves dissolved sugars made during photosynthesis to other parts of the plant. This allows for respiration, growth and glucose storage.
Specialised Tissues		

Factors affecting the rate of transpiration

Factor	Effect on transpiration	Because…
temperature	higher temperatures increase the rate of transpiration	water evaporates faster at higher temperatures
humidity	lower humidity increases the rate of transpiration	the drier the air the steeper the concentration gradient of water molecules between the air and the leaf
wind speed	more wind increases the rate of transpiration	wind removes the water vapour quickly, maintaining a steeper concentration gradient
light intensity	Higher light intensity increases the rate of transpiration	stomata open wider to let more carbo dioxide into the leaf for photosynthesis

Photosynthesis
Knowledge Organiser – Science – Year 9

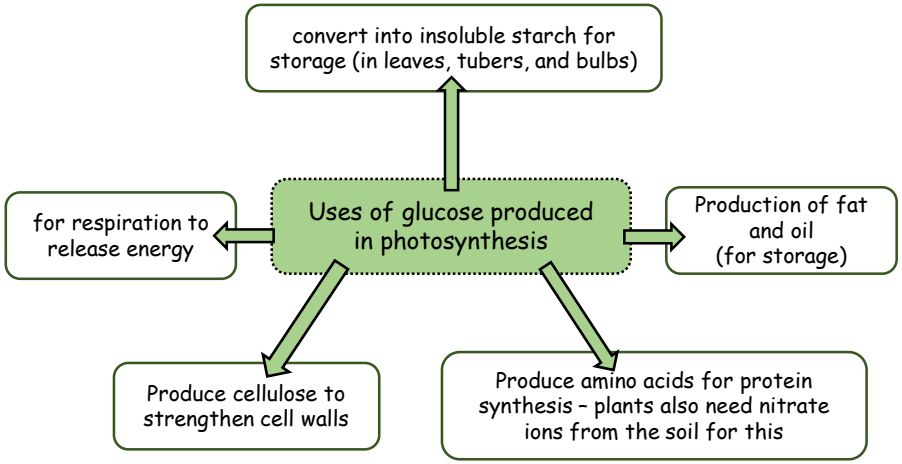
Photosynthesis reaction

Photosynthesis is a chemical reaction in which energy is transferred from the environment as light from the Sun to the leaves of a plant. This is an endothermic reaction.

Chlorophyll, the green pigment in chloroplasts in the leaves, absorbs the light energy. Leaves are well adapted to increase the rate of photosynthesis when needed.

carbon dioxide + water $\xrightarrow{\text{light}}$ **glucose** + oxygen

$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$



Inverse square law

As the distance of a light source from a plant increases, the light intensity decreases – this is called an inverse relationship. This relationship is not linear, as light intensity varies in inverse proportion to the square of the distance:

$$\text{light intensity} \propto \frac{1}{\text{distance}^2}$$

For example, if you double the distance between a light source and a plant, light intensity falls by three quarters.

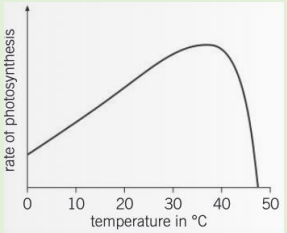
Rate of photosynthesis

A limiting factor is anything that limits the rate of a reaction when it is in short supply.

The limiting factors for photosynthesis are
- Temperature
- Carbon dioxide concentration
- Light intensity
- Amount of chlorophyll

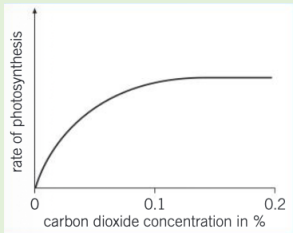
Less chlorophyll in the leaves reduces the rate of photosynthesis. More chlorophyll may be produced by plants in well-lit areas to increase the photosynthesis rate.

Limiting factors and photosynthesis rate



At low temperatures the rate of photosynthesis is low because the reactant molecules have less kinetic energy.

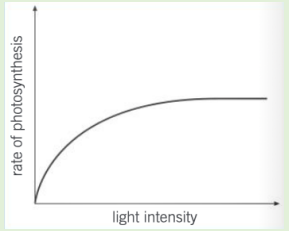
Photosynthesis is an enzyme-controlled reaction, so at high temperatures the enzymes are denatured and the rate quickly decreases.



Carbon dioxide is used up in photosynthesis, so increasing carbon dioxide concentration increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Carbon dioxide is often the limiting factor for photosynthesis.



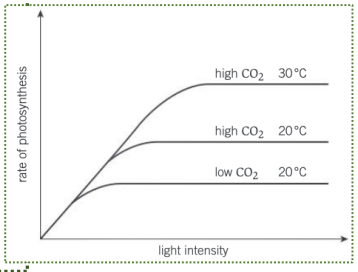
Light energy is needed for photosynthesis, so increasing light intensity increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Photosynthesis will stop if there is little or no light.

Interaction of limiting factors

Limiting factors often interact, and any one may be limiting photosynthesis.
For example, on the graph the lowest curve has both carbon dioxide and temperature limiting photosynthesis. Temperature is limiting for the middle curve, and the highest curve shows photosynthesis rate increases when both temperature and carbon dioxide are increased until another factor becomes limiting.



Greenhouse economics

Commercial greenhouses control limiting factors to get the highest possible rates of photosynthesis so they can grow plants as quickly as possible or produce the highest yields, whilst making a profit.

Key terms

carbon dioxide | chlorophyll | chloroplast | endothermic | glucose | inverse square law | limiting factor | photosynthesis

Investigating Photosynthesis

Knowledge Organiser - Science – Year 9

Aim

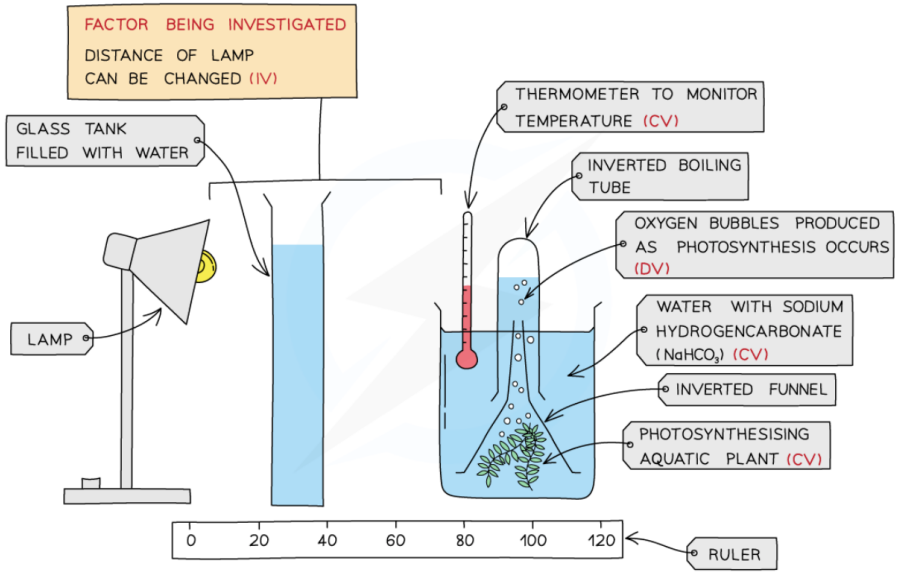
Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed

Variables

Dependent – The number of bubbles / volume of oxygen produced
Independent – Distance between light source and plant / light intensity.
Control – Temperature (can be controlled using and LED bulb or a heat shield, carbon dioxide concentration, type of plant, length of plant, mass of plant.

Method

Place a piece of pondweed (Elodea or Cabomba are often used), into a beaker of water
Use a light a set distance from the plant
Record the number of bubbles observed in three minutes
Repeat steps for different distances



Improvements

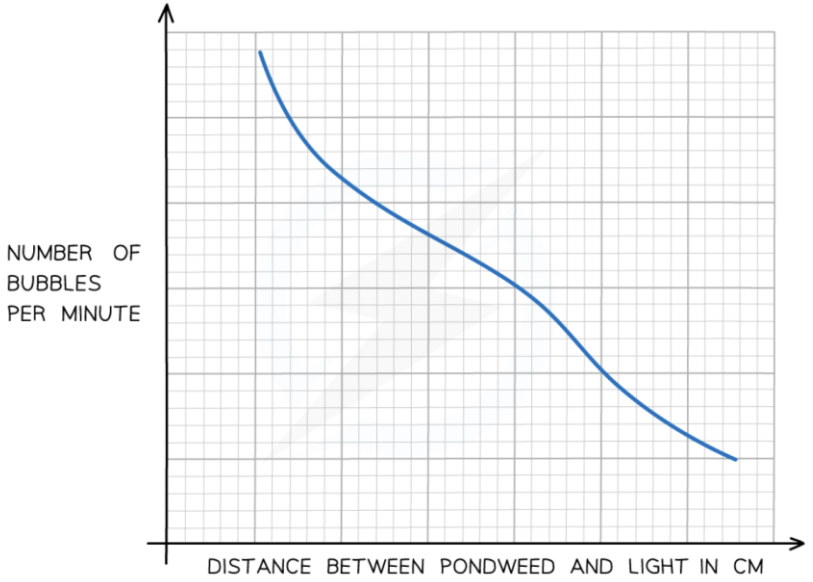
- Use a gas syringe to collect the volume of gas produced
- Repeat the experiment at least twice for each distance and calculate the mean number of bubbles
- Use of a glass tank between lamp and plant to prevent heating of the plant, or using an LED bulb that releases very little heat energy

Changing the Independent Variable

- To investigate the impact of carbon dioxide concentration the concentration of sodium hydrogen carbonate can be changed.
- Use different temperatures of sodium hydrogen carbonate solution.

Results

- As the distance between the plant and light source increases the number of bubbles decreases. This shows that the rate of photosynthesis decreases at lower light intensities.



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carbon dioxide | chlorophyll | chloroplast | endothermic | glucose | inverse square law | limiting factor | photosynthesis

Respiration
Knowledge Organiser – Science – Year 9

Cellular respiration

Cellular respiration is an exothermic reaction that occurs continuously in the mitochondria of living cells to supply the cells with energy.

The energy released during respiration is needed for all living processes, including

- chemical reactions to build larger molecules, for example, making proteins from amino acids
- muscle contraction for movement
- keeping warm

Respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen).

Type of respiration	Oxygen required?	Relative amount of energy transferred
aerobic	✔	Complete **oxidation** of glucose – large amount of energy is released
anaerobic	✘	Incomplete oxidation of glucose – much less energy is released per glucose molecule than in aerobic respiration

Aerobic respiration

glucose + oxygen → carbon dioxide + water

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Anaerobic respiration in muscles

glucose → lactic acid

$C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$

Fermentation

Anaerobic respiration in plant and yeast cells is represented by the equation:

glucose → ethanol + carbon dioxide (energy transferred to the environment)

Anaerobic respiration in yeast cells is called fermentation.

The products of fermentation are important in the manufacturing of bread and alcoholic drinks.

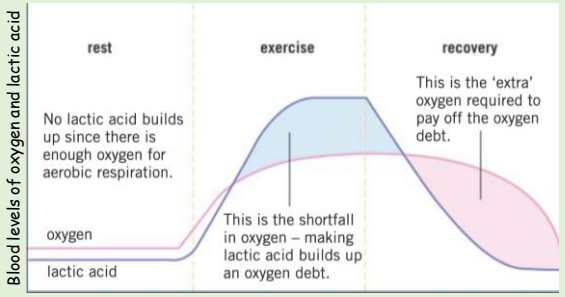
Response to exercise

During exercise the human body reacts to the increased demand for energy.

To supply the muscles with more oxygenated blood, heart rate, breathing rate, and breath volume all increase.

If insufficient oxygen is supplied, anaerobic respiration takes place instead, leading to the build up of lactic acid.

During long periods of vigorous exercise, muscles become fatigued and stop contracting efficiently.



After exercise, the lactic acid accumulated during anaerobic respiration needs to be removed. Oxygen debt is the amount of oxygen needed to react with the lactic acid to remove it from cells.

Removal of lactic acid

Lactic acid in the muscles

⇩

Transported to the liver in the blood

⇩

Lactic acid is converted back to glucose

Key terms

aerobic anaerobic exothermic fermentation lactic acid metabolism mitochondria oxidation oxygen debt respiration

Photosynthesis and cellular respiration
Knowledge Organiser – Science – Year 9

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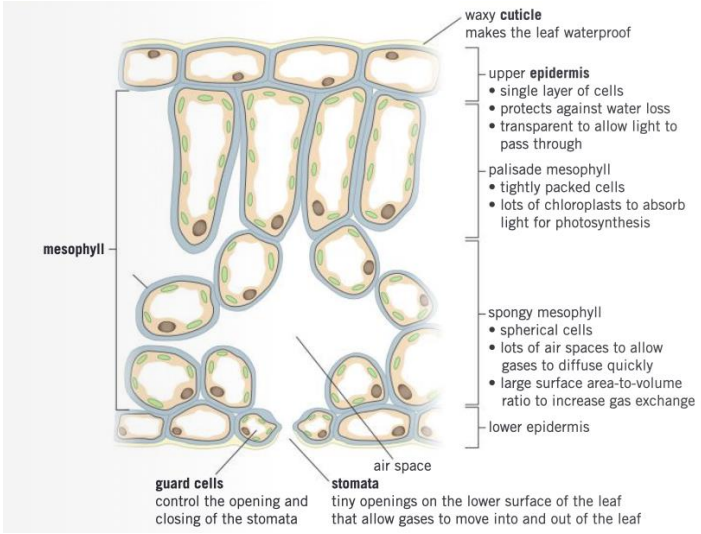

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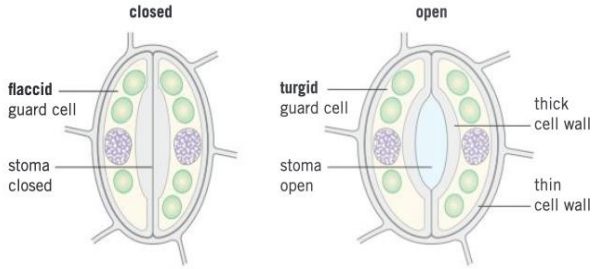

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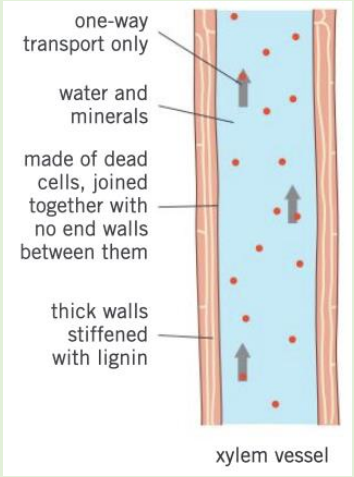
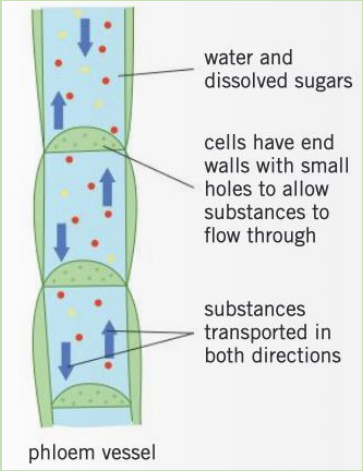
Specialised Tissues		

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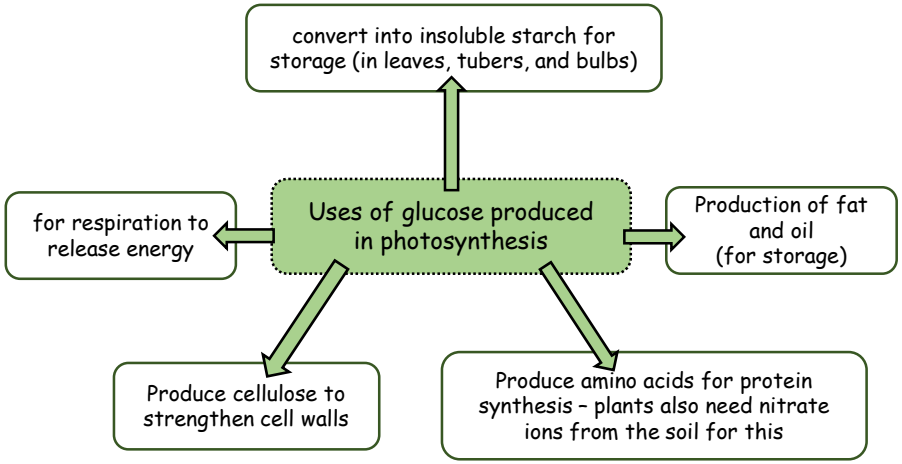

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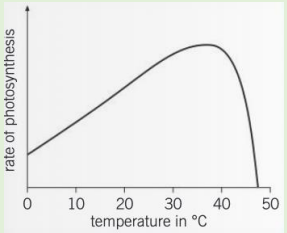

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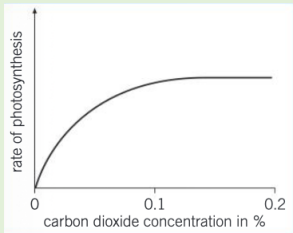
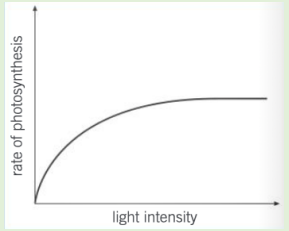


Carbon dioxide is used up in photosynthesis, so increasing carbon dioxide concentration increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Carbon dioxide is often the limiting factor for photosynthesis.



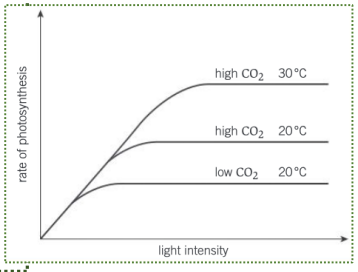
Light energy is needed for photosynthesis, so increasing light intensity increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Photosynthesis will stop if there is little or no light.

Interaction of limiting factors

Limiting factors often interact, and any one may be limiting photosynthesis.
For example, on the graph the lowest curve has both carbon dioxide and temperature limiting photosynthesis. Temperature is limiting for the middle curve, and the highest curve shows photosynthesis rate increases when both temperature and carbon dioxide are increased until another factor becomes limiting.



Greenhouse economics

Commercial greenhouses control limiting factors to get the highest possible rates of photosynthesis so they can grow plants as quickly as possible or produce the highest yields, whilst making a profit.

Key terms

carbon dioxide | chlorophyll | chloroplast | endothermic | glucose | inverse square law | limiting factor | photosynthesis

Investigating Photosynthesis

Knowledge Organiser - Science – Year 9

Aim

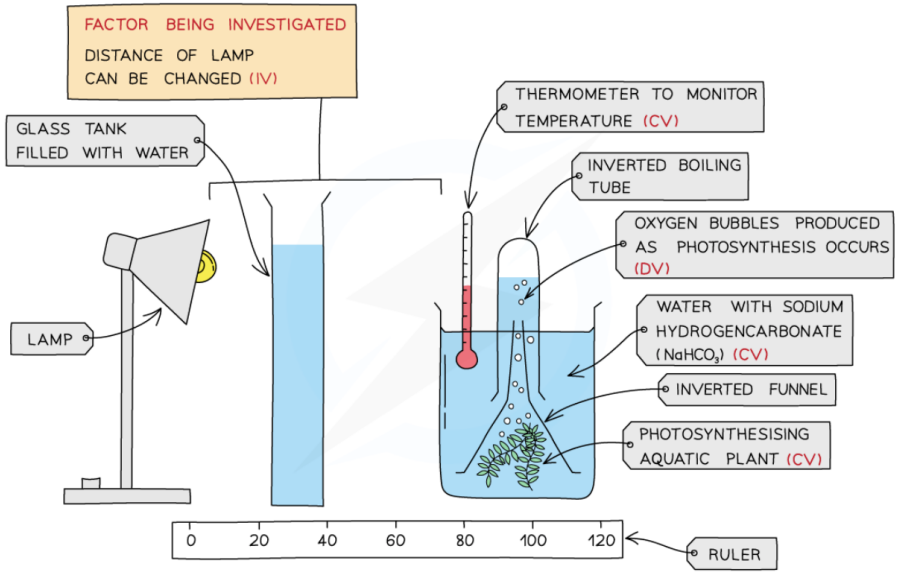
Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed

Variables

Dependent – The number of bubbles / volume of oxygen produced
Independent – Distance between light source and plant / light intensity.
Control – Temperature (can be controlled using and LED bulb or a heat shield, carbon dioxide concentration, type of plant, length of plant, mass of plant.

Method

Place a piece of pondweed (Elodea or Cabomba are often used), into a beaker of water
Use a light a set distance from the plant
Record the number of bubbles observed in three minutes
Repeat steps for different distances



Improvements

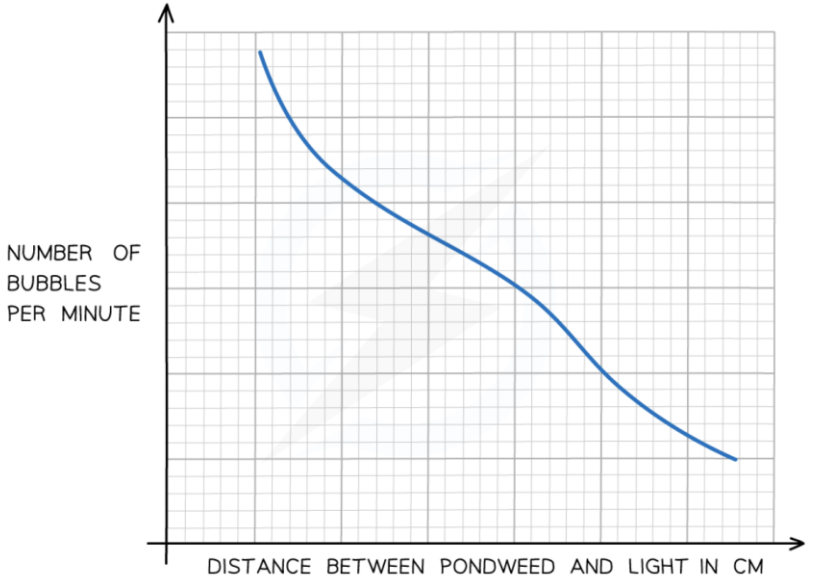
- Use a gas syringe to collect the volume of gas produced
- Repeat the experiment at least twice for each distance and calculate the mean number of bubbles
- Use of a glass tank between lamp and plant to prevent heating of the plant, or using an LED bulb that releases very little heat energy

Changing the Independent Variable

- To investigate the impact of carbon dioxide concentration the concentration of sodium hydrogen carbonate can be changed.
- Use different temperatures of sodium hydrogen carbonate solution.

Results

- As the distance between the plant and light source increases the number of bubbles decreases. This shows that the rate of photosynthesis decreases at lower light intensities.



Key terms

carbon dioxide | chlorophyll | chloroplast | endothermic | glucose | inverse square law | limiting factor | photosynthesis

Respiration
Knowledge Organiser – Science – Year 9

Cellular respiration

Cellular respiration is an exothermic reaction that occurs continuously in the mitochondria of living cells to supply the cells with energy.

The energy released during respiration is needed for all living processes, including

- chemical reactions to build larger molecules, for example, making proteins from amino acids
- muscle contraction for movement
- keeping warm

Respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen).

Type of respiration	Oxygen required?	Relative amount of energy transferred
aerobic	✔	Complete **oxidation** of glucose – large amount of energy is released
anaerobic	✘	Incomplete oxidation of glucose – much less energy is released per glucose molecule than in aerobic respiration

Aerobic respiration

glucose + oxygen → carbon dioxide + water

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Anaerobic respiration in muscles

glucose → lactic acid

$C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$

Fermentation

Anaerobic respiration in plant and yeast cells is represented by the equation:

glucose → ethanol + carbon dioxide (energy transferred to the environment)

Anaerobic respiration in yeast cells is called fermentation.

The products of fermentation are important in the manufacturing of bread and alcoholic drinks.

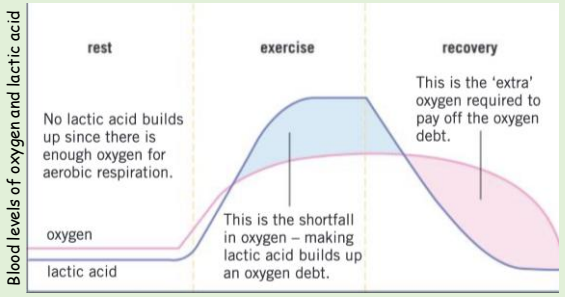
Response to exercise

During exercise the human body reacts to the increased demand for energy.

To supply the muscles with more oxygenated blood, heart rate, breathing rate, and breath volume all increase.

If insufficient oxygen is supplied, anaerobic respiration takes place instead, leading to the build up of lactic acid.

During long periods of vigorous exercise, muscles become fatigued and stop contracting efficiently.



After exercise, the lactic acid accumulated during anaerobic respiration needs to be removed. Oxygen debt is the amount of oxygen needed to react with the lactic acid to remove it from cells.

Removal of lactic acid

Lactic acid in the muscles

⇩

Transported to the liver in the blood

⇩

Lactic acid is converted back to glucose

Key terms

aerobic anaerobic exothermic fermentation lactic acid metabolism mitochondria oxidation oxygen debt respiration

Chemical Reactions 2

Knowledge Organiser - Science – Year 9

Reactivity series

Reaction with water	Reaction with acid	Reactivity series		Extraction method
		Metal	Reactivity	
Fizzes, gives off hydrogen gas	Explodes	Potassium	High reactivity	Electrolysis
		Sodium		
		Lithium		
	Fizzes, gives off hydrogen gas	Calcium		
Reacts very slowly		Magnesium		
		Aluminium (carbon)		
		Zinc		Reduction with carbon
		Iron		
No reaction	Reacts slowly with warm acid	Tin		
		Lead (hydrogen)		
	No reaction	Copper		
		Silver		Mined from Earth's crust
		Gold	Low reactivity	

Displacement reactions

In a **displacement reaction**, the **more** reactive element takes the place of the **less reactive** element.

For example, **Potassium is more reactive than calcium**, so potassium displaces the calcium in calcium chloride

Calcium chloride + Potassium → Potassium chloride + Calcium

$$CaCl_2 + 2K \rightarrow 2KCl + Ca$$

Acids and alkalis

Acids are compounds that release H^+ ions when in an aqueous form. The three acids are sulfuric acid, nitric acid and hydrochloric acid. They have a pH below 7.

Alkalis are compounds that release OH^- when in aqueous form. They have a pH above 7.

Neutral solutions have a pH of 7.

The pH scale is a measure of how acidic or alkaline a substance is. It is a scale from 1 to 14.

Indicators, such as **universal indicator or a pH probe** can be used to determine the pH of a solution.

When an acid and alkali react, **neutralisation can occur**.

Acid + alkali → metal salt + water

Reactions of acids

Reactions of acids with metals

Acids react with **metals** to form metal salts and **hydrogen gas**

Reaction of acids with metal oxides and hydroxides

Acids react with **metal hydroxides/oxides** to form metal salts and **water**

Reaction of acids with metal carbonates

Acids react with **metal carbonates** to form metal salts, **water** and **carbon dioxide**

Metal extraction

Metals that are **more reactive** than carbon are extracted using a process called **electrolysis**.

Metals that are **less reactive** than carbon are extracted by reduction with carbon

Metals that are **unreactive** are found as pure metals and are mined from the Earth's crust.

Salts

Hydrochloric acid forms a **chloride salt** e.g. Sodium chloride (NaCl)

Sulfuric acid forms a **sulfate salt** e.g. Sodium sulfate (Na_2SO_4)

Nitric acid forms a **nitrate salt** e.g sodium nitrate ($NaNO_3$)

Key terms

Acid alkali base crystallisation displacement metal neutralisation ore oxidation pH reactivity

Earth and atmosphere 2
Knowledge Organiser

The Earth's changing atmosphere

Period	Proportions of gases	Evidence
~ 4.6 billion years to 2.7 billion years ago	CO_2 – Released by volcanoes. Biggest component of the atmosphere. O_2 – Very little oxygen present N_2 – Released by volcanoes H_2O – Released by volcanoes. Existed as vapour -Earth too hot. Ammonia and methane may also have been present.	Very limited evidence. Comparisons made to other planets with an atmosphere rich in CO_2
~ 2.7 billion years to 200 million years ago	CO_2 – Begins to reduce. • Water condenses to form oceans, which CO_2 dissolves in. • Algae start to photosynthesise using CO_2. • CO_2 precipitates in the oceans as carbonates to form rocks • CO_2 taken in by plants and animals. Trapped as fossil fuels for millions of years O_2 – Increases due to evolving plants releasing during photosynthesis N_2 – Continues to increase through volcanic release H_2O – Decreases as the Earth cools, condensing to form seas and oceans	Still limited. Look at processes such as photo-synthesis to make theories.
~ 200 million years ago until the present day	CO_2 – about 0.04%. O_2 – about 21% N_2 – about 78% H_2O – Very little overall. Collects in clouds. A small proportion of other gases	Ice core evidence. Global measure-ments.

Pollutants

Pollutant	Origin	Effect
CO	Incomplete combustion	Colour/odourless toxic gas
Particulates	Incomplete combustion	**Global dimming**
SO_2	Sulfur impurities	**Acid rain**/respiratory issues
Nitrogen oxides	Heating of nitrogen in air	**Acid rain**/respiratory issues

Key terms

Acid rain **atmosphere** **carbon footprint** **pollutant** **climate change** **global warming** **greenhouse gas** **water**

Greenhouse effect and global warming

Greenhouse gases such as **carbon dioxide**, **methane** and **water vapour** absorb radiation from the sun and maintain the temperature on Earth. During the day, the Sun warms the earth's surface, whilst at night the earth cools and releases the heat back into the atmosphere. Some of the heat becomes trapped – this is the **Greenhouse effect**. In the last 200 years, human activities have led to an increase in the release of greenhouse gases through burning of fossil duels and deforestation.

Climate change

Global warming leads to changes in the weather patterns across the globe. This is known as global climate change. Climate change has numerous effects on the planet: Rising sea levels, changes in the amount of rainfall, polar ice caps melting and extreme weather events.

Earth's Resources

We use Earth's resources to provide us with warmth, fuel, shelter, food, and transport. These can be **natural** (timber, fuel) or **synthetic** resources made by scientists. Resources can also be categorised as **finite** or **renewable**. Finite resources such as fossil fuels will run out. Wood is a renewable resource, as trees can be grown to replace any that are cut down.

Water

Type	What is in it? How is potable water made?
Pure	Just water molecules.
Potable	Water molecules, low level of salts, safe levels of harmful microbes
Salty	Water molecules, high levels of salts, high levels of harmful microbes. **Desalination** is the process to turn salt water into potable water, either through **distillation** or **reverse osmosis**.
Fresh	Water molecules, low level of salts, often high levels of harmful microbes. To produce potable water, fresh water is passed through filters to remove larger objects before being **sterilised** to kill microbes with ozone, chlorine or UV light.

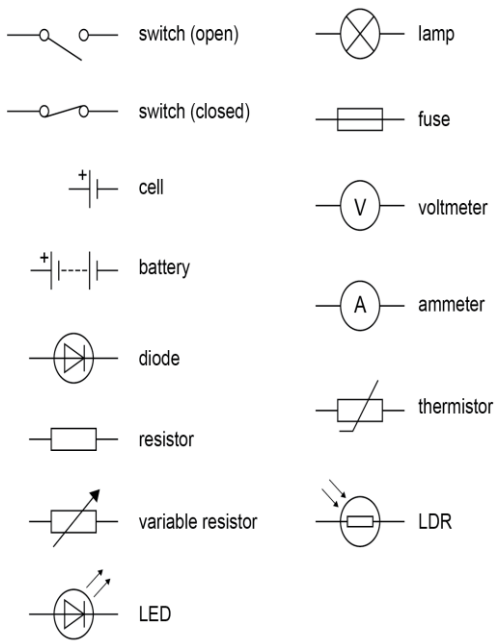
Resources

Many materials are made from **natural resources** that have **limited supplies**. When finished with a product, it can be: added to landfill, incinerated, **reused** (used again for a similar purpose) or **recycled** (conserves resources and requires less energy than creating new materials).

Year 9 Physics current and static electricity 2

Key vocabulary:
Potential difference – the work done in moving one coulomb of charge from one point in the circuit to another.
Current – a flow of electrons.
Charge – the rate of flow of electrons.
Resistance – the opposing of a current.
Power – how much energy is transferred (work done) in a certain amount of time.
Series – all components in a circuit follow on directly from each other.
Parallel – the current has alternate pathways to possibly take in a circuit.
Free (or delocalised) electrons – electrons that are free to move through the conductor (eg metal).
Key Units:
Current–Amps **(A)**
Potential difference–volts **(V)**
Charge-coulombs **(C)**
Resistance-ohms **(Ω)**
Power-watts **(W)**
Energy transferred-joules **(J)**
Energy transferred is the same as work done.

Circuit symbols



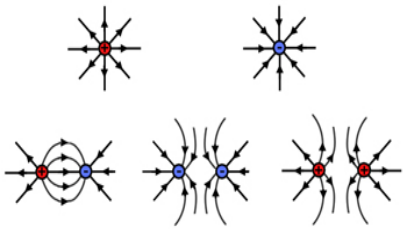
Electric current, voltage and resistance

Electrical current is the flow of charge, this charge comes from the negative electrons in the metal wire. These negative electrons move when there is a battery or cell is added. They can transfer energy as they move.

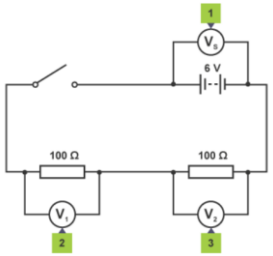
Resistance – caused by the collision between delocalised electrons and metal ions. The more collisions the greater the resistance and the smaller the current that flows.

Electric fields

All charged objects have an **electric field** around them, which shows how they will interact with other charged particles.
Electric fields will always run from positive to negative – shown by arrows. The greater the number of arrows, the stronger the electric field.
Like charges – the field lines show a gap in the electric field.
Unlike charges – filed lines move from + to -.

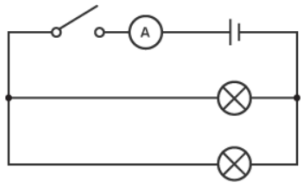


Series circuits – all components follow on directly from each other. The current only has one pathway to follow. The current is the same all the way around a series circuit. The potential difference is shared between the components in the circuit.



The series circuit has voltmeters in it. The voltmeter is used to measure potential difference and is in parallel which means it's across the component.

Parallel circuit – the electricity has more than one pathway to take. It has branches. The current will take the path of least resistance.
The current will be shared between the branches in the circuit. The potential difference will be the same across each component in the circuit.



The parallel circuit has an ammeter in it. The ammeter is used to measure current and is in series with the component, which means in the loop.

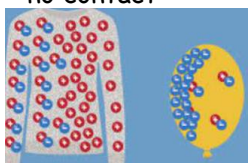
Static

Static is caused because of friction between two insulators resulting in the transfer of electrons.

Object gains electrons – object is negatively charged.
Object loses electrons – object is positively charged.

If there is a build-up of charge and the potential difference between two objects is great enough, a spark will 'jump' – this is a discharge of electricity.

The objects do not have to be touching – no contact needed for attraction / repulsion.



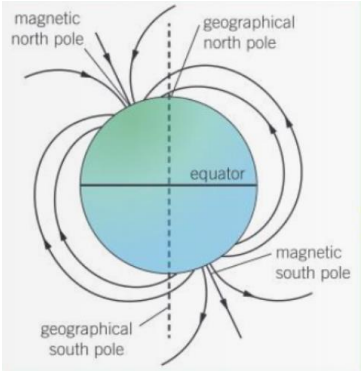
Knowledge Organiser Magnetism 2

Keywords

Attraction- a force that pulling together
Electromagnet- an insulated wire wrapped around an iron bar that becomes magnetic when there is a current in the wire.
Induced magnet- magnetisation of an unmagnetised magnetic material by placing it in a magnetic field.
Magnetic field- The space around a magnet or current- carrying wire.
Permanent magnet- creates its own magnetic field.
Repulsion- a force pushing apart
Solenoid- a long coil of wire that produces a magnetic field in and around the coil when there is a current in a coil.

Magnetic fields continued

If a plotting compass is not near a magnet, a compass will line up with the Earth's magnetic field, providing evidence that the Earth's core I magnetic.
As a compass points towards a south pole, the magnetic pole near the Earth's geographical North pole is actually a south pole.

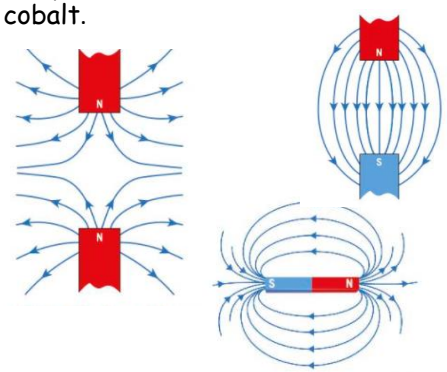


Magnets

Magnets have a north and a south pole. When two magnets are brought close together, they exert a non-contact force on each other.
If the poles are the same (N and N or S and S) they will repel each other.

If the poles are different (N and S) they will attract each other.

There are four magnetic materials. They are iron, steel, nickel and cobalt.

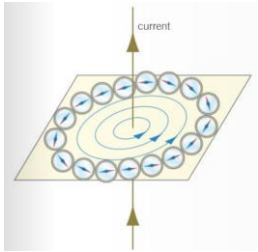


Electromagnets

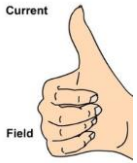
If an electric current flows through a wire (or other conductor), it will produce a magnetic field around the wire. The field strength increases:

- With a greater current
- Close to the wire.

Reversing the direction reverses the direction of the field.



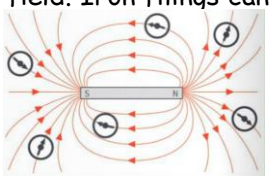
Right hand grip rule

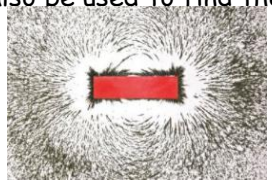


Magnetic fields

A magnetic field is the region around a magnet where another magnet or magnetic material will experience a force due to the magnet.
A magnetic field can be represented by magnetic field lines. They show the direction of the magnetic field. Field lines always point from the north pole into the south pole. The closer the field lines are together the stronger the magnetic field.

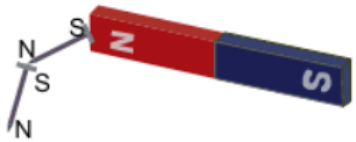
A plotting compass has a small bar magnet and can be used to plot the magnetic field lines around a magnet. When drawing field line ALWAYS include an arrow to show the direction of the magnetic field. Iron filings can also be used to find the magnetic field.





Induced and permanent magnets

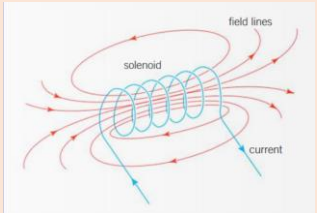
A permanent magnet produces its own magnetic field which is always there. An induced magnet is an object that becomes magnetic when it is placed in a magnetic field. The force between an induced magnet is always attraction (even if you change ends it will still attract).



Solenoids

A solenoid is a cylindrical coil of wire.
Bending a current- carrying wire into a solenoid increases the strength of the magnetic field produced.
The shape of the magnetic field around a solenoid is similar to that of a bar magnet. Inside the solenoid the magnetic field is strong and uniform.

If you place an iron core inside a solenoid you increase the strength. This is now an electromagnet.



- ✓ Electromagnets can be turned on and off.
- ✓ The strength can be adjusted by adjusting the current