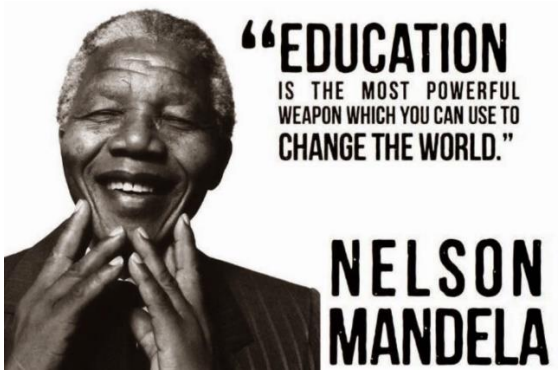
Westhoughton High School

Year 9 – Summer Term - Knowledge Organisers



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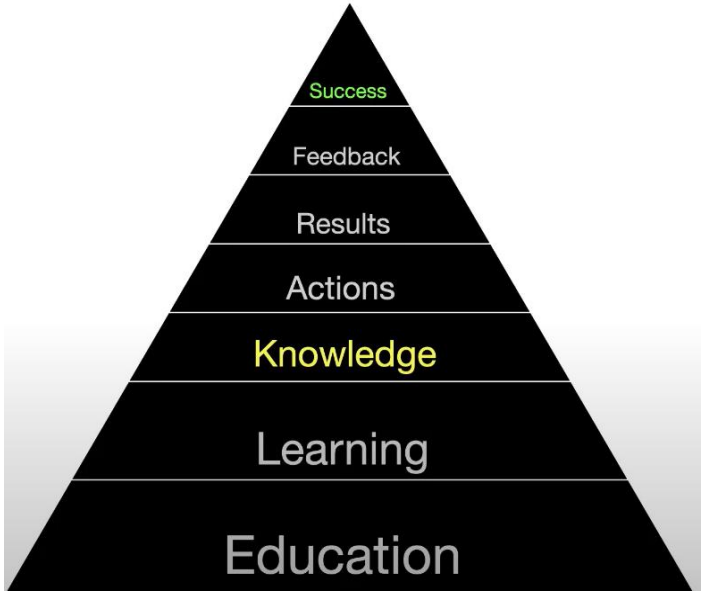
Form Group & Room: .....

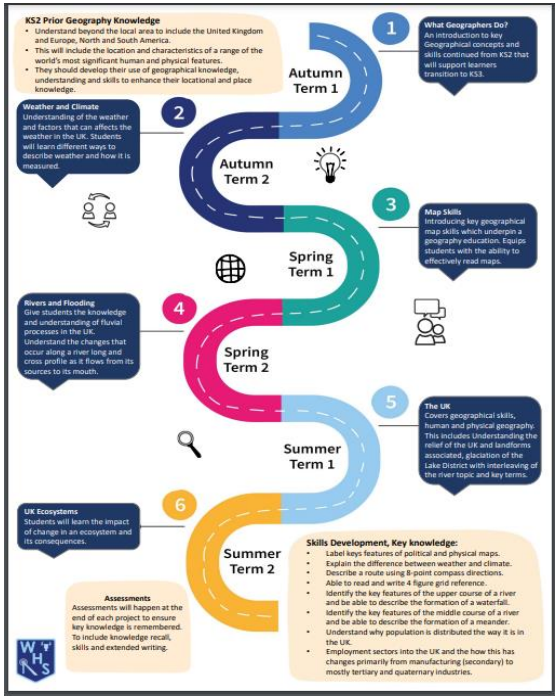
Form Tutor: .....



the "Knowledge" pyramid

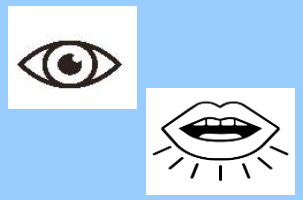
Introduction

The curriculum in each of your subjects at WHS has been carefully planned to help you learn new things, building upon what you know and preparing you for learning in the future. This is mapped out as a learning journey which each teacher will share with you, so you understand how your learning fits together as a whole. Each subject's roadmap is here https://www.westhoughton-high.org/subjects/.

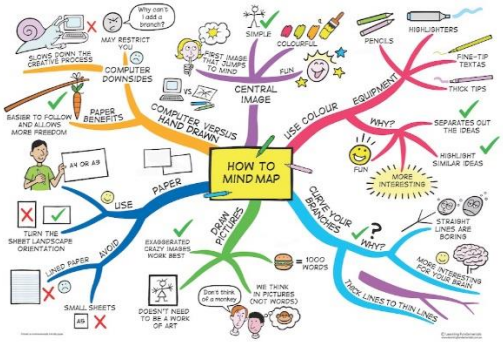
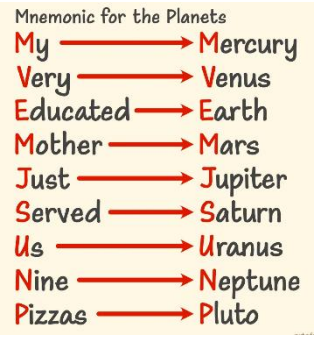
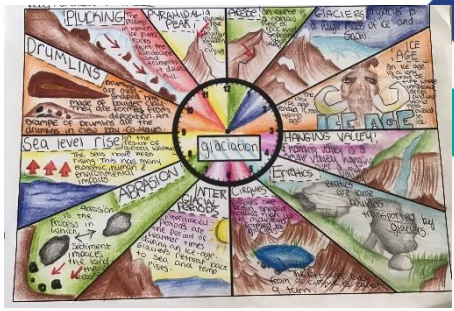


This booklet contains knowledge organisers for the topics you will study in each subject this term. These give an overview of the essential knowledge that you MUST remember to be as successful as possible in Year 8 and as you move through each year of school. Your teachers will expect you to use them during lessons to find out about what you are going to be learning in a new topic, to retrieve information during a connect activity – connecting your brain to what you are going to learn that lesson and to test yourself or others to recall knowledge. You will also use them to complete home learning activities, to regularly revise from so that you begin to remember more knowledge over time, to discuss what you have been learning with family and friends and to catch up on any learning you might have missed due to absence. You must bring your booklet to school every day and keep it safe at the end of each term as you will continue to use it to support ongoing revision.

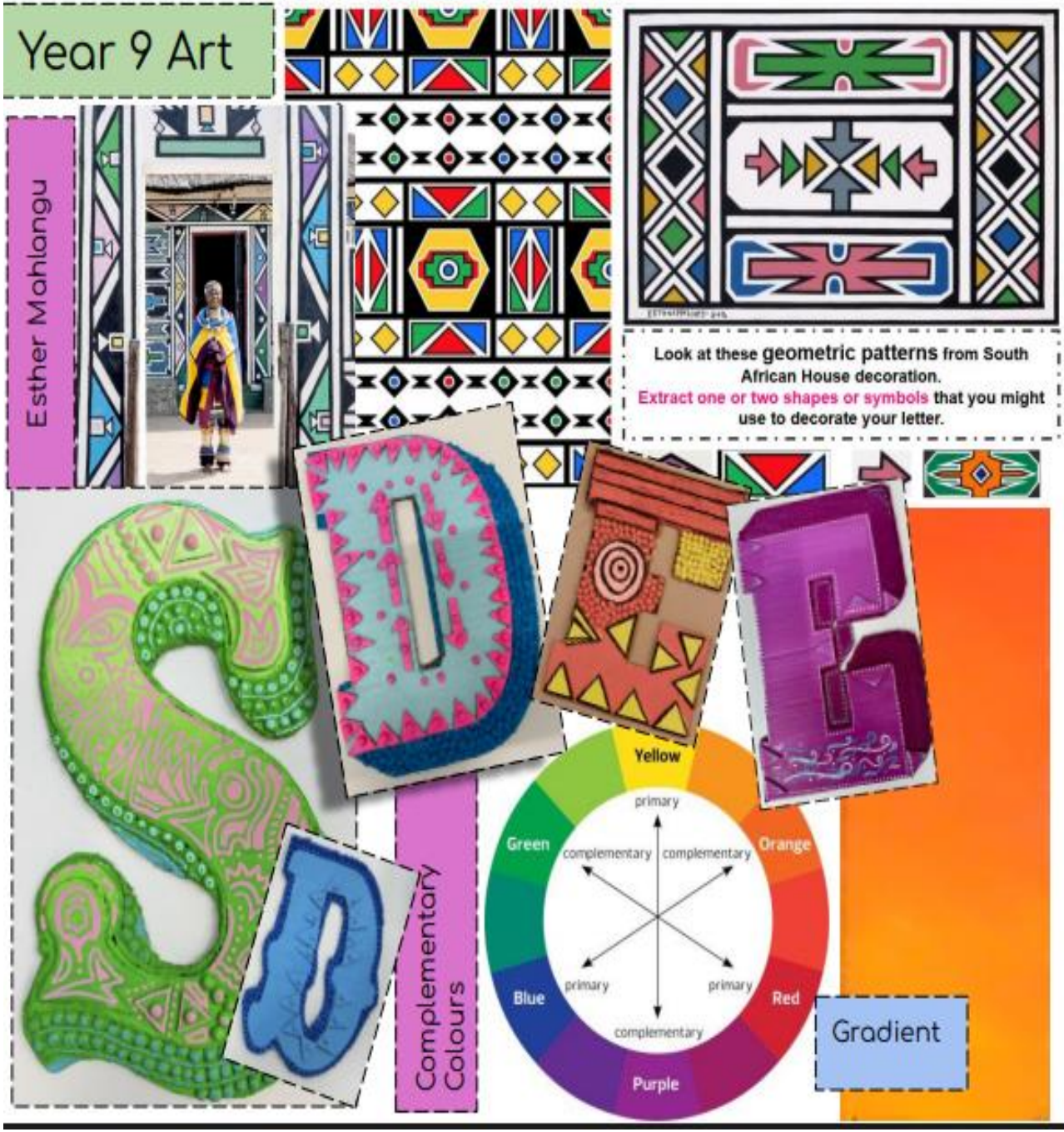
Learning Techniques to use with KOs – using them regularly is vital to make knowledge stick in your long-term memory (remember you need to revisit information at least 10 times before it is embedded in your memory).
Try using these ideas, choose different techniques to learn small sections of knowledge each day.

	Look, Say, Cover, Write, Check	Key Word Definitions	Flash Cards	Self Quizzing	Mind Maps	Paired Retrieval
STEP 1	Look at and read aloud a specific area of your KO. 	Write down the key words and definitions in two columns. 	Use your KO to condense and write down key facts or information onto flash cards. 	Use your KO to create a mini quiz. Write down your questions relating to the information. 	Create a mind map with the information on your KO. 	Ask a partner, friend or family to use the KO or your flash cards. 
STEP 2	Cover or flip the KO over and write down everything you remember. 	Repeat the above but don't look at your KO 	Add pictures that might help you remember. Then self-quiz using the flash-cards. 	Answer the questions, remember to use full sentences. 	Check your KO to make sure there are no mistakes on your mind map. 	Make sure they test you on different sections of the KO and also on previous topics.  
STEP 3	Check what you have written down. Correct any mistakes and add anything you missed in purple pen. 	Use a purple pen to check and correct your work 	Ask a friend or family member to quiz you on your knowledge. 	Ask a friend or family member to quiz you using the questions. 	Try to make more connections, link the information together where you can. 	Repeat this regularly so that you are frequently looking at KOs past and present. 

How to make learning stick…

Mind Mapping	Flash Cards	Look, Say, Cover, Write, Check	Key Word Mnemonics	Revision Clocks
				
Mind mapping is a great way of representing key information from a topic in a visual way. Use colour and images to represent the knowledge you need to learn. Keep writing to a minimum; use only keywords/phrases. Watch the clip for more tips and advice.	Make flash cards using your KO. Write a question on one side and the answer on the other or record key- words and definitions. Test yourself frequently. For more advice, scan the code.	This technique is one that has been well used from primary school upwards. It is useful for rehearsing keywords, definitions and spellings. Look at the information, read it aloud, cover it up, write it down and then check it is correct.	A mnemonic is a sentence you make up where each word begins with the same letter as the word you want to remember. It is a useful technique for remembering a group of facts/words in a certain order.	Draw a basic clock and break your KO down into 12 chunks. Make notes on each chunk in the 12 clock sections, use colour and images to make it memorable. Revise each section for 5 minutes, turn over and test how much you can recall. Watch the clip for more tips and advice.

Year 9 Art



Year 9 key words	
Decorate	make (something) look more attractive by adding extra items or images to it.
Complementary colours	Colours that are opposite on the colour wheel.
Acrylic	Acrylic paint is a fast-drying paint made of pigment suspended in acrylic polymer emulsion
Geometric	characterized by or decorated with regular lines and shapes.
Gradient	A smooth blending of shades from light to dark or from color to color.
Drop shadow	a visual effect consisting of a drawing element which looks like the shadow of an object, giving the impression that the object is raised above the objects behind it.

Year 9 Talking with Type: Typography/ Graffiti Timeline

Prehistoric Visual Communications Petroglyphs

3300 BCE

Egyptian hieroglyphs

3200 BCE

Archaic cuneiform

2900 BCE

Chinese Characters

1300 BCE

Latin alphabet, also known as the Roman alphabet

700 BCE

Darryl McCray ('Cornbread')

1960's Philadelphia

Devanagari is one of the official scripts of India

7th century BCE to present ADE

Shepard Fairey Political graffiti

1980's-present:USA

Jean-Michel Basquiat was a graffiti artist

1970'S New York

Claw is female graffiti writer in New York

1980's-present: USA

Barbara Kruger

1980's-present: USA

Ben Eine Typography Artist

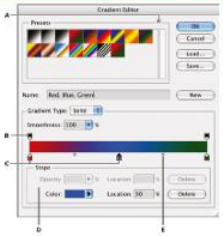
1980's-present: UK

Joby Carter Fairground Sign writer

1980's-present: UK

Prehistoric - Egyptian - Chinese - Roman - Indian - Graffiti Art - Neo Expressionism - PostModernism -Contemporary Typography

Computing—Graphics: Photopea Name_____

Tool	What it is used for ?
Image Editing/Graphics Software	Software programs that allow you to manipulate digital images.
Brush 	A brush tool is one of the **basic tools found in graphic design and editing applications**. It is a part of the painting tool set which may also include pencil tools, pen tools, fill colour and many others. It allows the user to paint on a picture or photograph with the selected colour.
Spot Healing Brush	The spot healing brush can be used to clone areas from an image and blend the pixels from the sampled area seamlessly with the target area. The basic principle is that the texture from the sample area is blended with the colour and luminosity surrounding wherever you paint.
Clone	The clone tool is used in digital image editing to replace information for one part of a picture with information from another part. In other image editing software, its equivalent is sometimes called a rubber stamp tool or a clone brush.
Text	This *tool* allows *text* to be typed onto the current layer using the Primary colour. The *Text* Controls in the *Tool* Bar can be used to change the font.
Gradient 	The Gradient tool **creates a gradual blend between multiple colours**. You can choose from pre-set gradient fills or create your own. Note: You cannot use the Gradient tool with bitmap or indexed-colour images. To fill part of the image, select the desired area.
Adjust white balance levels	White balance is **the adjustment of a digital photograph to make its colours appear more realistic** 
Face Remixing	**Mix faces together in different combinations**.
Adjustment Layers	An adjustment layer **applies colour and tonal adjustments to your image without permanently changing pixel values**.
File Formats for digital Graphics	PSD, TIFF, PNG, JPEG, GIF
Best file type for printing	TIFF
Best file type for online use	PNG/JPEG

Computing — Python

Key Terms

Python	A programming language
Programming Code	The process of writing computer programs . The instructions that you write to program a computer
Sequence	Parts of the code that run in order
Selection	Selects pathways through the code dependent on conditions
Iteration	Code is repeated (looped) while something is true or for a number of times
Algorithm	A set of rules / instructions
Variable	A value that can be changed (speed, lives, score) Function Inbuilt code that performs a specific task
String	A sequence of characters that can include letters, numbers, symbols
Integer	Whole numbers, no decimal point
Boolean	Can only output the result of True or False
Float	Decimal Numbers
Concatenation	Operation that joins two string together ('Tall + 'Giraffe")
Data Type	Format in how data is stored (float, integer, string)

Indentation	Moves code inwards to show it belongs to the same subsection of code
Syntax	Spelling and grammar of a programming language so that the computer can understand it
Comparison Operator	When comparing data, a comparison operator is used to test the condition
Compiler	Collects every line of code together and checks for errors before executing

Python to English

print('Hello')	Prints Hello on the screen
input('')	Inputs a value into the computer
x=input('')	Inputs a value and stores it into the variable x
if name == 'Fred':	'Checks to see if the variable 'name' has a value that is equal to 'Fred'
else:	The other option if the conditions for an if statement are not met (e.g.. name = 'Bob' when it should be Fred)

```
Fname = "Paul"
Sname = "Smith"
print(Fname+Sname)
```

Arithmetic Operators

+	Addition
—	Subtraction
*	Multiplication
/	Division
//	Integer division
%	Remainder
**	Exponent

Comparative Operators

==	Equal to
!=	Not equal to
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Variables/WHILE LOOPS

Variable

can hold a value that can be changed. We can assign a value to a variable by using an equals(=) sign. We can add 2 strings together using +, this is known as concatenating. We can get a keyboard input from the user using the input function. This example will ask the user for their name and store it in the "name" variable. We can then print that value. Combine the inputs with other Strings to print a clear message.

```
name = input("What is your name")
print("Your name is "+name)
```

A **while loop** will keep repeating code until a certain condition is met. For example repeat until lives do not equal 0.

Computing - Modelling Data

Key Facts:		
	Purpose of a spreadsheet	To perform basic and complex maths computations in an organised way.
	Spreadsheets	Spreadsheets are made up of workbooks and worksheets. Worksheets appear as tabs at the bottom of the spreadsheet.
	Where are Computer Models used?	Examples: Computer models are used in schools to predict student performance in exams, they are used to predict the weather, to predict how financial markets are going to change, to see whether car components will fit together before they are made and to see if a business is making enough money to stay open.
	How are spreadsheets used in computer models?	Spreadsheets are very good at processing data and then presenting it in graphical form. Presenting data in the form of a chart makes it much easier to understand, which makes it more persuasive than a table of numbers.

Cell Formatting:		
	Number	tell the spreadsheet what type of data the cell contains, eg currency, percentage, date, time, etc
	Alignment	align the text in the cell vertically (top, bottom or middle), horizontally (left or right) or at an angle
	Font	change the font used, text size and colour
	Border	add a solid, dotted, dashed or coloured border to the cell
	Adjusting column width and row height	To adjust a column's or rows width or a row's height, move your mouse cursor between two columns or rows. Click and drag to resize.

Common and Advance Functions:				
	= SUM( )	Adds a range of cells together.	=COUNTA	Counts cells together containing any type of information
	=AVERAGE( )	Finds the average for a range of cells	=IF( )	Changes the value of a cell if something is true, e.g. if a customer's total bill is over £100, deduct 10% from their bill
	=MIN( )	Returns the smallest value in the range	=COUNTIF ( )	Adds up cells that meet a certain rule, e.g. count the number of students that achieved level 6.
	=MAX( )	Returns the highest value in the range	=VLOOKUP	Matches contents of a cell with an answer, e.g. How much is a pepperoni pizza?
	=COUNT()	Counts how many cells meet a condition, e.g. count (A:A, "April") would return the number of times the word April (with a capital letter), occurs in column A	Symbols for calculations: + - * /	Addition, subtraction, multiplication, division

Key Term:	
Modelling	A program which has been developed to mimic a real life system. Spreadsheets use mathematical formulas and calculations to predict what is likely to happen based on data recorded about what actually did happen in the past. They process data, can be presented in a graphical form so it is easier to understand. Software includes Microsoft Excel and Google Sheets.
Cell	Location of a cell.
Cell Reference	The unique 'address' of a cell on a spreadsheet, made up of the Column letter and Row number, e.g. A1
Range	A group of cells that are next to each other, e.g. A2:B6
Active Cell	The currently selected cell. It has a thick black line around it with a small dot called the fill handle in the bottom right corner.
Row	A group of cells 1 cell high going across a worksheet. In Excel, these are the numbers down the left side of the page.
Column	A group of cells 1 cell wide going from the top to the bottom of a worksheet. In Excel these are the letters going across the top of the page.
Label	This is a piece of text that explains what the data in the cell next to it represents.
Absolute cell reference	Refers to a specific cell and doesn't change when copied to other cells using the fill handle. E.g.D3
Chart	A picture of data made from a range of cells. There are lots of types which are useful for different reasons, e.g. pie, line, scatter, area, radar, bar, radar etc
Legend	A table that explains which data is represented by different colours on a chart
Formula	Used in a spreadsheet cell, this starts with an '=' and combines numbers, mathematical operators and functions to manipulate data.
Function	These are built in to spreadsheets and perform standard tasks, like finding the average, highest and lowest of a set of numbers. They always look like =FunctionName(Details the function needs). Tooltips will appear as you type them to tell you what details that function needs.
Fill	Copies the contents of a cell or range of cells into others by dragging the fill handle in the bottom right of the active cell or range.
Conditional Formatting	Changes what a cell looks like based on rules about the data a cell contains.

Computing - Modelling Data Spreadsheets

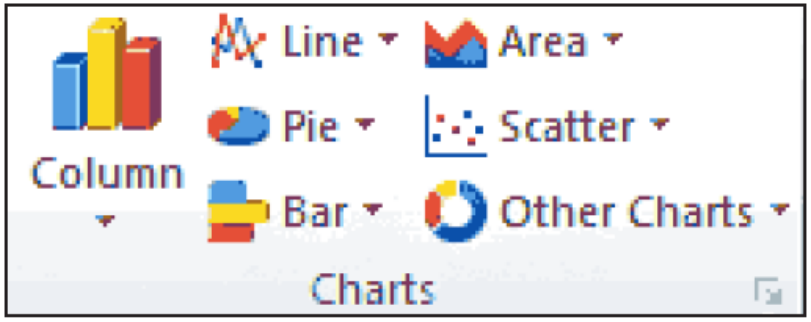
Modelling Data Example - CASH FLOW FORECAST

	April	May	June	July	August	September	October	November	December	January	February	March
Cash Inflows												
Sales	£3,600	£7,200	£22,000	£26,000	£27,000	£25,200	£18,000	£21,600	£36,000	£18,000	£14,400	£18,000
Loans	£20,000	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Savings	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
TOTAL	£23,600	£7,200	£22,000	£26,000	£27,000	£25,200	£18,000	£21,600	£36,000	£18,000	£14,400	£18,000
Cash Outflows												
Wages	£3,280	£3,280	£3,300	£3,330	£3,330	£3,330	£3,330	£3,330	£3,500	£3,500	£3,500	£3,500
Start-Up costs	£7,201	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Stock purchases	£1,440	£4,380	£17,800	£17,500	£18,500	£17,500	£4,500	£4,500	£4,500	£4,500	£4,500	£4,500
Telephone/Internet	£45	£45	£45	£45	£45	£45	£45	£45	£45	£45	£45	£45
Utility Bills	£65	£65	£65	£65	£65	£65	£65	£65	£65	£65	£65	£65
Advertising	£60	£60	£60	£60	£60	£60	£70	£70	£70	£70	£70	£70
Loan repayment	£185	£185	£185	£185	£185	£185	£185	£185	£185	£185	£185	£185
Business Rates	£152	£152	£152	£152	£152	£152	£152	£152	£152	£152	£152	£152
Rent	£833	£833	£833	£833	£833	£833	£833	£833	£833	£833	£833	£833
Drawings	£2,000	£2,000	£4,000	£4,000	£5,000	£6,000	£6,000	£10,000	£10,000	£14,000	£14,000	£11,000
TOTAL	£15,261	£11,000	£26,440	£26,170	£28,170	£28,170	£15,180	£19,180	£19,350	£23,350	£23,350	£20,350
Opening Balance	£0	£8,339	£4,539	£99	-£71	-£1,241	-£4,211	-£1,391	£1,029	£17,679	£12,329	£3,379
Net Cash Flow	£8,339	-£3,800	-£4,440	-£170	-£1,170	-£2,970	£2,820	£2,420	£16,650	-£5,350	-£8,950	-£2,350
Closing Balance	**£8,339**	**£4,539**	**£99**	**-£71**	**-£1,241**	**-£4,211**	**-£1,391**	**£1,029**	**£17,679**	**£12,329**	**£3,379**	**£1,029**

A **Cash Flow Forecast** is to show how much cash a business receives into the bank account for a period of 12 months. The cash from Sales and from the Loans that the business has borrowed from the bank make up the cash inflows. It also shows the cash outflows, so anything that business has to pay for example bills it has to pay those each month and we can total them for each month to calculate the total cash outflows.
The cash flow forecast also shows the opening balance in the bank account at the start of each month. We then work out the net cash flow so the inflows minus the outflows each month and we then can work out the closing balance by adding those two items together.
CONDITIONAL FORMATTING: is a feature in many spreadsheet applications that allows you to apply specific formatting to cells that meet certain criteria. It is most often used as colour-based formatting to highlight, emphasize, or differentiate among data and information stored in a spreadsheet.

Computing - Modelling Data

Charts and graphs provide a visual representation of data, which can often be easier to understand.. There are several types of charts and present data. You must always consider which would be a suitable chart or graph for your model.
LINE GRAPH – to show a change over time
PIE CHART – show the individual parts that make up a whole
BAR CHART – compare things that aren't directly related
SCATTER GRAPH – look for a pattern or link between two sets of data



Cell references begin with a letter, and finish with a number. EG: A1

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							

A range is a selection of cells. EG: (A2:F4)

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							

Golden rule: every formula always starts with an =

Name of the formula
See below for common formulae. Normally written in capitals.

=SUM(B10:B23)

= sign
An equal sign tells Excel that the cell contains a formula.

The selected range
The range used in the formula. This can be selected by clicking and dragging.

Computing - Modelling Data Spreadsheets

FORMULA is an expression which calculates the value of a cell.
In this example the Cash Inflows Total for April, would be to add the value of Sales, Loans and any savings for the month. Excel would calculate this using the formula =B3+B4+B5

FUNCTION is a predefined formula that performs calculations using specific values in a particular order. The SUM function adds values. You can add individual values, cell references or ranges or a mix of all three. Excel includes many common functions that can be used to quickly find the SUM AVERAGE, COUNT, MAXIMUM value, and MINIMUM value for a range of cells.

Subject: Design and Technology

INTRODUCTION

Once tree's are **felled** and converted into **Stock Forms** they are known as **'Timber'.** Timber comes in 2 main types: **Rough Sawn** and **Planed All Round (PAR).** Timbers are **seasoned** to reduce the moisture in them. This is done by drying them naturally or using a furnace. Uneven evaporation of the moisture causes **warping.** Timber can be a **sustainable resource** if it is **harvested responsibly and ethically.** Use this sheet for revision and for further research into timber based materials.

SOFTWOODS

Softwoods come from coniferous trees, a tree that usually has needles and cones rather than broad leaves. These trees are commonly referred to as **evergreens** as most of them keep their leaves all year round. Softwoods are **fast growing** and can reach full maturity within 25 years. Softwoods generally have a more **porous structure**. This means that if they are left unprotected, they can **absorb moisture** and begin to rot more quickly. Softwoods don't come in as many colour varieties as Hardwoods however, they are very **easy to stain** to make them look like their more expensive counterparts.

PINE

Properties: Lightweight, Easy to work, Can split easily.
Common Uses: Interior construction, Cheap furniture and Decking

CEDAR

Properties: Good strength to weight, Durable and Resistant to decay.
Common Uses: Construction, Boxes, Boats, Cladding and Musical Instruments.

LARCH

Properties: Durable, Tough, Good water resistance, Good surface finish.
Common Uses: Electrical fittings, casings, buttons and handles.

SPRUCE

Properties: Easy to work, high stiffness,
Common Uses: Construction (Interior/Exterior), Furniture and Musical Instruments

FIR

Properties: Machines well, Durable, Stiff and Good strength to weight.
Common Uses: Construction, Veneers.

HARDWOODS

Hardwoods come from **deciduous trees.** These are trees which **lose their leaves** in winter. Hardwoods take a **long time to grow.** In fact, if you were to plant a hardwood tree today, you would need to wait between 80-120 years for it to grow to full maturity. Hardwoods tend to be **less porous and more dense** which makes them **less prone to wearing and rotting.** Hardwoods come in a **variety of colours** and are known for their **aesthetic appeal.**

OAK

Properties: Tough, Hard, Durable, High quality finish.
Common Uses: Flooring, Furniture, Railway Sleepers and Veneers.

MAHOGANY

Properties: Easy to work, Durable, Excellent finish.
Common Uses: High end furniture, Joinery, Veneers.

BEECH

Properties: Fine finish, Tough and Durable.
Common Uses: Children's toys, Models, Furniture and veneers

BIRCH

Properties: Strong, Easy to work, High aesthetic qualities.
Common Uses: Plywood, Veneers, Crates and Speciality wood items..

1/2 OF THE WORLD'S TROPICAL FORESTS HAVE BEEN SUBJECT TO DEFORESTATION.

4,500
ACRES OF FOREST FALL TO CHAIN SAWS, FLAMES AND BULLDOZERS EVERY HOUR.

18M
ACRES OF THE WORLDS FORESTS ARE LOST PER YEAR.

2110
THE YEAR WE WILL RUN OUT OF FORESTS IF DEFORESTATION CONTINUES AT THE CURRENT RATE.

Deep Reading

If you want to see the damage that is being caused by **Deforestation** you need look no further than the **tropical rainforests**. Today, they are being rapidly **cleared for industries such as oil extraction, rubber plantations, cattle grazing, soya farming, expanding cities, roads, dams and of course logging.**

About 12% of all man-made climate emissions come from deforestation, mostly in tropical areas. The faster the trees go, **the chance of slowing or reversing climate change becomes slimmer**. Tropical deforestation causes **carbon dioxide**, the main greenhouse gas, to linger in the atmosphere and **trap solar radiation**. This raises temperatures and leads to **climate change**. Deforestation in Latin America, Asia and Africa can affect rainfall and weather everywhere from the US Midwest, to Europe and China.

Rainforests are home to more than half of the world's animals and as the forests come down, the animals and people who live in or around them become **impoverished**. Without the forests, people migrate to cities, or move to richer countries in search of work. The world's rainforests not only **provide food, energy, security, incomes and medicinal plants for 300m people**, but they are also home to the **richest wildlife in the world**.

- **Designers and manufacturers** have an **enormous responsibility** to ensure that they consider the type of timber or manufactured board for the products they design.
- Designers and manufacturers need to consider the **environmental impact** of choosing manufactured boards that can be harmful to produce.
- Designers should ensure all timbers that they use come from **sustainable** sources such as **FSC managed forests**.

TIMBER LIFE CYCLE

FSC FORESTS FOR ALL FOREVER

What do the above logos and symbols mean?

The timber lifecycle shows how timbers start out as trees and end up as products which are then disposed of. Each stage of the life cycle has an impact on the environment.

Trees absorb CO_2 and give out oxygen. This helps to **prevent Global Warming** and provides us with oxygen to breathe.

Some timber based products can be stripped down and the wood can be **'reclaimed'**. These materials are usually ground down and **converted to manufactured boards.**

Trees are felled. New seeds should be planted to ensure future generations have a **sustainable** supply of timber. If trees are not replanted and the land is used for urban development, this is known as **Deforestation.**

At the end of the products' life, the timber can be **used as fuel in power stations.** This gives off CO_2, contributing to Global Warming.

Trees are processed in a **mill** and cut to useful sizes known as **Stock Forms.** Machinery is commonly used for this process. The Machines require a **large amount of energy** to run, usually from fossil fuels (electricity). This gives off CO_2 which contributes to **Global Warming.**

Products are bought and used. Timber products don't tend to have an **impact on the environment** when they're being used.

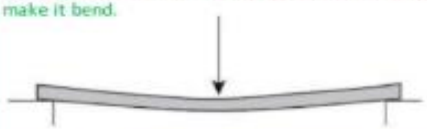
Waste materials from the mill, as well as reclaimed timber from old products is used to produce **Manufactured Boards**. This allows us to create more materials without the need to cut down more trees.

Various timbers are used in a range of products.. In their everyday use, these products are regularly having forces applied to them. These forces affect the way the product operates and its overall function and safety. Designers and manufacturers need to ensure that the materials they select for their products are able to withstand the forces and stresses the product will be subjected to. If they get this wrong it could have serious consequences.

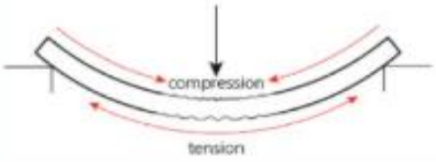
TYPES OF FORCES AND STRESSES

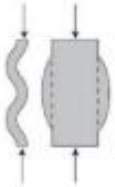
Tension forces are **pulling** forces that cause an object to be stretched or pulled apart.

Bending forces act at an angle to an object and make it bend.



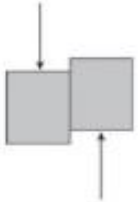
When an object **bends** it is under **compression** and **tension** at the same time. See below...





Compression forces are **pushing** forces that squeeze an object. Imagine a 'crushing' motion.

Shearing forces act **across** a material by creating a shearing action. Scissors are a good example.



Torsion forces are twisting forces that are applied to an object.

Stock Form	Description	Image
Sheet	**Metric** is the standard size for measuring sheets. Sheet starts at 3mm thick and usually increases thickness in increments of 3mm. Sheets have a variety of uses.	
Board	Boards are typically used in **laminating** to increase surface area. They are good **decorative** pieces of timber and are often used for cladding and flooring.	
Section/Length	Square Sections tend to be used for **frames and structures.** They tend to be strong and thick so that panels can be attached to them.	
Dowel	Dowel is supplied in **cylindrical form** and comes in various sizes. It is **measured by its diameter.**	
Moulds	Wood can be supplied in mouldings which have a **variety of shapes**. Commonly used for decoration.	

Name	Image	Description	Name	Image	Description
Oil (Indoor and Outdoor Products)		Soaks into timber. Protects and enhances appearance	**Paint** (Indoor and Outdoor Products)		Usually needs a primer. Wide range of colours
Bees Wax (Indoor Products only)		Rubbed into wood. Enhances natural grain.	**Wood Stain** (Indoor and Outdoor Products)		Permanently colours wood. Does not protect.
Varnish (Indoor and Outdoor Products)		Protects from moisture. Enhances appearance.	**Distressing and Scorching** (Indoor furnishings)		Gives a worn/vintage look. Popular in furnishings.

DRILLING

PILLAR DRILL

Good for **accuracy** when drilling timbers. The Pillar Drill is **powerful** enough to drill large holes through thick material. Selecting the correct **drill bit and speed is very important.**

HAND DRILL

Hand Drills are good for smaller tasks. As they are manual, they provide **better accuracy** than their powered counterparts.

CORDLESS DRILL

Very adaptable. The Cordless Drill has variable speeds and a clutch which prevents over tightening fixtures and fittings. They are **ergonomically designed.**

ABRADING

DISC SANDER

Mechanical machine which removes more material than hand methods.

RASP

A 'file like' tool with **rough teeth** for fast removal of material. Different profiles available.

SAND PAPER

Best for 'hard to reach areas. Different grades available. **Good for surface preparation.**

WIRE WOOL

Used for a **high quality surface preparation** before finishing. Produces a very smooth surface.

JOINING METHODS

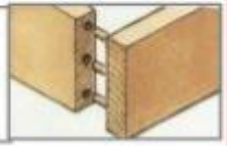
BUTT JOINT

Two pieces stuck together using only wood glue. **Low Strength.**

MITRE JOINT

Pieces cut at 45°. Stuck together with wood glue. **Low Strength.**

DOWEL JOINT



Dowel used to provide stability and strength. **High Strength.**

LAP JOINT

Glued. Aesthetically pleasing. Neat. **Medium Strength.**

COMB JOINT

Interlocking sections. Aesthetic and **High Strength.**

DOVETAIL JOINT

Interlocking sections at angles. Aesthetic. **Strongest joint.**

ADHESIVES

WOOD GLUE [PVA]

Wood glue **absorbs** into the surface of the 2 joining pieces and dries to form a **solid bond.**

HOT GLUE

Hot Glue is **not very strong**. Commonly used for modelling or smaller tasks.

CUTTING/SHAPING

TENON SAW

Used for cutting timber in **straight lines.** Thick blade prevents the blade from deviating.

COPING SAW

Used for cutting **unusual and difficult shapes** with thin a blade.

BAND SAW

Mechanically powered. Adults only. Can cut sections, boards and sheets to specific sizes. Used for larger jobs where a more powerful saw is required.

WOOD PLANE

Shaves the surface of the wood to **reduce the thickness** of material. Can be adjusted to take more or less material.

ONE OFF PRODUCTION

In one-off production a **single product** is designed and made to a client's specification. **Labour and material costs are high**, and a high level of design and manufacturing skills are needed. Prototypes are classed as one-off's.

BATCH PRODUCTION

In batch production **set quantities** of a product are made to order. Materials are cost-effective and manufacturing **costs are lower.** Seasonal items are usually Batch produced.

MASS PRODUCTION

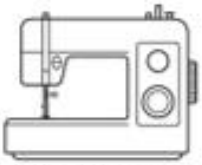
Mass production is the industrial scale manufacture of **large quantities** of products, usually on a **production line.** Standardised production methods mean it is suitable for products that are not redesigned very often.

CONTINUOUS PRODUCTION

Continuous production is the manufacture of an item **24/7 – 365.** The system is usually completely **automated using a production line.** Due to the scale on which the items are manufactured, they are **extremely cost effective.**

- To look at
- To examine in detail to explain and interpret

1. Investigate
2. Research
3. Explore

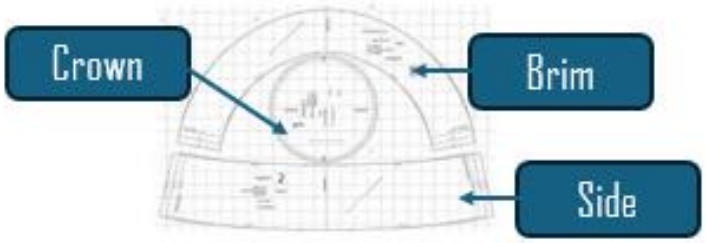


ANALYSE

(an+uh+lyz)

- In Year 9 you will be **analysing** an existing product so you can replicate your own version
- Your **analysis** will help you when you manufacture.

Your bucket hat is made up of the following components



Design Principles

SCLPT	
S = Shape	
C = Colour	
L = Line	
P = Pattern	
T = Texture	

The 'Analyse' process

BE ABLE TO: Analyse a product to support future design tasks
GOOD: Detailed writing includes SCLPT and FACT analysis

1: I SEE — FACTS: Describe what you see

When I LOOK at.....
- I see.....
- The Shape / Colour / Line / Pattern / Texture is.....
- Its Function Appearance / Construction / End User is....

2: I THINK — OPINIONS: What do you think, when you look at th

When I think about .....
- I think .....
- I think the Shape / Colour / Line / Pattern / Texture is.....
- I think the Function Appearance / Construction / End User

Aim Higher: Combine facts and options into 1 sentence

Challenge — Analyse PIES: Target Us
PIES; Physical needs, Intellectual needs, Emotional needs, Social needs of the user w
"interacting" with the product

What are your thoughts on these matters?
1. What do you think about the products safety? (E)
2. How easy do you think it is to use? (P /I)
3. Why do you think the consumer would buy/use this product? (S)

3: I WONDER — What do you want to know, when you look at th

When I look at the product.....
I wonder? (Ask a range of questions you would like answering)
- What...
- Where...
- Why.....
- When
- How...

CHALLENGE
- *Explain the purpose of the question*
- *I need to know ....., so that.....*

TASK: Stage 4:
Analyse a product using the reviewing stage: "

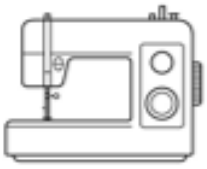
When I review the analysis, the essential criteria are....
- It must....
- It should..
- It needs....
- The.....SCLPT/FACE

For reference only, see next page

LITERACY& GRAPHICACY : Visual Thinking Strategy: Analysis Product Analysis / Theme Analysis / Research Analysis / Design Reviews

BE ABLE TO: Analyse a product to support future design tasks
GOOD: Descriptive analysis
EBI: Extension tasks

INFORMATION : When we analyse a product we need to look at its F.A.C.E
F= Function / A=Appearance / C=Construction / E= End User



ANALYSE

(an+uh+lyz)

TASK: Stage 1 Analyse a product using the observation stages: "I see"

1: I SEE

Describe what you see

When I LOOKED at…./ VIEWED the… /OBSERVED the….:

- *I see….*
- *I noticed…*

Example 1:

- I see….a rabbit (not a description, just stated) ▫
- I see… *a rabbit shaped back support (A for Appearance)*

Example 2:

- I see 2 parts (not a description, just stated) ▫
- I noticed…2 components, one is the main body, the second is a support (F & A)

Verbs

describe
duplicate
find
list
locate
name
recall
recognize
reproduce
state
tell
underline
write

TASK: Stage 2: Analyse a product using the personal opinion stage: "I think"

2: I THINK

What do you think, when you look at it?

When I think about …….
I think…..
Example 1:

- The rabbit is good (no reason or specific detail)
- *I think the rabbit shape is a strength, because it is realistic, yet cute.*

However, your opinion may be negative

- When I think about the shape, *I think it is a weakness, as the rabbit is "cute" and wouldn't appeal to my age group.*

EXTEND: Target User needs

- *PIES; Physical needs, Intellectual needs, Emotional needs, Social needs of the user when "interacting" with the product*

What are your thoughts on these matters?

1. *What do you think about the products safety? (E)*
2. *How easy do you think it is to use? (P/I)*
3. *Who do you think would buy this product? (S)*
4. *What do you think helps support the stability and balance? (P)*

Verbs

calculate
compare
define
describe
discuss
distinguish
expand
explain
identify
interpret
locate
outline
predict
report
restate
translate

TASK: Stage 3: Analyse a product using the questioning stage: "I wonder?"

3: I WONDER ?

What do you want to know, when you look at it?

When I look at the product…..
I wonder?
Example 1:

- *What material? (not specific in detail)*
- *What material has been used to make the product?*

EXTEND: QUESTION IT; 5W'S AND 1 H

WHO / WHAT/WHERE /WHEN /WHY /HOW?

Review and extend to include a range of questions, beginning with different W's or H

CHALLENGE

- *Explain the purpose of the question*
- *I need to know this, so that…..*

TASK: Stage 4: Analyse a product using the reviewing stage: "I conclude"

TASK stage 4: I CONCLUDE

Review your analysis, what are the most important facts to take forward

When I review my analysis I need to consider that my design…..

1. Must…so that
2. *Could….because….*

Example:

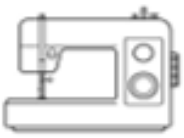
- *Must be big (how big is big? Not specific enough)* ▫
- *The main body must be large enough to hold/support my phone*

EXTEND: Essential or Desirable

Essential= Need / Must have. Desirable= Want / Could have
Review work and ensure you have a range of essential & /or desirable points

FINAL CHALLENGE **F.A.C.E & P.I.E.S analysis**

1. Code stage 4 facts ; F.A.C.E / P I E S
2. Review and Extend; Add to "I conclude" to make sure you have F.A.C.E & P.I.E.S design criteria



ANALYSE

(an+uh+lyz)

Verbs

advertise
analyze
appraise
attribute
categorize
compare
contrast
differentiate
distinguish
examine
identify
infer
investigate
organize
outline
separate
sequence
test

Verbs

argue
appraise
assess
check
debate
decide
defend
determine
dispute
editorialize
judge
justify
prioritize
rate
recommend
select
support
verify

Subject: Food Preparation and Nutrition Topic: Food Production Methods

All food must be grown, reared or caught
In the past food was grown, prepared and cooked at home or sold by small-scale producers or merchants.

Some people still grow food at home or on allotments. Food can also be bought from a wide range of sources, including:
cafes/coffee shops;
convenience stores;
farmers markets

Food Processing
Food processing is any deliberate change to food that happens to a food before it is available to eat. Processing makes food safer to eat by killing existing bacteria and slowing bacterial growth.
Food is processed for a number of reasons:
to extend shelf life;
to add variety;
for convenience;
for consumer's health.
Innovations in food processing have led to the development of functional foods; these provide benefits over and above the basic nutritional value, e.g. dairy products containing probiotic bacteria.

Food provenance
Food provenance is about where food is grown, caught or reared, and how it was produced. Food certification and assurance schemes guarantee defined standards of food safety or animal welfare. There are many in the UK, including:

World food
A number of ingredients and foods that are now readily available have been introduced to the UK over a long period of time. Many are imported from other countries giving access to ingredients and foods that would not normally grow in the UK.
The availability of these ingredients and foods gives a wide choice throughout the year.

Food availability
Some ingredients or foods are available throughout the year because they have been imported from other countries where they are in season at different times of the year.

Climate and terrain are two key factors that affect food availability and where food is grown, reared and caught.

There is a great variety of food grown all over Europe. The type of farming is partly determined by the climate and the geography of the country or region. The terrain or landscape determines which crops are grown or animals reared. Cereal crops are grown in flat plains, whereas sheep can be reared in hilly terrain.

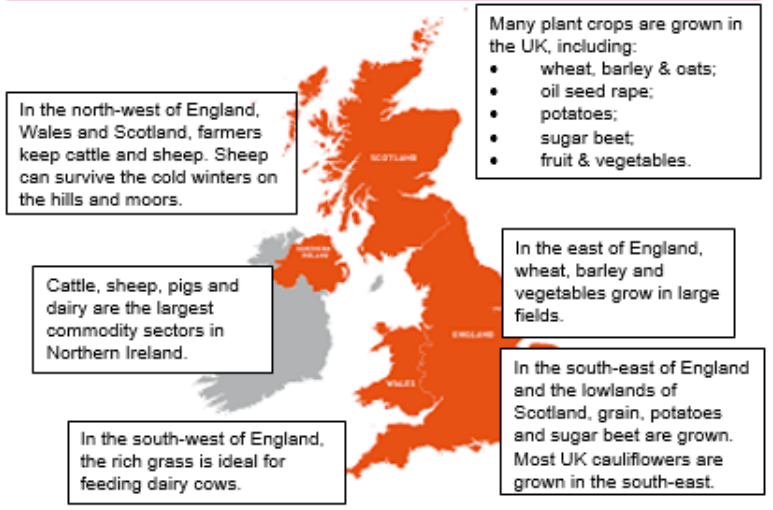
Seasonality
Fruit and vegetables naturally grow in cycles and ripen during a certain season each year. Some meat and fish can also be seasonal. Advantages of buying food in season include:

- it is fresh;
- best flavour, colour and texture;
- optimal nutritional value;
- supports local growers;
- lower cost;
- reduced energy needed to transport.

Climate change
There is worldwide concern about climate change and the increased number of extreme or unusual weather conditions.
Changes in temperature can affect plant growing seasons and livestock conditions. It is very likely to affect food security at a global, regional and local level.

Food security
Food security exists when everyone has access to enough affordable, safe and nutritious food to keep them healthy, in ways the planet can sustain in the future.

Map showing key growing areas in the UK – some parts of the UK have excellent soil for crops, while others are used for cattle, sheep, pigs and poultry.



Subject: Food Preparation and Nutrition

Topic: Food Science

Functions of ingredients
Ingredients provide a variety of functions in recipes.

Carbohydrate, protein and fat
Carbohydrate, protein and fat all have a range of properties that make them useful in a variety of food products.

Carbohydrates perform different functions in food.
They can:
- help to cause the colour change to bread, toast and bakery products (dextrinisation);
- contribute to the chewiness, colour and sweet flavour of caramel;
- thicken products such as sauces and custards (gelatinisation).

Gelatinisation
When starch is mixed with water and heated, the starch granules swell and eventually rupture, absorbing liquid, which thickens the mixture. On cooling, if enough starch is used, a gel forms.

Proteins perform different functions in food products.
They:
- aerate foods, e.g. whisking egg whites;
- thicken sauces, e.g. egg custard;
- bind ingredients together, e.g. fishcakes;
- form structures, e.g. gluten formation in bread;
- gel, e.g. lime jelly.

Fats performs different functions in food.
They help to:
- add 'shortness' or 'flakiness' to foods, e.g. shortbread, pastry;
- provide a range of textures and cooking mediums;
- glaze foods, e.g. butter on carrots;
- aerate mixtures, e.g. a creamed cake mix;
- add a range of flavours.

Liquid plant oils

Visible plant oils: Nut and seed oils (sunflower, olive, almond)

Foods containing invisible plant oils:
- Seeds
- -nuts
- Fruits- avocado
- Fried foods- chips
- - processed ready meals and takeaways

Solid animal fats

Visible animal fats: butter, lard, suet, ghee, fat on meat

Foods containing invisible animal fats
-Cheese
Butter in cakes
Meat products i.e. sausages
Many processed ready meals and takeaways

Solid plant fats

Visible plant fats: white vegetable fats, vegetable fat spreads, cocoa butter

Foods containing invisible plant fats:
- Processed foods- ready made curries, fried chicken, ready meals
- -Chocolate
- Pastries, cakes, biscuits and some breads

Liquid animal oils

Visible animal oils: cod liver oil, oily fish

Foods containing invisible animal oils:
- Milk/cream
- egg yolk

Coagulation
Coagulation follows denaturation. For example, when egg white is cooked it changes colour and becomes firmer (sets).
The heat causes egg proteins to unfold from their coiled state and form a solid, stable network.

Aeration
Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar.

Small bubbles of air are incorporated and form a stable foam.

Key Terminology

Dextrinisation
Gelatinisation
Aeration
Coagulation
Can you define these terms?
Can you provide a food example for each of these terms?
Can you remember the different types of fats and their food examples?

Subject: Food Preparation and Nutrition Topic: Macro and Micro Nutrients

Nutrients can be split into two categories:

- Macronutrients
- Micronutrients

Macronutrients are the nutrients we need in larger quantities that provide us with energy. The three macronutrients are fat, protein and carbohydrate.

Micro nutrients are needed in small amount in the body

They provide the body with essential vitamins and minerals.

Vitamins and minerals can be found in a variety of food sources including fruits and vegetables.

Our body needs vitamins and minerals in small amounts, they help use other nutrients efficiently. You can usually get enough vitamins and minerals from a balanced diet that includes plenty of fruit and vegetables. There are many different vitamins and minerals, each with its own purpose. They are found in different foods. Here are some examples:

How much do you need?
Everyone needs the same vitamins and minerals, but the amounts you need vary with age and sex.

For example:
- A teenage boy needs 1.0 g of calcium every day, but an adult man needs just 0.70 g. This is because the boy is growing but the man is not.
- A teenage girl needs 0.015 g of iron daily, but a teenage boy needs just 0.011 g. This is because girls lose blood, which contains iron, during menstruation (periods).

Vitamin A	Cheese, eggs, oily fish	Fighting infection, better vision, keeping skin healthy
Vitamin B1	Peas, bananas, oranges, nuts, bread	Releasing energy from food
Vitamin B2	Milk, eggs	Healthy skin, eyes and nervous system, releasing energy from food
Vitamin B12	Meat, fish, milk, cheese, eggs	Make red blood cells, release energy from food
Vitamin C	Citrus fruits	Healthy skin, blood vessels, bones and cartilage
Vitamin D	Our body creates this from direct sunlight but it is in oily fish, red meat and egg yolks	Helps keep bones, teeth and muscles healthy
Vitamin E	Vegetable oil, olive oil, nuts, seeds, cereals	Healthy skin, eyes and immune system
Vitamin K	Green vegetables, vegetable oil, cereals	Healing wounds
Mineral	**Foods**	**Function(s)**
Calcium	Milk, green vegetables	Strong bones/teeth, healthy muscles, blood clotting
Iodine	Fish, shellfish, yoghurt	Makes some hormones
Iron	Red meat, beans, nuts	Making red blood cells
Zinc	Red meat, beans, chickpeas	Helps to heal wounds

Table 1. Vitamin loss by different cooking methods	
Cooking methods	**Vitamin loss in % (C, B1, B2, B6)**
Boiling	35 – 60
Poaching	Less than boiling
Steaming	10 – 25
Pressure cooking	5 – 10
Microwave cooking	5 – 25
Roasting	10 – 47
Stewing/Braising	10 – 12
Grilling	10 – 12
Baking	10 – 12
Frying	7 – 10

Micro nutrients can be lost during cooking processes, especially water soluble vitamins.

Freezing

Freezing is an excellent way to **preserve food** as it STOPS any bacterial growth as the water in the food is frozen solid.
The temperature of a freezer is a minimum of -18°C (often around -23°C).

To be able to preserve the shape, texture and appearance of frozen fruits they can be flash frozen on open trays in the freezer for a short time until frozen solid. Then the food can be placed in freezer bags to stop it getting freezer burn.

Blanching

Blanching is **heating** fruit or vegetables in **boiling water** for a **short time** to **destroy** the **enzymes** before plunging into **cold** water to stop the cooking process.

When some fruit and vegetables are prepared for freezing they need to be blanched to destroy the enzymes.
This will prevent enzymic action while the food is stored in the freezer.

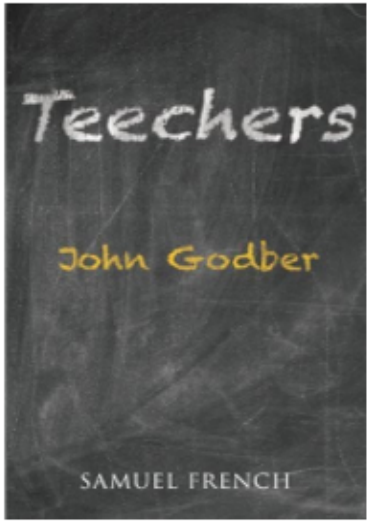
Year 9 Knowledge Organiser – 'Teechers' by John Godber

Real Life

You will explore the play 'Teechers' by John Godber, demonstrating how to create performance work from a script. You will also learn to apply stage directions to a piece of work to ensure an audience is engaged in the work you create.

Tasks for this topic:

- Exploring how you use stage directions to engage an audience
- Select which performance skills to use within a piece of script work
- Using your rehearsal time effectively to produce a piece of scripted work.



Performance Techniques	
Stage directions	An instruction in the text of a play indicating the movement, position, or tone of an actor,
Rehearsal	A practice or trial performance of a play
Blocking	The location of actors on the stage and the movements that they make

YEAR 9 SUMMER TERM KNOWLEDGE ORGANISER: UTOPIAN VISIONS
THE CRUCIBLE BY ARTHUR MILLER

Plot Overview: In the Puritan New England town of Salem, Massachusetts, the rumour of witchcraft is spreading like wildfire. This leads to numerous people being accused of witchcraft and trialled in court. The 1953 play is a fictionalised version of the Salem witch trials of 1692-1693.

Act	Plot Summary
Act 1	• Reverend Parris discovers that a group of girls, including Abigail (his niece) and Betty (his daughter), went dancing in the forest with a Black slave, named Tituba, the previous evening. • Betty Parris falls into a coma and a group of townspeople crowd Reverend Parris' home. Rumours of witchcraft are spread • Abigail is questioned about the dancing in the forest. She states they did nothing more than dance. She instructs the other girls who were there not to admit to anything. • John Proctor (a farmer) speaks to Abigail alone. It is revealed to the audience that Abigail and John had a year-long affair while she worked in their family home, which led to her being fired by his wife, Elizabeth Proctor. • Betty awakes and begins screaming. The townspeople argue about whether she is bewitched. Reverand Hale arrives and examines Betty. He quizzes Betty and the girls about their dancing in the forest. • Reverand Hale speaks to Tituba. Tituba confesses to communicating with the devil and accuses other townspeople of consorting with the devil too. Abigail and Betty join in with the accusations.
Act 2	• Eight days later, John and Elizabeth Proctor discuss the ongoing trials and witchcraft allegations in their farmhouse (located just outside Salm). • Elizabeth urges John to reveal that Abigail is a liar but he refuses. She accuses him of still having feelings for Abigail. • Mary Warren (the Proctors' servant and Abigail's friend) returns with news that Elizabeth has been accused of witchcraft. Mary gives a poppet (doll) to Elizabeth. • Officers suddenly arrive at the Proctors' house. They discover the poppet Elizabeth was given and notice that a needle is stuck in its belly. They believe that the poppet was used to represent Abigail because she had fallen screaming to the floor with a needle stuck in her stomach. • The officers arrest Elizabeth Proctor for witchcraft.
Act 3	• The trials begin in the courthouse. • John Proctor brings Mary to court and tells Judge Danforth that Mary will testify that the girls are lying. Judge Danforth informs John that Elizabeth is pregnant so will be spared for a time. • Mary testifies: she tells the court that Abigail and the other girls are lying. Abigail and the other girls accuse Mary of bewitching them. • Furious, John Proctor confesses to the court about his affair with Abigail and reveals that this is what has motivated her to lie about his wife. • The court summons Elizabeth and asks her if John has ever been unfaithful to her. To protect his honour, Elizabeth lies and says that he has never had an affair. • Abigail and the other girls continue to accuse Mary of bewitching them. Mary breaks down and accuses John Proctor of being a witch. • Judge Danforth orders John Proctor to be arrested.
Act 4	• It is now Autumn and it's revealed that Abigail has run away with money that she stole from her uncle, Reverend Parris. • Reverend Hale begs those accused of witchcraft to confess, as this will save them from being hanged. • John Proctor agrees to confess but he refuses to blame anyone else. • The court insists that his confession is made public but John becomes angry and withdraws his confession. • John Proctor is led to the gallows to be hanged.

Key Symbols

Crucible

Poppet

Fire

Big Ideas

Demonisation
Portraying something / someone as wicked and threatening.

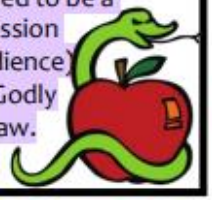
Morality
The social standards of good or bad behaviour.

Scapegoat
Unfairly blaming someone / something for wrongdoings, mistakes or faults of others.

Intolerance
Unwillingness to accept views, beliefs and behaviour that differ from one's own.

Patriarchy
A society controlled by men, often excluding and / or demonising women.

Sin
An immoral act considered to be a transgression (disobedience) against Godly / divine law.



YEAR 9 SUMMER TERM KNOWLEDGE ORGANISER: UTOPIAN VISIONS
THE CRUCIBLE BY ARTHUR MILLER

Key Characters

Abigail Williams
Antagonist / Rev. Parris' niece / previous servant to the Proctors / intelligent / cunning / manipulative

John Proctor
Tragic hero / farmer / Elizabeth Proctor's husband / stern / harsh / powerful

Reverand Hale
Minister / expert on witchcraft

Elizabeth Proctor
John Proctor's wife / virtuous / cold / jealous

Reverand Parris
Minister of Salem's church / father of Betty / uncle of Abigail / paranoid / power-hungry

Tituba
Reverend Parris' Black slave from Barbados / performs voodoo

Mary Warren
Servant to the Proctors / Abigail's friend / timid / easily influenced

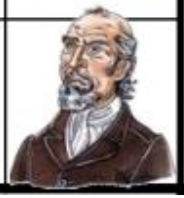
Betty Parris
Reverend Parris' ten-year-old daughter / sick / easily influenced

Francis Nurse
Wealthy man / Rebecca Nurse's husband / well-respected / influential

Rebecca Nurse
Francis Nurse's wife / sensible / upright

Judge Danforth
Judge over the witch trials / moral

Giles Corey
Farmer / brave / moral



Context – We must understand the influences of the world we live in when examining texts.

Allegory
A story that has a hidden meaning, where the events and characters stand for something other than themselves.
The characters in *The Crucible* are based on real historical characters in the Salem witch trials. The plot is also an allegory for the Red Scare / McCarthyism.

The Salem Witch Trials
The Salem witch trials (1692-1693) were a series of investigations, persecutions and witch hunts that caused 19 convicted 'witches' to be hanged, and many others imprisoned, in Salem, Massachusetts. Suspicions and rumours created hysteria across Salem, which led to the convictions and executions.

The Puritans
The Puritans were a group of English Protestants in the 16th and 17th centuries who wanted to simplify and regulate forms of worship. In 1620, a group of Puritans left England to escape mistreatment because of their religious beliefs. They crossed the Atlantic Ocean in a ship called the Mayflower and arrived in Massachusetts in December 1620.
Puritans rejected excess and extravagance. They followed strict rules, believed in the Devil and witchcraft, and dressed simply and modestly.

The Red Scare / McCarthyism
American playwright, Arthur Miller, published *The Crucible* in 1953. During this time, America was at war with USSR (The Cold War). Fearing that Russia was take over and impose communism on Americans, politician, Joseph McCarthy, claimed to have a list of communists in America. Many people were accused of communism, meaning they would lose their jobs, homes and families.
McCarthyism / The Red Scare created panic and hysteria within America, which meant that society became paranoid and made false accusations to avoid blame.

Otherness
Otherness is a critical theory that investigates the presentation of 'others' ('them') by the dominant group ('us') to perpetuate (continue) a single story about 'others'/ 'them'.
'Otherness' uses real or imagined differences as a tool to stigmatise, discriminate and stereotype.

The Panopticon
A critical theory, developed by Michel Foucault, stating that the threat of surveillance, as well as all form surveillance (CCTV, guards, authority figures) mean that society self-regulates, follows rules and is controlled.

YEAR 9 AUTUMN TERM KNOWLEDGE ORGANISER: UTOPIAN VISIONS
TECHNICAL ACCURACY & KEY DEVICES

'FOUR FOR MORE'-THE 4-PART SUCCESS STORY

Part	Key Features
SETTING 	• Introduce your story by focusing on the setting • Describe the weather / environment / surroundings / objects / décor • DEVICES: Personification / pathetic fallacy / symbolism / prepositions / foreshadowing
CHARACTER 	• Describe your character(s) within your setting • One or two characters – keep it minimal • Craft their actions / behaviour to reflect their personality and emotions • DEVICES: Sensory language / similes / metaphors / minimal dialogue
FLASHBACK 	• Include a flashback to teach the reader something about your character and / or their world • Begin this section with a trigger • This memory should contrast your character's current situation • DEVICES: Sensory language / juxtaposition / light imagery / similes / metaphors / symbolism
RETURN TO THE SCENE 	• Begin this section with a trigger that forces your character back to their current world • Offer a glimpse of change / a subtle change to end your story • Return to something that you described in your opening paragraph to create a cyclical structure • DEVICES: Sensory language / personification / pathetic fallacy / symbolism / cyclical structure

Device / Feature

Cyclical structure
The end of the text repeats an idea / image /character from the beginning


Pathetic fallacy
Giving human emotions to something non-human (usually nature)


Foreshadow
Hints / clues of future events


Personification
Giving living qualities to something non-human


Imagery
Metaphors, similes, symbols


Sensory language
Five senses


Juxtaposition
Contrasting ideas / images


Simile
Comparing something to something else: 'as', 'like'


Metaphor
Describing something by stating it is something else


Symbolism
Objects, colours, sounds, places


Tenses

PAST
Something that has already happened
Had / went / said / walked

PRESENT
Something that is currently happening
Have / go / say / walk

FUTURE
Something that will happen
Will have / will go / will say / will walk

Common Homophones

Word Classes

Adjective
Describes a noun or pronoun.
Blue / young / powerful


Adverb
How, when or where something happens.
Furiously / yesterday / here


Preposition
Where something is; the time, direction or cause of something.
On / under / above


Pronoun
Words that replace nouns or noun phrases.
She / he / they

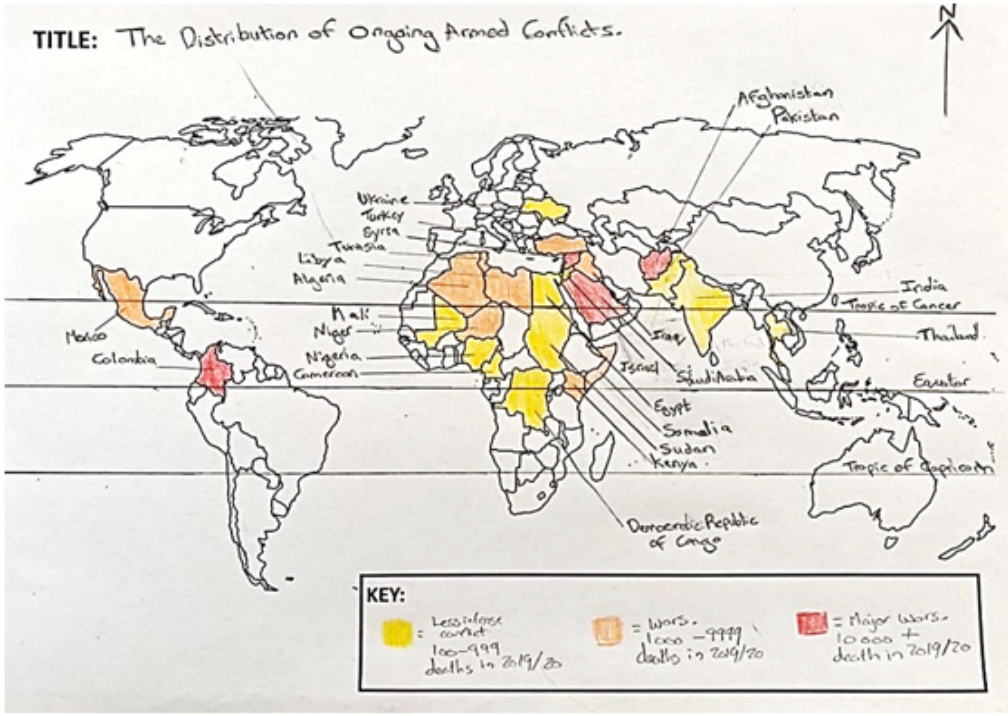

Noun
Person, place, thing, idea or state of being.
Manchester / cat / love


Verb
An action or state of being.
Jump / write / be


Year 9 Conflict & Borders

War	War is a violent conflict between groups of people or nations, often using weapons that can lead to death.
Changing Borders	political borders can change over time, and new countries can be created or change in size.
Impact	This is an effect. What happens due to an event.
Migration	When people move to live and work.
Refugee	When someone enters a new because it is no longer safe to continue living somewhere.
Development	Improving a country in terms of wealth and wellbeing
Geopolitics	Geopolitics is the study of how a country's geography (location, terrain, land size, climate and raw materials) affect its foreign, economic, military policy and strategy.
Relief	Changes in height in a landscape.
Topography	is the study of the land's surface, including its different forms and features.
Nato	The North Atlantic Treaty Organisation – A group of countries that have an agreement to support each other.
Sanction	A country imposing sanctions on another country, such as by refusing to trade.

Ongoing Global Conflicts



- The map shows ongoing global conflicts in 2023 the darker the colour the more fatalities there were.
- The majority of conflicts were taking place in the northern hemisphere (above the equator)
- There are quite a few conflicts in North and Central Africa and Central Asia.
- There is only one conflict in Europe which is in Ukraine

Advantages of Choropleth Maps

- Different colours or shading can make them easy to interpret.
- Data is presented by country/region/continent which makes it easy to see patterns and analyse.

How does conflict affect Geography?

- After WW1 the borders of Europe were redrawn to punish Germany and Austria for creating war in Europe. Both countries were striped of territory and new countries were created.

How does Geography affect conflict?

- The physical geography of a place can have a major impact on war and help to inform ***battle strategies***.
- Physical features can make a place easier to defend. For example:
- **Forests:** Can provide cover for guerilla tactics and impede visibility for larger armies. An example of this is the jungle influenced how the Vietnam War was fought with the Viet Cong ambushing American troops and disappearing back into the forest.
- **River & Coasts:** Can act as natural barriers, limiting crossing points and potentially providing defensive advantages. An example of this is the D-Day landings in WW2. The Normandy Coastline with its beaches and cliffs presented challenges for Allied Forces

German troops manning a machine gun in a bunker overlooking a beach.

How does conflict affect economic development?

- War can limit a countries ability to improve itself.
- Funds that could be spent improving a countries healthcare, education facilities and technology are spent on guns and ammunition.
- An example of conflict affecting development is Afghanistan. The Taliban have stopped women from working and girls from attending secondary school college and University.
- This means that nearly 50% of the population cannot contribute economically.

Why are refugees dying in the Mediterranean ?

What – People risking their lives to cross the sea to reach Europe

Why – Ongoing conflict in Syria and other Middle-eastern and African countries meant people fled for safety. Often risking their lives.

How: There are no safe routes into Europe so refugees are risking their lives crossing the Mediterranean on small boats hoping for a better life. Many 1000s have died.

What is NATO?

The North Atlantic Treaty Organisation – A group of countries that have an agreement to support each other. It was created after World War 2.

Year 9 Hot Deserts

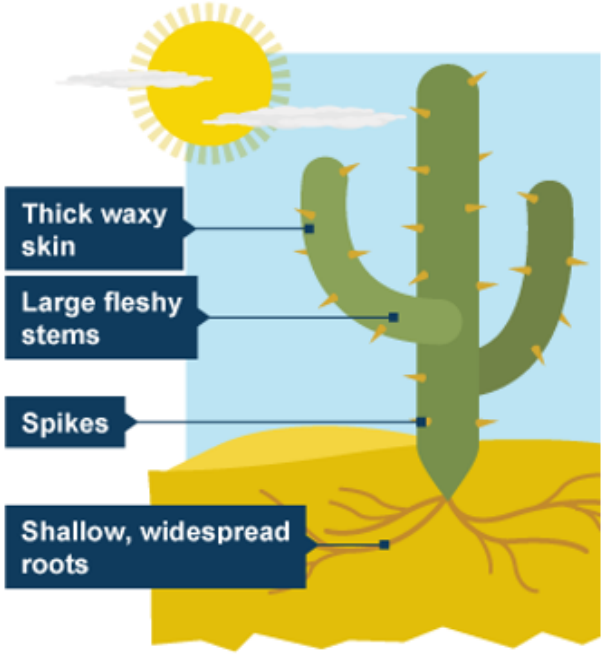
Term	Definition
Desert	**Hot deserts** are hot arid areas with little rainfall, extreme temperature and sparse vegetation
Ecosystem	A collection of plants and animals within a particular area.
Biome	A large ecosystem where plants and animals are determined by the area's climate.
Climate	Climate is the average weather conditions in a place over a long period of time.
Adaptation	When a plant or animal changes to suit the environment it lives in.
Drought	When an area receives very little rainfall.
Development	How a countries standard of living changes over time (wealth & wellbeing)
Infertile Soil	Soil that cannot support plant growth / poor quality so plants will not grow
Desertification	This is process by which healthy soil turns into desert.

Vegetation in the Desert

Deserts have very low biodiversity because it is very hot and dry. The plants that are able to survive there are heavily adapted to cope with the lack of rain and high temperatures.

The **cactus** opposite has a number of important adaptations.

- The thick waxy skin prevent moisture loss in the heat.
- The large fleshy stems can store water for when the plant needs it because there is so little rainfall.
- Spikes stop animals from eating the stem to get the water.
- The shallow widespread roots are so the plant can catch any rainfall quickly before it evaporates.



Location

- The majority of deserts are found near to or on either the Tropic of Cancer or the Tropic of Capricorn.
- The Sahara Desert is the worlds largest desert and it spans the full length of Northern Africa.

Climate

- During the day, desert temperatures rise to an average of 38°C (in summer).
- At night the temperature can drop as low as -2°C as there are no clouds to keep the heat close to earth.
- Deserts receive under 250mm of rainfall per year making them the driest of all biomes. The average in Manchester is 900mm per year.

Soil

- Desert soils are thin, sandy and rocky.
- Desert soils are very dry. When it does rain they soak up the water very quickly.

Who lives in Hot Deserts?

People have been living in deserts for 1000's of years. In the Sahara Desert there is a group of people called the **Bedouin** who have lived in the desert for many generations. They are a **traditional society** meaning the knowledge and skills have been passed down through generations about how to survive in the desert. They are also **nomadic** meaning they move regularly in search of food and water for themselves and their animals.

Las Vegas: A city in the desert

- Las Vegas is a city that was built in the Nevada Desert. It became a city after the Hoover Dam was built on the Colorado River creating Lake Mead providing enough water to support a larger population.
- Las Vegas has a population of 660,000 people.
- Due to an increasing population and low rainfall levels in 2020 Lake Mead was reduced to 25% of its capacity.
- Las Vegas is having to put in place measures to try and reduce the amount of water it is using.
- Some of these measures are banning big swimming pools, re-using water and removing grass (which shouldn't grow in the desert anyway.)

Can Deserts Grow?

Desertification is the process by which healthy soil becomes desert. This is happening in deserts all over the world. So yes deserts can grow.

Two reasons desertification is occuring:

1. **Climate Change:** As the planet is warming up and some areas are receiving less rainfall vegetation is dying.
2. **Overuse of the soil:** Too much farming can cause the soil to become infertile. Plant roots no longer hold the soil together and it can be blown away by wind. This leaves bare rock.

Can we stop deserts growing?

Yes, in Africa some methods are proving successful at stopping the Sahara growing

1. **The Great Green Wall:** Planting millions of trees along the edge of the Sahara desert. The roots hold the soil together and the tree canopy provides shade reducing the temperature of the soil so it can retain moisture.

Year 9 Knowledge Organiser: Civil Rights in the USA

What do I need to know?

- ✓ What was segregation and how did affect the lives of Black Americans?
- ✓ How much progress was made in the civil rights movement in the 1950s and the reasons for this progress?
- ✓ What were the main reasons for progress in the civil rights movement in the 1960?

KEY VOCABULARY

Segregation	Separating people from each other (based on race or skin colour)
Discrimination	Unfair treatment of people based on race, skin colour or gender.
White supremacy	The belief that white people are a superior race and should therefore dominate society.
Lynching	A term used when a mob kill (often by hanging) someone accused of a crimes such as murder or rape.

HOW DID SEGREGATION AFFECT THE LIVES OF BLACK AMERICANS?

Slavery was abolished in America in 1865. However, freedom did not lead to equality. In fact, most black people continued to face racism, discrimination and even violence. In the 1950s, in the South, segregation laws (called the **Jim Crow Laws**) said all public facilities had to have separate sections for white people and black people. Examples include:

- ✓ Black children could not go to the nearest school if it was a 'white' school.
- ✓ Black Americans had to sit in the 'coloured' section on buses and could be arrested if they sat in the 'white' section.
- ✓ Cinemas, restaurants, theatres and churches were either just for white or black Americans or had separate seating.

Black Americans were also prevented from voting.

- ✓ Most states had a literacy test to register to vote – harder tests were given to black people.
- ✓ White employers threatened to sack black employees who registered to vote.

WHAT HAPPENED TO EMMETT TILL?

- ✓ In August 1955, Emmett Till, a 14 year old black boy from Chicago, visited relatives in Mississippi where he was accused of harassing a white woman, Carolyn Bryant ,in her store – she claimed that he had taken hold of her waist, asked her for a date and wolf whistled at her.
- ✓ Bryant's husband and brother-in-law abducted Till, beat and shot him and threw his body into a local river.
- ✓ The two men were arrested and put on trial. The all-white jury found the two white defendants not guilty. They later sold their story (admitting the murder) to a magazine.
- ✓ Till's mother had an open viewing of the body leading to huge publicity. Many Black and white Americans were shocked by what had happened. Many became involved in the civil rights movement as a result.

WHO WERE THE KU KLUX KLAN?

- ✓ The Ku Klux Klan was formed in 1866 to prevent ex-slaves gaining the vote and any form of equality. It operated in the Southern states.
- ✓ It was a secret organisation and because many of their actions were illegal, they always hid their identities by wearing hoods.
- ✓ They terrorised Black Americans by intimidation and extreme violence including bombings and lynching.
- ✓ Members of the Klan included politicians, judges, and policemen. This made it very difficult to get suspected Klan members arrested or convicted of their crimes.

How much progress did the civil rights movement make in the 1950s?

KEY VOCABULARY			
State government	Controls what happens in an individual state and can make some laws for that state.	**Separate but equal**	This stated that segregation was legal as long as facilities for both races were of an equal standard.
Federal government	The national government led by the president. It makes laws for the whole country.	**NAACP**	National Association for the Advancement of Colored People. They gained civil rights by taking cases to court

HOW IMPORTANT WAS BROWN V. TOPEKA BOARD OF EDUCATION?

A black girl, Linda Brown, had to walk 21 blocks to her black school when there was a white school only 7 blocks away. Her father went to the NAACP for help. They took the case to the Supreme Court. On May 17, 1954, it was ruled that schools had to desegregate.

This was a success because:
- ✓ 'Separate but equal' had been abolished.
- ✓ By 1957, 723 school districts were desegregated in the border states with little violence.

However, its success was limited because:
- ✓ No deadline was set for desegregation so as late as 1962 schools in Mississippi and Alabama were still segregated.
- ✓ White Citizens Councils were formed to make sure schools stayed segregated and membership of the KKK rose.

WHY WAS THE MONTGOMERY BUS BOYCOTT SUCCESSFUL?

In 1955, Rosa Parks was arrested for sitting in the white section on a bus. A one-day bus boycott was organised as a protest. It was so successful that the Montgomery Improvement Association (MIA), led by Martin Luther King, decided to continue the boycott for another 12 months.

This was successful because:
- ✓ The MIA organised carpools so black people could get to work.
- ✓ The boycotters carried on despite threats, loss of jobs, bombings (including King's house) and arrests.
- ✓ The determination of the boycotters impressed the NAACP who took the case (Browder v. Gayle) for desegregation of buses to the Supreme Court.
- ✓ The actions of white people were shown in the media gaining sympathy for the boycotters.

HOW IMPORTANT WERE EVENTS AT LITTLE ROCK HIGH SCHOOL?

In 1957, 9 black students were admitted to Little Rock High School. The Governor of Arkansas, Orval Faubus, did not want desegregation to happen so used the National Guard to stop the black students from getting into the school. White mobs also harassed the students. Eventually, President Eisenhower took control of the National Guard and used them to protect the black students for the rest of the school year. However, they had to endure threats and taunts from white teachers and students.

This was a success because:
- ✓ Due to the publicity many Americans saw the racial hatred that existed in the South which forced the president to act.
- ✓ It showed that states would be overruled by the Federal government when necessary.

However, its success was limited because:
- ✓ Only one of the Little Rock 9 actually graduated.
- ✓ Faubus closed Little Rock High School to prevent further desegregation.

1954 The Brown v. Topeka Case → **1955** The murder of Emmett Till → **1955** The Montgomery Bus Boycott → **1957** Events at Little Rock High School

What was the main reason for progress in the civil rights movement in the 1960s?

HOW IMPORTANT WERE THE GREENSBORO SIT-INS, 1960?

Four black students sat at a lunch counter in a department store. The staff refused to serve them as the lunch counter was segregated. The students refused to leave. The next day 25 students arrived and sat at the counter in shifts. The local newspaper reported the story and the sit-ins spread, with 50,000 people taking part, to other lunch counters and were soon national news.

This was important because:

✓Protesters faced racial abuse and had food and drink poured over them but did not react violently. This brought sympathy for the protesters.

✓Black protestors were joined by white people showing increased support for civil rights.

✓Lunch counters and other diners were desegregated as a result of the sit-ins.

HOW IMPORTANT WERE THE FREEDOM RIDES, 1961?

Two buses left Washington DC to travel South to test if the desegregation of buses and station facilities was happening. The first bus was firebombed by the KKK in Anniston, Alabama. Riders on the second bus were beaten up by KKK members in Birmingham. There were over 60 Freedom Rides throughout the summer. Most were met with violence and over 900 Riders were arrested.

This was important because:

✓The violent reaction of white people led to a great deal of national publicity and the refusal of the Riders to retaliate impressed many.

✓The Freedom Rides did not result in any law changing but President Kennedy said he would enforce desegregation if states did not obey.

✓The Southern states began to desegregate bus facilities.

KEY VOCABULARY

Peaceful protest	Protests that do no use violence or retaliate to violence

HOW IMPORTANT WAS THE BIRMINGHAM CAMPAIGN 1963?

This campaign, led by Martin Luther King, aimed to end segregation in Birmingham, Alabama. It included sit-ins, marches and a boycott of shops. 6,000 children marched in the 'Children's Crusade'. Police sprayed them with water hoses, hit them with batons, and threaten them with police dogs. 900 were arrested.

This was important because:

✓ Events brought worldwide publicity that made the USA look bad.

✓ President Kennedy intervened and put pressure on shops and businesses in Birmingham to desegregate.

✓ The events convinced President Kennedy to introduce a new civil rights bill.

✓ Over 300 cities in the South agreed to at least some desegregation as a result of protests that spread because of the Birmingham Campaign.

HOW IMPORTANT WAS THE WASHINGTON MARCH, 1963?

This was a march for jobs and freedom. Over 400,000 people, including 40,000 white people, protested peacefully together. Martin Luther King gave his famous 'I have a dream' speech. President Kennedy, decided to meet with the leaders to congratulate them on their success.

This was important because:

✓ The media coverage attracted a worldwide audience so millions of people heard King's speech.

✓ It showed the huge support that existed for civil rights.

✓ Kennedy committed himself to get a new Civil Rights Act passed This became the 1964 Civil Rights Act.

1960 Greensboro Sit-ins → **1961 Freedom Rides** → **Spring 1963 Birmingham Campaign** → **August 1963 Washington March**

What was the main reason for progress in the civil rights movement in the 1960s?

HOW IMPORTANT WAS FREEDOM SUMMER, 1964?

The aim was to increase the number of black voters in Mississippi. It involved white students from the North coming to teach in Freedom Schools for black children while others taught black people how to pass the voter registration tests. The KKK burned churches and homes and beat up volunteers. Many black people lost their jobs for trying to register to vote or allowing their children to go to a freedom school. Three civil rights workers were murdered by the KKK. These became known as the Mississippi Murders.

This was important because:

- ✓ The Mississippi Murders became a massive scandal and gained publicity for black Americans' lack of voting rights.

BUT

- ✓ Around 17,000 black people tried to register to vote; only 1,600 succeeded.

HOW IMPORTANT WAS THE MARCH FROM SELMA TO MONTGOMERY, 1965?

King decided to campaign in Selma, hoping to put pressure on President Johnson to pass a new law to help black Americans to vote. On 'Bloody Sunday', 600 protesters set out to march from Selma to Montgomery but state troopers stopped them at the Edmund Pettus Bridge, firing tear gas and attacking protesters with clubs and electric cattle prods.

This was important because:

- ✓ The violence of the state troopers made the USA look bad and damaged its reputation abroad.
- ✓ It persuaded Johnson to pass the Voting Rights Act of 1965.
- ✓ President Johnson intervened: he got federal troops to escort a bigger march, led by King, from Selma to Montgomery.

KEY VOCABULARY

Black Nationalism	Black people being proud of their African heritage and wanting to form a separate black nation.

HOW IMPORTANT WAS MALCOLM X?

Malcolm X rejected peaceful protest, especially its stress on not retaliating to white violence. He argued that King's peaceful approach had not resulted in enough change for African Americans. He also believed in Black Nationalism.

He was important because:

- ✓ He spoke on television highlighting the problems in the ghettoes that were faced by many young black people.
- ✓ He was a role model and had great influence on young black Americans.

BUT

- ✓ His message that black people should fight back led to fear amongst many white Americans.

HOW IMPORTANT WAS THE BLACK POWER MOVEMENT?

The Black Panther Party is an example of a Black Power group. They aimed to achieve equality "by any means necessary", encouraging black people to defend themselves. They were often involved in shootouts with police. They were angry about the poor conditions in the ghettoes so they patrolled the streets in black communities to keep them safe, ran breakfast clubs for poor black children, organised medical clinics for poor black people, and ran courses on black history.

They were important because:

- ✓ The Black Panthers did help to improve conditions in the ghettoes.

BUT

- ✓ It's use of violence alienated moderate whites and blacks. It gave a bad name to the civil rights movement.

1964 Freedom Summer → **March 1965 March from Selma to Montgomery** → **1968 King's campaign in the North**

What was the main reason for progress in the civil rights movement in the 1960s?

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- ✓ His message that black people should fight back led to fear amongst many white Americans.

HOW IMPORTANT WAS THE MARCH FROM SELMA TO MONTGOMERY, 1965?

King decided to campaign in Selma, hoping to put pressure on President Johnson to pass a new law to help black Americans to vote. On 'Bloody Sunday', 600 protesters set out to march from Selma to Montgomery but state troopers stopped them at the Edmund Pettus Bridge, firing tear gas and attacking protesters with clubs and electric cattle prods.

This was important because:

- ✓ The violence of the state troopers made the USA look bad and damaged its reputation abroad.
- ✓ It persuaded Johnson to pass the Voting Rights Act of 1965.
- ✓ President Johnson intervened: he got federal troops to escort a bigger march, led by King, from Selma to Montgomery.

HOW IMPORTANT WAS THE BLACK POWER MOVEMENT?

The Black Panther Party is an example of a Black Power group. They aimed to achieve equality "by any means necessary", encouraging black people to defend themselves. They were often involved in shootouts with police. They were angry about the poor conditions in the ghettoes so they patrolled the streets in black communities to keep them safe, ran breakfast clubs for poor black children, organised medical clinics for poor black people, and ran courses on black history.

They were important because:

- ✓ The Black Panthers did help to improve conditions in the ghettoes.

BUT

- ✓ It's use of violence alienated moderate whites and blacks. It gave a bad name to the civil rights movement.

1964 Freedom Summer → **March 1965 March from Selma to Montgomery** → **1968 King's campaign in the North**

HOW IMPORTANT WAS KING'S CAMPAIGN IN THE NORTH, 1968?

Between 1964 and 1968, there were 329 major race riots in northern cities. The riots were caused by police brutality and poor living conditions. King wanted to prove that non-violent action would work in the North so joined a campaign for fairer housing in Chicago.

But many black politicians did not support the campaign and King struggled to connect with ghetto gangs who didn't agree with his methods. King did reach a deal on fairer housing with the Mayor of Chicago but the Mayor ignored the agreement and nothing changed.

Co-ordinates

Component Knowledge

- Recognise the different axis on a graph
- To be able to plot a coordinate in positive and negative quadrants

Key Vocabulary

Horizontal	Going side-to-side, like the horizon. This is the x axis
Vertical	In an up-down direction or position. This is the y axis
Co-ordinates	A set of values that show an exact position. On graphs it is usually a pair of numbers

Co-ordinates:

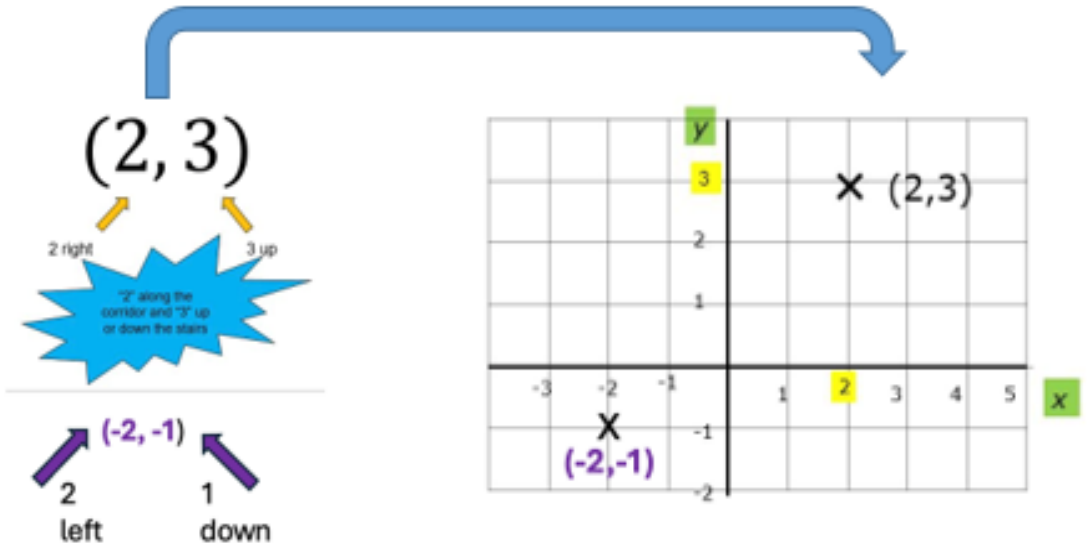
Coordinates are a set of instructions to get to a location from the origin $(0, 0)$.

The first number (x) tells us how far we go 'along the corridor' HORIZONTAL

The second number (y) tells us how far we go 'up (or down) the stairs'. VERTICAL

$$(x, y)$$

Co-ordinates example



Online Clip

M618

Straight line graphs

Component Knowledge

- Recognise and sketch horizontal and vertical graphs
- Complete a table of values
- Plot straight line graphs
- Identify gradients/intercepts from a graph
- Identify gradients/intercepts from an equation

Key Vocabulary

Axis	A fixed reference line a grid to help show the position of coordinates
Gradient	How steep a graph is at any point
Y intercept	Where the graph cuts through the y axis
Coordinate	A set of values that show an exact position
Quadrant	Any of the 4 areas made when we divide up a plane by an x and y axis
Vertical	In an up and down position. The y axis is the vertical axis
Horizontal	Going side to side. The x axis is the horizontal axis
Graph	A diagram showing the relationship between two quantities

Completing a table of values and plotting a graph

To plot a straight line graph, you may be given a table or you may need to draw one.

Example: Plot the graph of $y = 4x - 2$ for the values of x from -3 to 3.

1) Draw a table of values if you have not been given one.

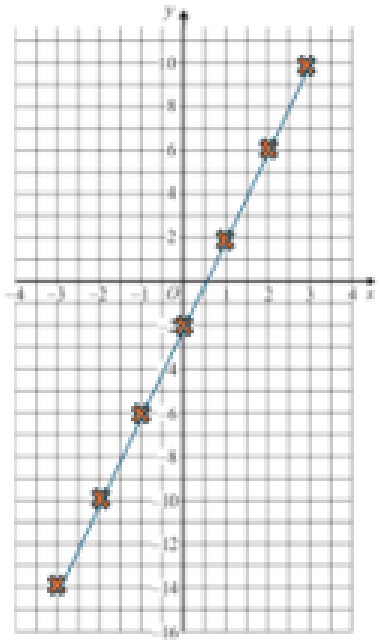
x	-3	-2	-1	0	1	2	3
y							

2) Substitute in your x values to $y = 4x - 2$, this will give the corresponding y values.

x	-3	-2	-1	0	1	2	3
y	-14	-10	-6	-2	2	6	10

3) Plot the points on the graph.

E.g. (-3, -14), (-2, -10), (-1, -6), (0, -2), ... etc



4) Join up with a straight line.

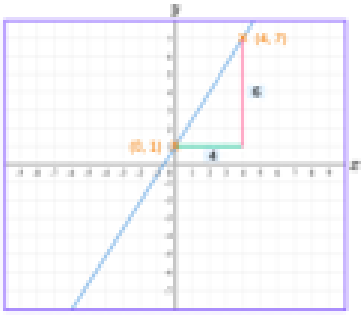
The equations of all straight lines can be written in the form:

$$y = mx + c$$

Gradient – The number in front of the x. This tells us how steep the line is.

Intercept – The number on its own. Shows where the line cuts the y axis.

The gradient of a line tells us how steep the line is, the greater the gradient the steeper the line.



You can find the gradient using the graph by picking 2 points on the line and using

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

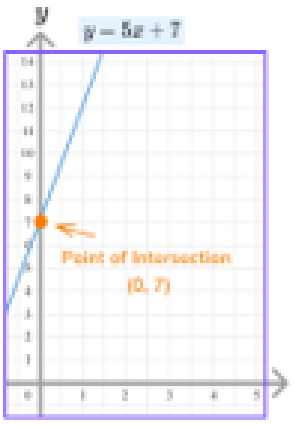
The change in y is equal to $y_2 - y_1 = 7 - 1 = 6$

The change in x is equal to $x_2 - x_1 = 4 - 0 = 4$

$$m = \frac{6}{4}$$

The y intercept is where the line crosses the y axis

You can find the y intercept from the equation by putting x equal to 0



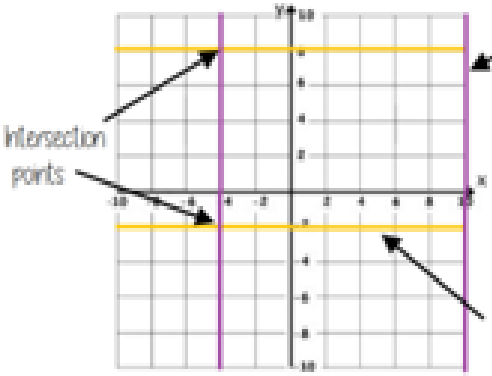
The gradient and intercept of a straight line can also be identified form the formula.

Example: Find the gradient and intercept of the following lines.

1) $y = 5x - 2$ — Grad = 5 Intercept = - 2
2) $2y = 4x + 5$ $y = 2x + 2.5$ — Grad = 2 Intercept = 2.5
3) $x + y = 10$ $y = -x + 10$ — Grad = - 1 Intercept = 10

Rearrange all equations so they are in the form y = mx + c (the y must be isolated)

Lines parallel to the axis (Horizontal and Vetical lines)



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

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

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

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

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

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

Online clips

M797, M932, M544, M888

Exchange rates

Component Knowledge

- Convert other currencies into pounds and vice versa
- Be able to compare costs in different currencies

Key Vocabulary

Currency	Money, such as coins or banknotes, used as a medium of exchange
Exchange Rate	The rate at which the money of one country can be exchanged for the money of another country
British Pounds	The currency used in the United Kingdom
US Dollar	The currency used in The United States of America

How to work out exchange rates

1) Write down the exchange rate and the other information given
2) Highlight the rate
3) Decide whether to multiply or divide by the rate
   a. If you are going **FROM** the "1" to the other currency, then **multiply**
   b. If you are going **TO** the "1" from the other currency, then **divide**
4) Multiply or divide the given currency by the exchange rate
5) State your final answer with the correct currency symbol

Example

Given that £1 = $1.87, convert £70 to dollars.

1) £1 = $1.87
2) £1 = $1.87 This tells us that every £1 is equal to $1.87
3) We are going from the "1" to the other currency so we multiply
4) £70 x $1.87
5) = $130.90

Comparing Currencies

Example

A coat in London costs £60. The same coat in Dublin costs €74.88 The exchange rate is £1 = €1.17.

In which city is the coat cheaper and by how much?

1) We can choose to compare in £ or €. I have chosen £.
2) Cost of coat in Dublin in £ = 74.88 ÷ 1.17 = £64.
3) This means it is cheaper to buy the coat in London as it is £4 cheaper (£64-£60=£4).

You may be given a conversion graph instead of an exchange rate

You can use the graph to find the exchange rate.

The picture can't be displayed.

Online clip U610

Conversion graphs

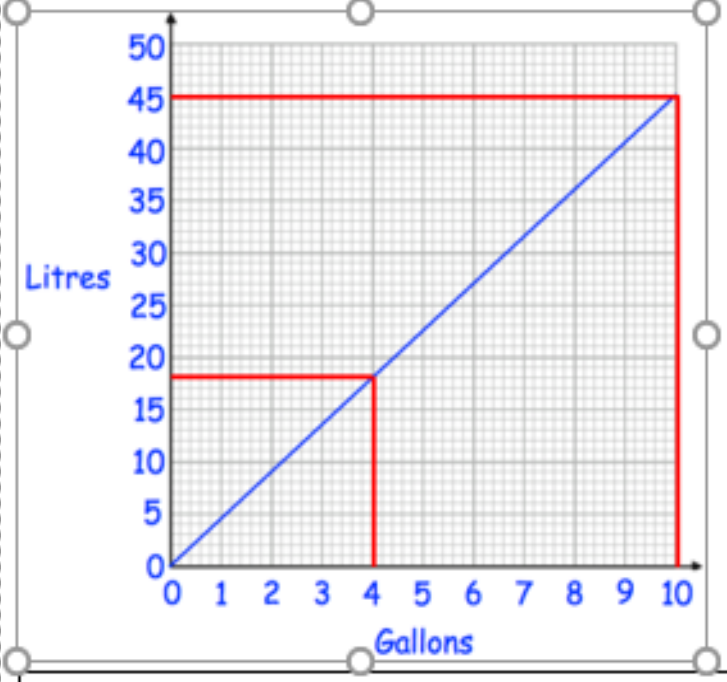
Component Knowledge

- Plot a conversion graph
- Interpret a conversion graph

Key Vocabulary

Conversion graph	Straight line graphs that show a relationship between two units and can be used to convert from one to another.
Convert	Change a value or expression from one form to another.
Axes	A fixed reference line on a grid to help show the position of coordinates.

Using conversion graphs



Example 1- Use the graph to convert 45 litres to gallons.

Draw a line to the right from 45 litres until it meets the diagonal line.

Then draw from the diagonal line, down until it reaches the gallons on the x axis.

Now read the number from the axis. In this example 45 litres = 10 gallons.

Example 2- Use the graph to convert 4 gallons to litres.

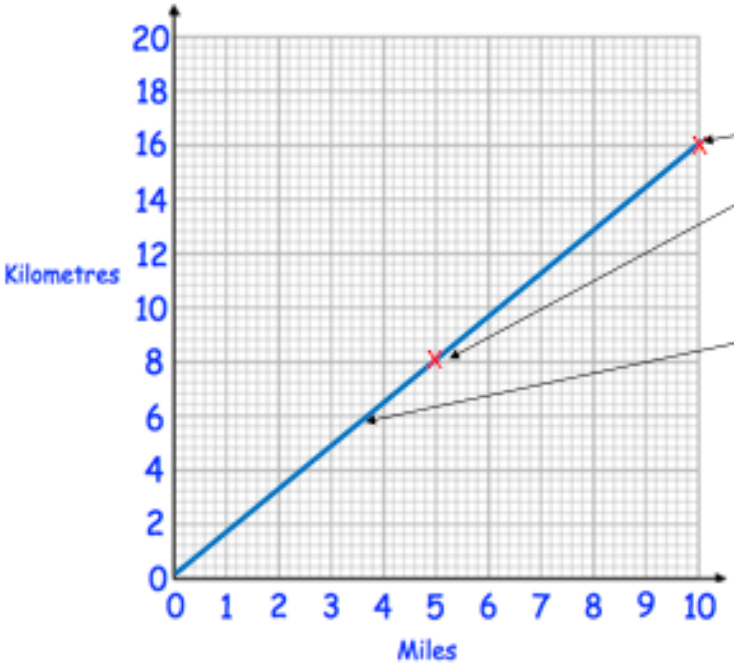
Draw a line up from 4 gallons until it meets the diagonal line.
Then draw from the diagonal line to the left until it reaches the litres on the y axis.
Now read the number from the axis. In this example 4 gallons = 18 litres.

Example 3- Use the graph to convert 60 gallons to litres.

The graph does not go up to 60 gallons but you can use a value from the graph and then multiply to answer this question.
In this example the graph shows that 10 gallons is equal to 45 litres.
If you multiply 10 gallons by 6 you would get 60 gallons.
Do the same to the litres (45 × 6) and you will work out the answer.
In this example the answer is 270 litres.

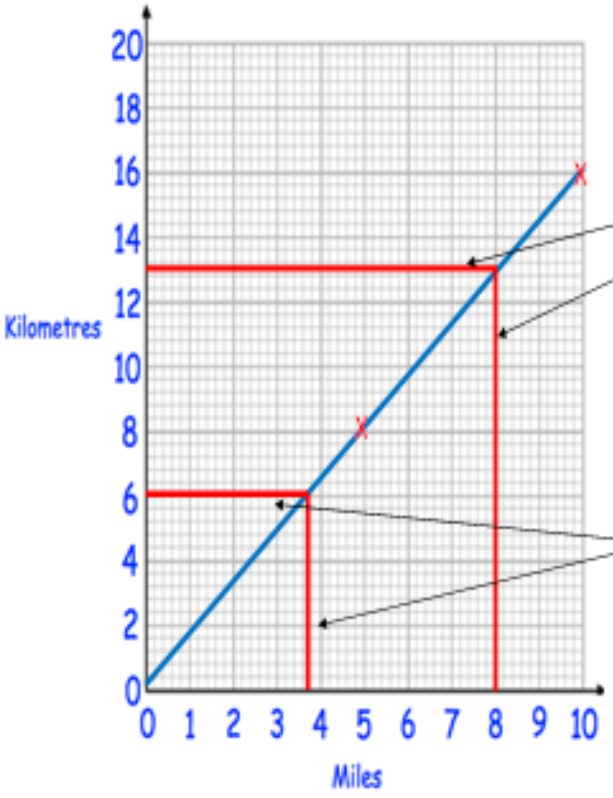
Plotting conversion graphs

Use the fact 5 miles = 8 kilometres to draw a conversion graph on the grid.



Mark a cross at 5 miles and 8 kilometres and then another one at 10 miles and 6 kilometres.

Join these points up from (0,0).



Use your graph to convert 8 miles to kilometres

Draw a line up from 8 miles until it meets the diagonal line. Then draw from the diagonal line to the left until it reaches kilometres on the y axis. Then read the number from the axis. In this example 8 miles is 12.8 kilometres.

Use your graph to convert 6 kilometres to miles

Draw a line to the right from 6 kilometres until it meets the diagonal line. Then draw from the diagonal line, down until it reaches miles on the x axis. Then read the number from the axis. In this example 6 kilometres is 3.8 miles.

Online clip

U610

Pressure

Component Knowledge

- Calculate the pressure exerted on an object using the formula.
- Calculate the force exerted by an object using pressure and area.
- Calculate the area using pressure and force.

Key Vocabulary

Pressure	The effect of a force over an area.
Force	Force is push or pull. Measures in Newtons (N).
Area	The amount of space taken up on a flat surface.
Gravity	The force that attracts a body towards any other physical body that has mass.
Measure	To find a number that shows the size or amount of something.

Key Concepts

Whenever an object rests on a solid surface, the surface pushes back against the object, balancing the weight.

The effect that the force of gravity has on the surface depends on the size of the force and the area it is acting over. This effect is called pressure.

Pressure can be increased by increasing the size of the force or decreasing the area.

Formulae

$$Pressure = \frac{Force}{Area}$$

$$Area = \frac{Force}{Pressure}$$

$$Force = Pressure \times Area$$

Examples

A tracked excavator has a weight of 210,000N. The area in contact with the ground is $4m^2$.

$$Pressure = \frac{Force}{Area} = \frac{210{,}000N}{4m^2} = 52{,}500\ N/m^2$$

A man weighs 880N and his shoes have an area of $500cm^2$. What pressure does he put on the floor?

$$Pressure = \frac{Force}{Area} = \frac{800N}{500cm^2} = 1.6\ N/cm^2$$

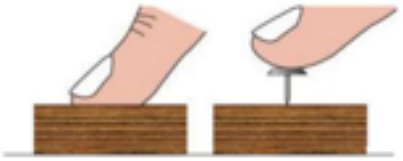
Units

Force is typically measures in Newton's (N)

Sometimes pressure is measures in Pascals (Pa)

- 1 Pa is the same as 1 N/m^2
- 1000 Pa equals 1 kilopascal (kPa)

Visual Representation



The drawing pin will sink into the wood as it has a small surface area which **concentrates** the force.

The finder won't sink in as it has a large surface area which **spreads out** the force.

Online clips

U527, U842

Density, mass and volume

Component Knowledge

- Calculate simple density, mass or volume
- Calculate more complex density, mass or volume
- Combining mass and volume to find density of a compound.

Key Vocabulary

Density	A measure of how tightly the mass of an object is packed into the space it takes up. If an object is heavy and small it will have a higher density
Mass	The mass of an object is the quantity of matter it contains. It never changes.
Volume	Volume is defined as the space occupied within the boundaries of an object in three-dimensional space
Units	The unit of measure used to describe density, mass and volume.
Compound measurement	A measure made up of two or more measurements (e.g. speed, pressure, density)

Formulae for density, mass and volume

$$Density = \frac{Mass}{Volume}$$

$$Volume = \frac{Mass}{Density}$$

$$Mass = Density \times Volume$$

Calculate density

A solid silver spoon has a mass of 65.1g. The volume of the spoon is 6.2cm³. Calculate the density of silver.

Density = $\frac{Mass}{Volume}$ ← Write out the formula

Density = $\frac{65.1g}{6.2cm^3}$ ← Substitute in the values from the question

Density = 10.5 g/cm^3 ← Remember to include the units in the final answer

Calculate volume

Iron has a density of 7.8g/cm³. A solid iron statue has a mass of 877.5g. Work out the volume of the statue.

Volume = $\frac{Mass}{Density}$ ← Write out the formula

Volume = $\frac{877.5g}{7.8g/cm^3}$ ← Substitute in the values from the question

Volume = 112.5 cm^3 ← Remember to include the units in the final answer

Calculate mass

A piece of plastic has a density of 1.3g/cm³ and a volume of 100cm³. Work out the mass of the piece of plastic.

$Mass = Density \times Volume$ ← Write out the formula

$Mass = 1.3g/cm^3 \times 100cm^3$ ← Substitute in the values from the question

$Mass = 130g$ ← Remember to include the units in the final answer

Useful Conversions

tonne ×1000 kg ×1000 g

÷1000 ÷1000

Km^3 ×1000^3 m^3 ×100^3 cm^3 ×10^3 mm^3

÷1000^3 ÷100^3 ÷10^3

Calculate more complex density, mass or volume

When calculating more complex density, mass or volume you may need to do a calculation before you can then substitute the values from the question into the formula. You made need to calculate the volume of the object first or you may need to change the units of mass or volume so that they are the same.

A glass cube of side length 5cm has a mass of 306.25g. Calculate the density of the glass.

$5 \times 5 \times 5 = 125cm^3$ ← Calculate the volume of the cube

$Density = \frac{Mass}{Volume}$ ← Write out the formula

$Density = \frac{306.25g}{125cm^3}$ ← Substitute in the values you know

$Density = 2.45g/cm^3$ ← Remember to include the units in the final answer

A garden ornament has a volume of $0.05m^3$. The ornament is made from a stone that has a density of $6.4g/cm^3$. Calculate the mass of the ornament. Include suitable units.

$0.05m^3 \times 1,000,000 = 50,000cm^3$ ← Units need to be the same. Convert m^3 into cm^3

$Mass = Density \times Volume$ ← Write out the formula

$Mass = 6.4g/cm^3 \times 50,000cm^3$ ← Substitute in the values from the question

$Mass = 320,000g$ ← Remember to include the units in the final answer

$Mass = 320kg$ ← Change the units to kg as it is more suitable than g

Combining mass and volume to find new density

When combining mass and volume to find a new combined density you cannot just add the two densities together. You have to find the total mass and the total volume of the new substance and then use these amounts to calculate the density of the compound (Sterling silver in the example below).

Some sterling silver is made with 900 g of silver and 90 g of copper. The density of silver is 10 g/cm^3. The density of copper is 9 g/cm^3. What is the density of the sterling silver?

a)

	Silver	Copper	Sterling silver
Density	10 g/cm^3	9 g/cm^3	
Mass	900g	90 g	
Volume			

← Fill in what you know from the question

b)

	Silver	Copper	Sterling silver
Density	10 g/cm^3	9 g/cm^3	
Mass	900g	90 g	
Volume	90cm^3	10 cm^3	

← Calculate the missing volumes

c)

	Silver	Copper	Sterling silver
Density	10 g/cm^3	9 g/cm^3	
Mass	900g	90 g	990 g
Volume	90cm^3	10 cm^3	100 cm^3

← Calculate the new mass and new volume by adding

d)

	Silver	Copper	Sterling silver
Density	10 g/cm^3	9 g/cm^3	9.9g/cm^3
Mass	900g	90 g	990 g
Volume	90cm^3	10 cm^3	100 cm^3

← Calculate the new density by dividing the new mass by the new volume

Online clip

U910

Speed, Distance & Time

Component Knowledge

- Calculate speed given distance and time (including fractional time).
- Use the correct formula to calculate speed, distance & time.

Key Vocabulary

Speed	A measure of how fast something is happening
Distance	A measure of how far it is from one place to another
Time	A measure of how long something takes to happen
Units	A quantity used as a standard measurement
Convert	To change something from one form to another
Average	A calculated central value of a set of numbers
Metric	A standard unit of measure using metres, kilograms and seconds
Imperial	A unit of measure developed in England. E.g. miles, pounds, gallons etc.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

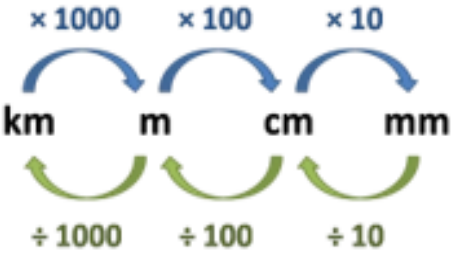
$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Units of speed include: m/s (metres per second), mph (miles per hour), Km/h (kilometres per hour).

Units of distance include: m (metres), km (kilometres) miles.

Units of time include: s (seconds), min (minutes), h (hours).

Useful conversions



5 miles ≈ 8 kilometres

Example 1

Jim travels 45 miles in 3 hours.

What was his average speed in mph?

$$Speed = \frac{Distance}{Time} = \frac{45}{3}$$

$$= 15mph$$

Example 2

Jess travels 45 miles in 1 hour 30 mins.

What was her average speed in mph?

$$Speed = \frac{Distance}{Time} = \frac{45}{1.5}$$

$$= 30mph$$

1 hour 30 mins
$= 1\frac{30}{60}$ h
= 1.5 hours

Example 3

Jim drives at 40 mph for 3 hours.

How far did he travel?

$$Distance = Speed \times Time$$

$$Distance = 40 \times 3$$

$$= 120 \text{ miles}$$

Example 4

For 15 minutes Sally ran at

an average speed of 20 km/h

$$Distance = Speed \times Time$$

$$Distance = 20 \times 0.25$$

$$= 5 \text{ km}$$

Note: there are different units of time so we convert mins to hours.

15 mins = $\frac{15}{60}$ = 025 h

Example 5

A train travels 300 miles at 60 mph.

How long did this take?

$$Time = \frac{Distance}{Speed} = \frac{300}{60}$$

$$= 5 \text{ hours}$$

Example 5

A runner travels 3 km at 5 m/s.

How long did they take?

$$Time = \frac{Distance}{Speed} = \frac{3000}{5}$$

$$= 600 seconds$$

$$= 10 \text{ minutes}$$

Note: there are different units of distance so we convert km to m.

3km = 3000m

Note: this is not a sensible unit. We convert 600s to mins.

600s = 10 mins

Multi-Part Journeys

Julie drove 45km from Bath to Bristol.

She then drove 68km from Bristol to Cardiff.

Julie's average speed from Bath to Bristol was 50km/h

Julie took 105 minutes to drive from Bristol to Cardiff.

Work out Julie's average speed for her total drive from Bath to Cardiff.

Creating a table can help solve problems with multi-part journeys.

	Speed	Distance	Time
Bath to Bristol	50 km/h	45 km	0.9 h
Bristol to Cardiff	We do not need this	68 km	105 mins (1.75 h)
Total	**42.6 km/h**	113 km	2.65 h

We cannot just find the second speed and take the mean of the 2 values because the distances are different.

Use the formula to find the missing value so we can find the total distance and total time by adding them (we must convert the time to a decimal).

$$Average\ Speed = \frac{Total\ Distance}{Total\ Time} = \frac{113}{2.65} = 42.6km/h(1.d.p)$$

Online clips

U151, M515

Real life graphs

Component Knowledge

- Plot and interpret simple real life graphs
- Plot and interpret distance time graphs

Key Vocabulary

Real life graph	This is a graph that represents a situation that we would see in real life.
Distance time graph	A graph that shows a journey and the relationship between the distance reached in a given time.
Y-intercept	Where a graph crosses the y-axis.
Gradient	How steep a line is at any point
Gradient (distance time graph)	The rate of change of one variable with respect to another (distance and time). This can be seen by the steepness and represents speed.

Real life graphs

Graphs that are representative of real-life situations. The actual meaning of the values depends on the labels and units on each axis.

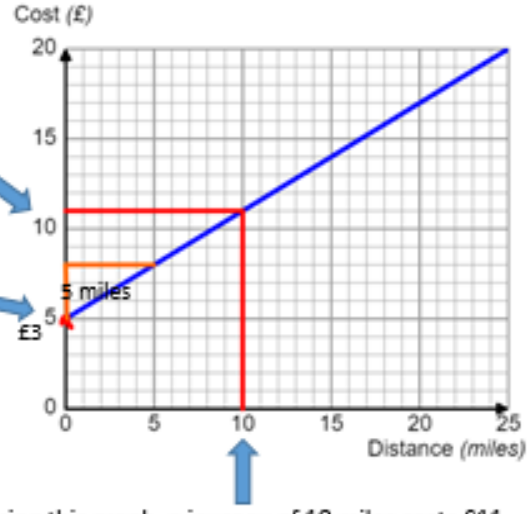
Real life graph – taxi journey

This graph shows the cost of using a taxi for a journey.

The gradient shows the cost per 5 miles travelled. In this example it costs £3 per 5 miles travelled, which equals £0.60 per miles travelled.

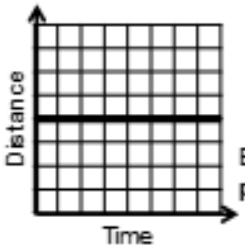
The y-intercept shows the starting cost for the journey (something that has to be paid no matter how long the journey is). In this example the starting cost is £5.

The graph can be used to calculate the cost of a journey or the distance of the journey.



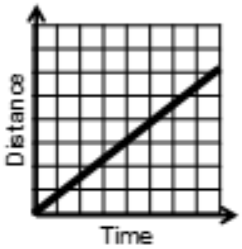
Using this graph, a journey of 10 miles costs £11.

Introduction to distance time graphs



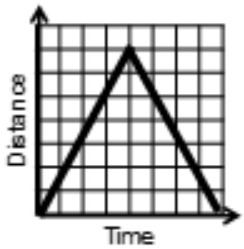
A horizontal line means that there is no movement.

Example - a car **remains parked** in a car park.



A diagonal line means that there is movement at a constant rate. The less steep the gradient is, the slower the movement is.

Example - a motorbike travels away from home at a **steady speed**.

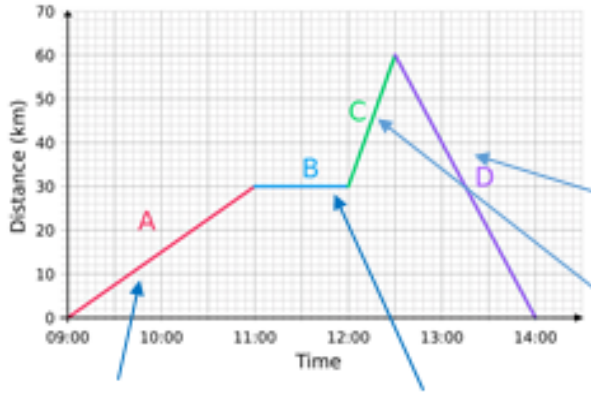


A diagonal line means that there is movement at a constant rate.
If it is positive (up) it means it is movement away from the start.
If it is negative (down) it means it is movement back to the start.

Example - a runner runs at a **steady pace** to the end of a track, turns around then runs at the **same speed back**.

Real life graphs - distance time graphs

The graph below describes a journey that has several parts to it, each represented by a different straight line.
Part A: 09:00–11:00, the person travelled 30 km away from their starting point and that took them 2 hours.
Part B: 11:00–12:00, we can see that the line is flat, so the distance from their starting point did not change – they were stationary.
Part C: 12:00–12:30, they moved a further 30 km away from their starting point.
Part D: 12:30–14:00, they travelled the full 60 km back to where they began.



Calculate the speed – for each part of the journey:

$$\text{Speed}(S) = \frac{\text{Distance}(D)}{\text{Time}(T)}$$

Part D: 12:30–14:00

$\text{Speed}(S) = \frac{60}{1.5} = 40\ km/h$

Part A: 09:00–11:00

$\text{Speed}(S) = \frac{30}{2} = 15\ km/h$

Part B: 11:00–12:00

$\text{Speed}(S) = \frac{0}{1} = 0\ km/h$

Part C: 12:00–12:30

$\text{Speed}(S) = \frac{30}{0.5} = 60\ km/h$

From this we can see that the person travelled the fastest over **part C.**

Online clips

U652, U638, U896, U403, U914

Area under a graph

Component Knowledge

- Know that distance comes from finding the area under the graph
- Find the total area under the graph using trapezia, triangles and rectangles.

Key Vocabulary

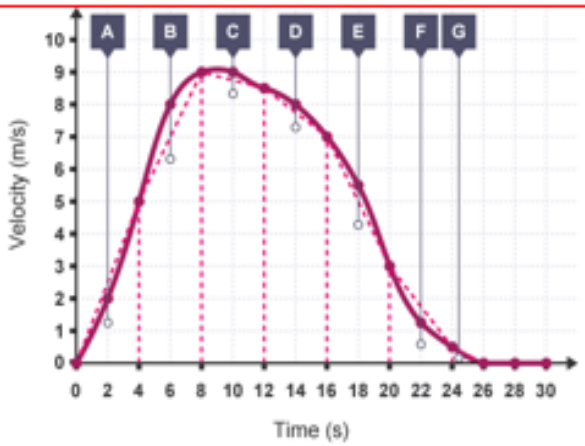
Distance	The length of the space between two points
Speed	The rate at which something moves or operates
Time	The measurable period during with an action continues
Area	The measurement of a surface
Approximate	Something that is similar but not exactly equal to something else
Speed-time graph	A graph that shows the relationship between the speed of an object and the time elapsed

The area under a speed-time graph represents the distance travelled. The area under a velocity-time graph represents the displacement of the moving object. If the velocity is always positive, then the displacement will be the same as the distance.

The area under a graph can be estimated by dividing the space into triangles, rectangles and trapezia. The more shapes used, the more accurate your answer.

Example

The velocity of a sledge as it slides down a hill is shown in the graph.
Find the distance travelled by the sledge over its 30 seconds journey.
Vertical lines every 4 seconds along the horizontal axis have been added and points joined to make triangles, rectangles or trapeziums.



The areas of the shapes are

A: $A = \frac{b \times h}{2} = \frac{4 \times 5}{2} = 10$

B: $A = \frac{(a+b) \times h}{2} = \frac{(5+9) \times 4}{2} = 28$

C: $A = \frac{(a+b) \times h}{2} = \frac{(9+8.5) \times 4}{2} = 35$

D: $A = \frac{(a+b) \times h}{2} = \frac{(8.5+7) \times 4}{2} = 31$

E: $A = \frac{(a+b) \times h}{2} = \frac{(7+3) \times 4}{2} = 20$

F: $A = \frac{(a+b) \times h}{2} = \frac{(3+0.5) \times 4}{2} = 7$

G: $A = \frac{b \times h}{2} = \frac{0.5 \times 2}{2} = 0.5$

Total area = 131.5.

So, the total distance covered is 131.5m

Online clips

U265, U882

Gradient of a graph

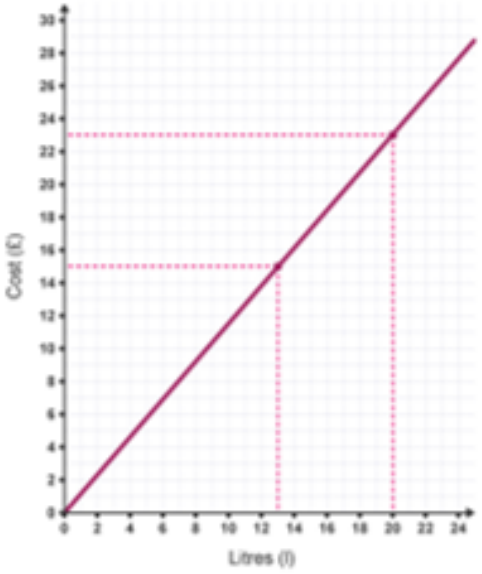
Component Knowledge

- Interpret what the gradient of a graph represents in real life
- Find the gradient of a straight line graph
- Find the gradient of a tangent to a curve

Key Vocabulary

Gradient	How steep a line is.
Tangent	A line that touches a curve at a point, matching the curve's slope at that point.
Curve	A smooth flowing line (no sharp changes).
Co-ordinate	A point on a graph showing how far along and how far up or down the point is from the origin.
Acceleration	How fast velocity changes.
Speed	How fast something is moving.

This graph shows the cost of petrol. It shows that 20 litres will cost £23 or £15 will buy 13

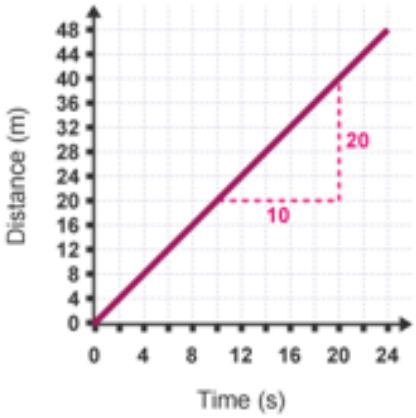


Gradient = $\frac{change\ in\ y}{change\ in\ x}$

Using the points (0,0) and (20,23) the gradient = $\frac{23-0}{20-0} = 1.15$

The units of the axes help give the gradient a meaning

In this example, the gradient shows the cost per litre (£1.15 per litre)

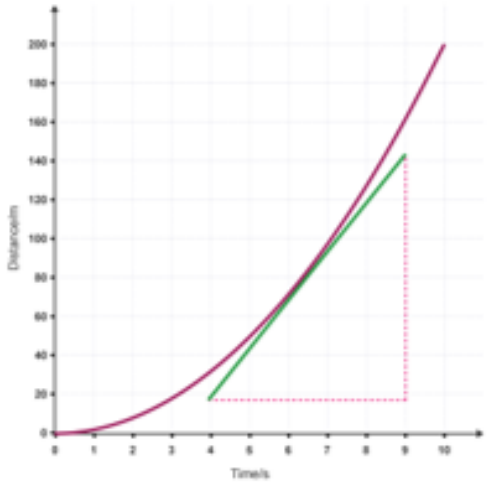


The gradient of a distance-time graph represents speed

Gradient = $\frac{change\ in\ y}{change\ in\ x} = \frac{change\ in\ metres}{change\ in\ seconds} = m/s$

The speed is $\frac{20}{10} = 2m/s$

This distance-time graph shows the first ten seconds of motion for a car.



The average speed over the 10 seconds = the gradient of the line from

(0,0) to (10, 200) =

$$\frac{200}{10} = \frac{20m}{s}$$

To find an estimate of the speed after 6.5 seconds, draw the tangent to the curve at 6.5

Gradient =

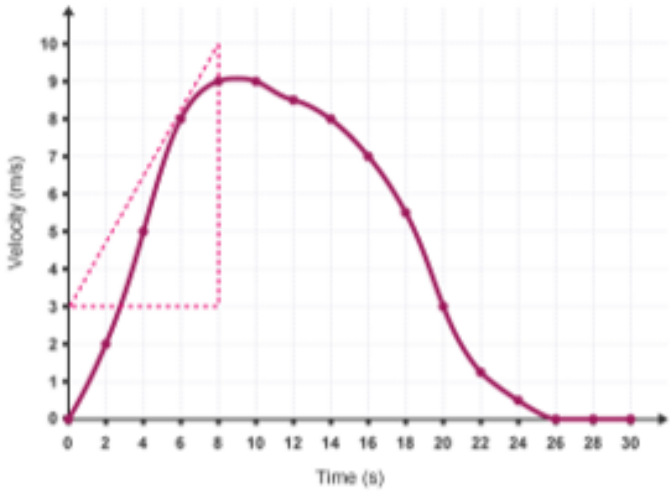
$$\frac{140-20}{9-4} = \frac{120}{5} = \frac{24m}{s}$$

A velocity-time graph shows the velocity of a moving object on the vertical axis and time on the horizontal axis.

The gradient of a velocity-time graph represents acceleration, which is the rate of change of velocity. If the velocity-time graph is curved, the acceleration, at a particular point in time, can be found by calculating the gradient of a tangent to the curve.

A negative gradient shows the rate of "slowing down" or deceleration.

The velocity of a sledge as it slides down a hill is shown in the graph. Find the acceleration of the sledge when t = 6s



Draw a tangent to the curve at the point where t = 6s and draw two lines to form a right angle triangle. The acceleration is equal to the gradient of the tangent.

$$\text{Acceleration} = \frac{change\ in\ y}{change\ in\ x}$$

$$= \frac{7\ m/s}{8s} = 0.875 m/s^2$$

After about 10 seconds, the gradients are negative meaning the sledge is slowing down or decelerating.

Online clips

U315, U477, U800

Averages

Component Knowledge

- To understand and calculate the mode from a list.
- To understand and calculate the median from a list.
- To understand and calculate the mean from a list
- To calculate the range and understand it is **not** an average.

Key Vocabulary

Data set	Collection of values that share a common relationship. This could be answers to a set question or information for a set objective.
Average	Is a value (or values) that is used to represent a whole data set
Mode	The most frequent value in a data set. It is a type of average. Modal is another word used more mode.
Median	The middle value of a data set, when ordered. It is a type of average.
Mean	A measure of the size of the data when shared out equally. It is a type of average.
Range	A value to show spread out a data set is. It can be used to describe how representative of the whole data set the average used is. IT IS NOT AN AVERAGE.

Averages

We use averages to summarise a whole data set in a single value/few values. We do this so we can interpret large data sets and also compare data sets more easily.

Mode- the most frequent value/ few values in a data set. There can also be no mode in a set of data.

Ex 1, find the mode:

blue red blue green blue blue
pink green blue red blue yellow

Blue is the mode.

Ex 2, find the mode:

9, 4, 3, 6, 9, 5, 2, 1, 8, 7

To make it easier, we can re-write these values in ascending(increasing) order.

1, 2, 3, 4, 5, 6, 7, 8, 9, 9. We can now see clearly **9 is the mode.**

Ex 3, find the mode:

9, 4, 3, 6, 9, 5, 2, 1, 8, 7, 3

Re-written 1, 2, 3, 3, 4, 5, 6, 7, 8, 9, 9 We can see **3 and 9 are the modal values.**

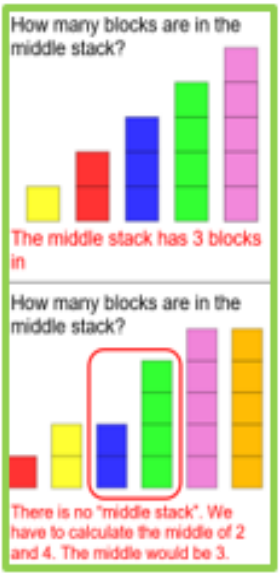
** We usually only have 1, 2 or 3 modal values**

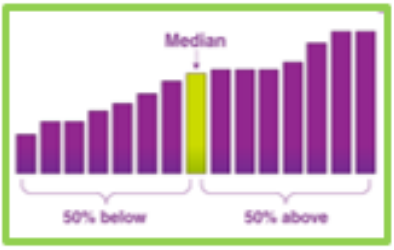
Ex 4, find the mode:

4, 3, 6, 9, 5, 2, 1, 8, 7

Re-written 1, 2, 3, 4, 5, 6, 7, 8, 9 We can see there **are NO modal values.**

Median- the middle value in a data set, when in order. If there are 2 middle values, we find the midpoint between them.





Find the median of: ~~1~~, ~~3~~, ~~3~~, **6**, ~~7~~, ~~8~~, ~~9~~

Median = 6

Find the median of: ~~1~~, ~~2~~, ~~3~~, **4**, **5**, ~~6~~, ~~8~~, ~~9~~

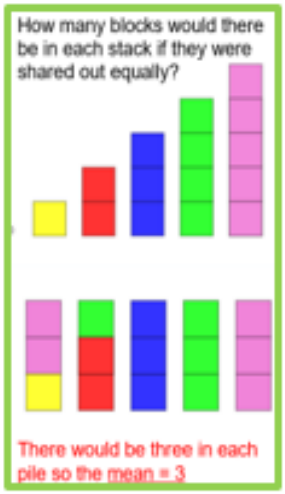
Median is the midpoint of 4 and 5 = 4.5

Find the median of the following set of numbers.

40 −2 10 40 −31 3 −34 −13 −10 1 30 16 −16

−34 −31 −16 −13 −10 −2 1 3 10 16 30 40 40

Mean- The mean is the size of each part when a quantity is shared equally. We can do this by adding all the values in the data set together and then dividing it equally between the number of values.



Example 1.
Find the mean of the following set of numbers.

19, 6, 17, 6

Solution.
To find the mean divide the sum of the numbers by the number of numbers.

$$\frac{\text{Sum of numbers}}{\text{Number of numbers}} = \frac{19+6+17+6}{4}$$

$$= \frac{48}{4}$$

$$= 12$$

There are 4 values in the data set so we are dividing by 4.

Range- the range shows how spread out the data is. It is useful to order the data when finding the range. The smaller the range, the more consistent the data.

E.g. Find the range of the following numbers

43 36 10 −8 −3 −6 −4 −22

−22 −8 −6 −4 −3 10 36 43

65

Range =43- -22 = 65

Online Clips

M841, M934, M940, M328

Reverse mean

Component Knowledge

- Rearrange the formula used to work out the mean to find the total or frequency
- Find missing values when given the mean
- Problem solve using the mean

Key Vocabulary

Average	A calculated central value of a set of numbers
Mean	The average of a set of numbers
Inverse	Reverses the effect of another operation
Operation	A mathematical process
Function machine	A way of writing rules using a flow diagram

Key Concepts

Reverse mean questions often involve starting with the mean and working your way back to find the total.

This involves rearranging the formula to calculate the mean.

Function machines are often a good visual to use when working backwards.

Useful formula

Mean = Total ÷ Frequency

Total = Mean x Frequency

Frequency = Total ÷ Mean

Function machines

Data → Add up → ÷ frequency = mean

Missing value = Subtract ← x frequency ← mean

Example 1

We can use reverse mean to work out a missing number in a set.

If we are told the numbers 4, 2, 8, ? have a mean of 4, we can work out the value of the missing number.

Total = 4 x 4 = 16

16 – 8 – 4 – 2 = 2

So, the missing number is 2

Example 2

There are 10 boys and 20 girls in a class. The class has a test. The mean mark for all the class is 60. The mean mark for the girls is 54. Work out the mean mark for the boys.

10 + 20 = 30 in class

Total for class = 60 x 30 = 1800

Girls total = 54 x 20 = 1080

Boys total = 1800 – 1080 = 720

Boys mean = 720/10 = 72

Online clips

Averages from a frequency table

Component Knowledge

- To be able to calculate the mean, median, mode and range from a frequency table.

Key Vocabulary

Frequency	The number of pieces of data we have.
Mean	Add up the values you are given and divide by the number of values you have.
Median	The middle value when the data is in order.
Mode	The value or item with the highest frequency.
Range	This is the difference between the largest and smallest values. Shows the spread of the data

A team played 10 games and recorded the number of goals scored in those games.

Goal scored (x)	Frequency (f)	Total Frequency so far		$(fx)(f\ multiplied\ by\ x)$
0	2	(2)	2	0 x 2 = 0
1	2	(2+2)	4	1 x 2 = 2
2	5	(2+2+5)	9	2 x 5 = 10
3	1	(2+2+5+1)	10	3 x 1 = 3
Total	10			15

Calculating the mean number of goals scored.

Step 1: calculate the total frequency

Step 2: calculate (fx)

Step 3: calculate the mean using the formula $\frac{total\ fx}{total\ frequency}$

Mean = $\frac{15}{10}$ = 1.5 goals

Calculating the mode number of goals scored.

Mode = highest frequency of goals scored

Highest frequency = 5 for 2 goals scored

Mode = 2 goals scored

Calculating the median number of goals scored.

Median value = $\frac{Total\ frequency+1}{2}$

$\frac{11}{2}$ = 5.5th value

add the frequency column until you reach the value in-between the 5th and 6th value

Median = 2 goals

Calculating the range number of goals scored.

Highest number of goals = 3

Lowest number of goals = 0

Range = 3 – 0

Range = 3

Online clip M127

Averages from a grouped frequency table

Component Knowledge

- Calculate an estimate for the mean from a grouped frequency table.
- Calculate the modal class interval from a grouped frequency table.
- Calculate the median from a grouped frequency table.

Key Vocabulary

Average	A number expressing the central or typical value in a set of data, particularly the mode, median or mean.
Grouped Data	If we have a large spread of data, we put it into categories (classes) to make the data easier to display or analyse.
Class interval	Group.

Averages from grouped data

a) Find an estimate for the mean of this data.

Length (L cm)	Frequency (f)	Midpoint (x)	fx
$0 < L \leq 10$	10	5	$10 \times 5 = 50$
$10 < L \leq 20$	15	15	$15 \times 15 = 225$
$20 < L \leq 30$	23	25	$23 \times 25 = 575$
$30 < L \leq 40$	7	35	$7 \times 35 = 245$
Total	55		1095

Step 1: Calculate the total frequency.

Step 2: Find the midpoint of each group.

Step 3: frequency (f) x midpoint (x).

Step 4: Calculate the estimated mean.

$$\frac{Total\ fx}{Total\ f} = \frac{1095}{55} = 19.9\text{cm}$$

b) Identify the modal class interval.

Modal class is $20 < L \leq 30$

Modal Class = The group that has the highest frequency.

c) Identify the group in which the median would lie.

$$= \frac{56}{2} = 28^{th}\ \text{Value.}$$

$$\text{Median Value} = \frac{Total\ frequency + 1}{2}$$

Add the frequency column until you reach the 28th value.

Median is in the group $20 < L \leq 30$

NOTE:

For grouped data, we can only calculate an estimate for each average as we do not know the exact values in each group.

Online clip

M287

Averages from a grouped frequency table

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Online clip

M287

Stem and leaf Diagrams

Component Knowledge

- Put data into a stem and leaf diagram
- Create a key to explain the diagram
- Find averages using a stem and leaf diagram

Key Vocabulary

Stem and leaf diagram	A diagram where each data value is split into a leaf and a stem
Ascending	From smallest to largest
Mean	A calculated central value of a set of numbers
Mode	The number which appears most often in a set of numbers
Median	The middle of a sorted list of numbers
Range	The difference between the lowest and highest values

Key Concepts

A **stem and leaf diagram** is a method of organising numerical data based on the place value of the numbers.

Each number is split into two parts:

- The first digit(s) form the stem
- The last digit forms the leaf

The leaf should only ever contain a single digit

How to set up a stem and leaf diagram

- Organise the data into ascending order, smallest to largest
- Determine how the numbers are split into 2 parts by writing a key for the stem and leaf diagram
- Write the values for the "stem" into the diagram
- Write the values for the "leaf" into the diagram

The key

A stem and leaf diagram must have a **key**. This explains how to convert the digits in the stem and lead diagram into a single data point. Remember to include any units in the key if appropriate.

Key : 1	4 means 1.4kg

Key : 3	5 represents 35 years

Key : 1	9 represents 1.9kg

Boys Key : 1	4 represents 41 marks
Girls Key : 4	0 represents 40 marks

Example

A group of students are making models out of clay. The weight of each model is shown below. Draw a stem and leaf diagram.

1.5kg, 2.3kg, 1.6kg, 3.1kg, 3.1kg, 1.4kg, 2.5kg, 1.7kg, 1.8kg, 2.4kg

1) Order the numbers

1.4kg, 1.5kg, 1.6kg, 1.7kg, 1.8kg, 2.3kg, 2.4kg, 2.5kg, 3.1kg, 3.1kg

2) Split the numbers into two parts.

1.4kg splits into units (1) and tenths (4)

3) Put the values into the diagram and create a key

Key : 1	4 means 1.4kg
1	4 5 6 7 8
2	3 4 5
3	1 1

Dual Stem and Leaf diagrams

Comparing data sets is simplified by using a dual stem and leaf diagram which have two sets of data represented back to back.

For example, the two sets of data shown below could be combined together to form one dual stem and leaf diagram instead of having two separate diagrams

	Female
0	6 7
1	2 4 8 8 9
2	4 5 5 5 6 6
3	0 1 2 3 3 3 6
4	

Key : 1 | 2 means 12

	Male
0	1 4 5
1	0 2 3 4 4 8
2	2 7 7 9
3	0 0 0 3 6 8
4	0

Key : 1 | 0 means 10

Note the digits in the leaf for females is still in ascending order but from right to left, rather than left to right.

Female		Male
7 6	0	1 4 5
9 8 8 4 2	1	0 2 3 4 4 8
6 6 5 5 5 4	2	2 7 7 9
5 3 3 3 2 1 0	3	0 0 0 3 6 8
	4	0

Key : 3 | 1 | 4 represents
13 Female
14 Male

The data for the two classes is now much easier to compare and draw conclusions from

Averages from a stem and leaf diagram

The mode, median, mean and average can all be found from the data in a stem and leaf diagram

Key : 1	9 represents 1.9kg
1	9
2	2 8
3	1 4 4 9
4	5 8
5	1

From the stem and leaf we can see that 3.4kg is the mode and it appears the most in the diagram

The range is 3.2kg and the mean is 3.51kg

For the median we need to find the middle value. There are 10 values so to find the location of the median we do (10 + 1) / 2 = 5.5

We count 5 and a half places to find the median is 3.4kg

Or we can cross off from either side to find the middle number.

Online clips

M648, M210

Scatter Graphs

Component Knowledge

- Plot points on a scatter graph
- Describe the relationship between variables using a scatter graph
- Identify outliers on a scatter graph
- Draw and interpret a line of best fit

Key Vocabulary

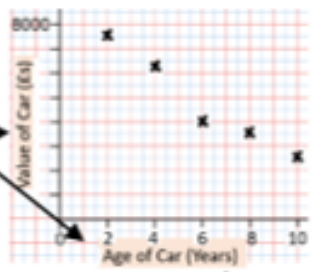
Origin	Where two axes meet on a graph
Outlier	A point that lies outside the trend of the graph
Relationship	The link between two variables
Correlation	The mathematical definition for the type of relationship between two variables
Line of best fit	A straight line on a graph that represents the data on a scatter graph
Interpret	Describe what the data is showing

Plotting a scatter graph

Age of car (years)	2	4	6	8	10
Value of car (£)	7500	6250	4000	3500	2500

The data forms information pairs for the scatter graph that you plot as coordinates e.g. (2, 7500).

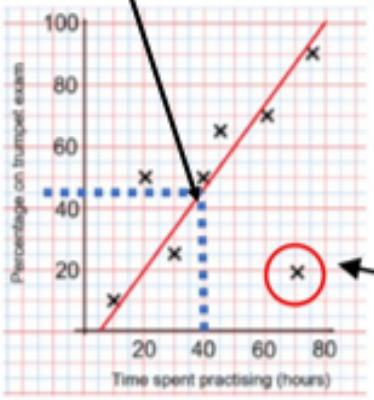
Make sure axes are clearly labeled and values are equally spaced



The line of best fit

We use the line of best fit to estimate other values.

E.g. 40 hours revising predicts 45% score on exam



We cannot use our line of best fit to predict information outside of our data range.

This point is an 'outlier'
It doesn't fit the model and stands apart from the rest of the data

Types of Correlation- describes the relationship only.

Positive correlation
As one variable increases so does the other variable.

Negative correlation
As one variable increases the other variable decreases.

No correlation
There is no relationship between the two variables.

Online clips

M769, M596

Probability Rules

Component Knowledge

- Understand what probability shows
- Understand probability notation
- Write a probability of a single event
- Use the NOT rule
- Use the OR rule
- Use the AND rule

Key Vocabulary

Probability	The mathematical chance, likelihood, of an outcome happening
Event	The "thing" that is being completed/done/observed/counted
(Event) Outcome	What happens when the event is performed
Probability scale	A numerical scale from 0 to 1, with 0 being an impossible outcome and 1 being an outcome certain to happen
Mutually exclusive (event) outcomes	When outcomes cannot happen at the same time e.g. being an adult and being a child, you **cannot be both**
Exhaustive (event) outcomes	When a set of outcomes cover all possibilities with no gaps e.g. You pass a test or fail a test.
Independent events	Where the outcome of one event does **not** affect the outcome of another
Dependent events	Where the outcome of one event **does** affect the outcome of another

Single Event Probability:

The probability of an (event) outcome A, happening is

$$P(outcome\ A) = \frac{number\ of\ ways\ outcome\ A\ can\ happen}{number\ of\ ways\ any\ outcome\ can\ happen}$$

e.g. the probability of rolling a number greater than 4 on a regular 6 sided dice

Outcomes "greater than 4": $\mathbf{5}$ *or* $\mathbf{6}$, *so* ***2 options***

All possible outcomes: $\mathbf{1, 2, 3, 4, 5}$ *or* $\mathbf{6}$, *so* ***6 possibilities altogther***

$$P(roll\ a\ number\ greater\ than\ 4) = \frac{2}{6}$$

Probability NOT happening:

The probability of an (event) outcome A, **not** happening is written as A' and is found by

$$P(A') = 1 - P(A\ does\ happen)$$

This is because the probabilities of mutually exclusive and exhaustive events always sum to 1.

Probability of A OR B happening:

The probability of either (event) outcome A happening, OR either (event) outcome B happening is written as A∪B

$$P(A \cup B) = P(A) + P(B)$$

Eg If the probability I draw a tennis match is 0.4, P(draw)=0.4

and the probability I win a tennis match is 0.3, P(win)=0.3

The probability I either win OR draw is

$$\begin{aligned} P(Win\ or\ Draw) &= P(Win) + P(Draw) \\ &= 0.3 + 0.4 \\ &= 0.7 \end{aligned}$$

Probability of A AND B happening:

For independent events the probability of (event) outcome A happening, AND then (event) outcome B happening is written as A∩B

$$P(A \cap B) = P(A) \times P(B)$$

Eg If the probability I miss the bus is 0.3, P(miss the bus)=0.3

and the probability I pass a test is 0.8, P(pass test)=0.8

The probability I miss the bus and pass a test is

$$\begin{aligned} P(Miss\ and\ Pass) &= P(Miss) \times P(Pass) \\ &= 0.3 \times 0.8 \\ &= 0.24 \end{aligned}$$

Online clip

M755

Venn Diagrams

Component Knowledge

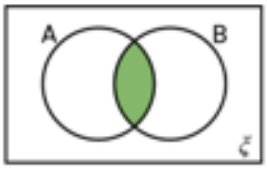
- Complete a Venn Diagram when given a set of data
- Fill in missing values in a Venn Diagram
- Interpret a Venn diagram
- Find probabilities from a Venn Diagram
- Use simple set notation

Key Vocabulary

Set	A collection of "things" (objects or numbers)
Union	The set made by combining the elements of two sets
Intersection	The intersection of two sets has only elements common to both sets
Probability	The change that something happens
Venn Diagram	A diagram that shows sets which elements belong to which set by drawing regions around them. It is used to represent data that has an overlap.

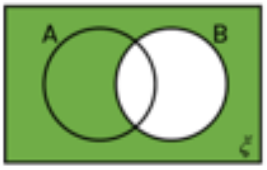
Key Concepts

Venn diagrams show all possible relationships between different sets of data.



A ∩ B
The **intersect** of A and B.
The set of elements in **both A and B**.

A ∪ B
The **union** of A and B.
The set of elements in **A or B or both.**



B'
The **complement** of B.
The set of elements **not in B.**

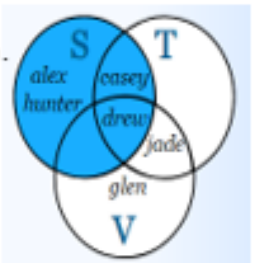
Venn Diagrams with 3 sets

Diagrams can be drawn to show more than 2 sets of data. This is an example of a Venn Diagram containing 3 sets.

S = {Alex, Hunter, Casey and Drew}

T = {Jade, Casey and Drew}

V = {Drew, Jade and Glen}



Example

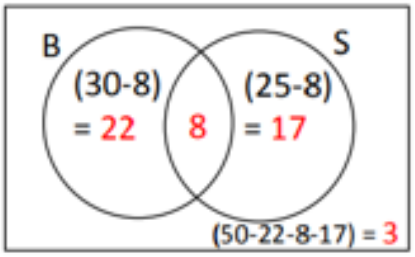
Out of 50 people surveyed:

30 have a brother

25 have a sister

8 have both a brother and a sister

This is what the Venn Diagram for this information would look like



Remember – the people in the intersection are also included in the whole circle so we don't duplicate data.

From the Venn Diagram, we can see that the probability of someone from this group just having a brother is 22/50.

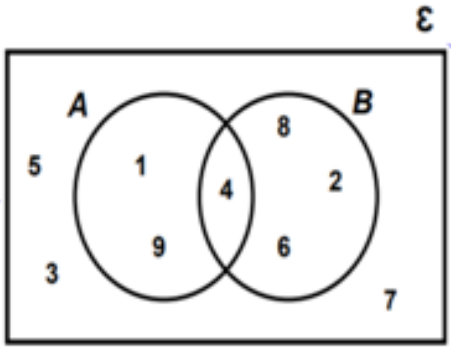
The probability of someone from this group having neither a brother or a sister is 3/50.

The probability of having a brother and a sister,

$$P(A \cap B) = \frac{8}{50}$$

Example: Given a set of numbers

$\mathcal{E}$={1,2,3,4,5,6,7,8,9}
A={square numbers}
B={even numbers}



ε - denotes the universal set.
This is the set containing all of the elements being considered.

In set A 'the square numbers' are 1, 4 and 9.

In set B the 'even numbers' are 2, 4, 6, 8.

4 is in both groups so would go in the centre (the intersection)

Outside of the circles are any numbers remaining in ε

Online clips

M829, M419, M834

Set Notation

Component Knowledge

- Complete a Venn Diagram when given a set of data
- Fill in missing values in a Venn Diagram
- Find probabilities from a Venn Diagram

Key Vocabulary

Set	A collection of "things" (objects or numbers)
Union	The set made by combining the elements of two sets
Intersection	The intersection of two sets has only elements common to both sets
Complement	All elements from a universal set not in our set
Element	Things contained in a set

Key Concepts

A set can be a list of items known as elements

A subset would be a selection of these elements.

When we list elements within a set, we use these curly brackets { } and separate each elements in the list with commas.

The universal set, ξ, is the list of every element that there is available to choose from.

The complement of a set is denoted with an apostrophe and would be the remaining elements in the universal set that are not part of that set.

Symbol	Description
$\{\}$	Curly brackets - contain all items in a set
,	Comma - separates items in a set
'	Complement - the items not in a set
ξ	The Universal Set - contains all items in every set and subset required
ϕ	The Empty Set - contains no items
A	Set A
A'	Not Set A (the complement of Set A)
B	Set B
B'	Not Set B (the complement of Set B)
$A \cap B$	A and B (A intersection B)
$(A \cap B)'$	Not A and B (the complement of A intersection B)
$A \cup B$	A or B (A union B)
$(A \cup B)'$	Not A or B (the complement of A union B)
$n(A)$	The number of elements in A. The cardinality of A

These are the different symbols you may see when working with set notation

Pie charts

Component Knowledge

- Calculate angles in a pie chart
- Draw a pie chart from a table
- Interpret pie charts using fractions
- Interpret pie charts using angles

Key Vocabulary

Angle	The amount of turn between 2 lines.
Pie chart	A chart that displays data proportionally.
Protractor	Equipment used to measure and draw angles

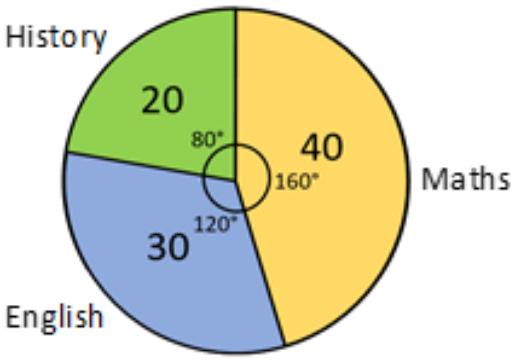
Drawing pie charts

How many degrees for one person? $\frac{360}{90} = 4°$

360 ÷ total = degrees for one person. In this example one person is 4°.

Subject	Number of Students	Calculation	Angle
Maths	40	40 × 4°	160°
English	30	30 × 4°	120°
History	20	20 × 4°	80°
Total	90		360°

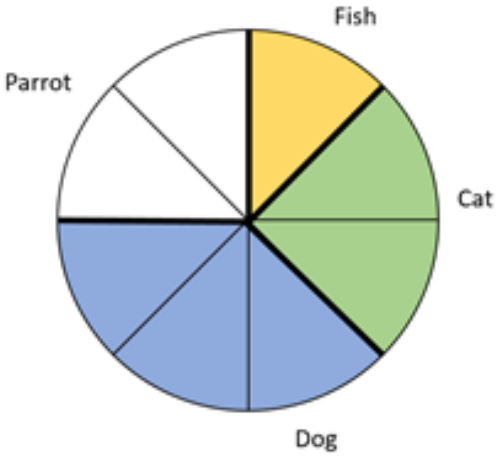
Multiply number of students by 4° to get the angle.



Draw the angles onto the pie chart. Label each part with what it is (subject in this example) and how many it represents (40 for Maths in this example).

Interpret pie charts (fractions)

A class of **32 students** were surveyed to find their **favourite pet**.
The **pie chart** shows the total answers. How popular was each animal?



The pie chart is split into 8 pieces, so each sector is worth $\frac{1}{8}$ of $32 = 4$

Fish: $\frac{1}{8}$ of $32 = 4$

Cat: $\frac{2}{8}$ of $32 = 8$

Dog: $\frac{3}{8}$ of $32 = 12$

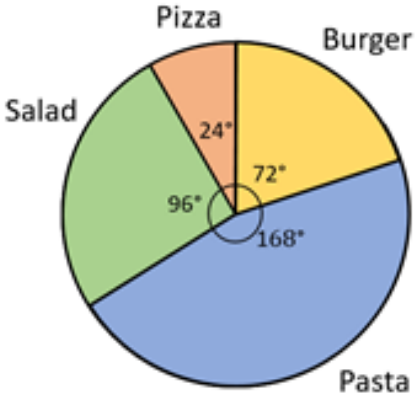
Parrot: $\frac{2}{8}$ of $32 = 8$

Check that the totals add up to the original total in the question.
$(4 + 8 + 12 + 8 = 32)$

Interpret pie charts (angles)

150 students were surveyed about their favourite food.

Favourite Food	Angle	Calculation	Frequency
Burger	72°	$\frac{72}{360} \times 150$	30
Pasta	168°	$\frac{168}{360} \times 150$	70
Salad	96°	$\frac{96}{360} \times 150$	40
Pizza	24°	$\frac{24}{360} \times 150$	10



To calculate the frequency from a pie chart when you are given the angle, you do the opposite of what you do to calculate the angle.

Angle ÷ 360 × total frequency

Online clips

M574, M165

Conversation in a pharmacy

Ça va? - How are you?
Ça ne va pas - I am not well
Je suis malade - I am ill
Quel est le problème?
- What's the problem?
J'ai mal à la jambe - I have a sore leg
J'ai mal à la main - I have a sore hand
J'ai mal à la tête - I have a headache
J'ai mal à la gorge - I have a sore throat
J'ai mal à la bouche
- I have a sore mouth
J'ai mal à l'oreille - I have earache
J'ai mal au ventre
- I have a stomach ache
J'ai mal au cœur - I feel sick
J'ai mal au dos - I have a bad back
J'ai mal au bras - I have a sore arm
J'ai mal au doigt - I have a sore finger
J'ai mal aux pieds - I have sore feet
J'ai froid - I am cold
J'ai chaud - I am hot
Je n'ai pas faim - I am not hungry
J'ai soif - I am thirsty
J'ai de la fièvre - I have a fever
Je suis fatigué(e) – I'm tired
Je suis enrhumé(e) - I have a cold
J'ai de la grippe - I have flu

Depuis combien de temps?
- How long for?
Depuis un jour - For a day
Depuis deux jours - For two days
Depuis une semaine - For a week
Depuis un mois - For a month

Allez chez le médecin
- Go to the doctor's
Restez au lit - Stay in bed
Buvez de l'eau - Drink some water
Prenez du sirop
- Take some syrup/medicine
Prenez de l'aspirine - Take some aspirin

Talking about being healthy

Je suis en bonne forme / Je suis sain(e) – I am healthy
Je ne suis pas en bonne forme / Je ne suis pas sain(e) – I am not healthy
Pour être en forme, … - To be healthy, …
je mange… - I eat…
je ne mange pas de/d'… - I don't eat…
je ne mange jamais de/d'… - I never eat…
je mange… - I eat
je ne bois pas de/d'… - I don't drink…
je ne bois jamais de/d'… - I never drink…
je ne mange pas (assez) de légumes
- I don't eat (enough) vegetables
je mange beaucoup de fruits
- I eat lots of fruit
je bois beaucoup d'eau – I drink lots of water
je ne bois jamais de coca – I never drink coke
je fais souvent du sport – I often do sport

Giving recommendations for being healthy

Pour rester en forme, …
- To stay healthy, …
il faut…
- you must…
il ne faut pas…
- you must not…
il ne faut jamais…
- you must never…
manger bien
- eat well
manger moins/plus de…
- eat more/less of
boire beaucoup d'eau
- drink lots of water
faire beaucoup d'exercice
- do lots of exercise
faire du sport
- do sport
aller au gymnase
- go to the gym
manger assez de (légumes)
- eat enough (vegetables)
boire de l'alcool
- drink alcohol
boire du coca
- drink coke
dormir huit heures par nuit
sleep 8 hours per night
éviter le stress - avoid stress
c'est bon/mauvais
pour la santé
- It's good/bad
for your health

Key ideas

At the pharmacy
What happened?
Am I healthy?
Recommendations

Talking about what happened

Je jouais (au foot)
- I was playing (football)
Je faisais (de la boxe)/(un curry)
- I was (boxing)/I was making (curry)
Je rentrais du collège
- I was coming/came home from school
quand – when
je me suis fait mal au *dos*
- I hurt my *back*
je me suis fait mal à la *bouche*
- I hurt my *mouth*
je me suis fait mal à l'*oreille*
- I got *earache*
je me suis fait mal aux *pieds*
- I hurt my *feet*
je me suis cassé le *doigt*
- I broke my *finger*
je me suis cassé la *jambe*
- I broke my *leg*
je me suis cassé l'*épaule*
- I broke my *shoulder*
je me suis cassé les *bras*
- I broke my *arms*
Je me suis coupé le/la/l'/les…
- I cut my…
J'ai pris un coup de soleil
- I got sunburnt

Year 9 Topic 3: La santé - Health

Year 9 Topic 3: Transferable language

Using a range of language improves the quality of our speaking and writing and allows us to access more challenging texts!

Partitive Article – Some

du - masc. (de + le = du)
de la - fem. (de + la = de la)
des - plural (de + les = des)
de l' - vowel sound (de + l' = de l')

Definite Article – The

le – masculine
la – feminine
les – plural
l' – starts with a vowel sound

To The

à = to

au – masc. (à + le = au)
à la – fem. (à + la = à la)
à l' – vowel sound (à + l' = à l')
aux – plural (à + les = aux)

Adverbs

Heureusement – Fortunately
Malheureusement – Unfortunately

Time phrases

En général – In general
De temps en temps – From time to time
Une fois par semaine – Once a week
Deux fois par semaine – Twice a week
Souvent – Often
Quelquefois – Sometimes
Tout d'abord / D'abord - Firstly
Ensuite – Next
Puis – Then
Finalement – Finally

Reflexive verbs

Se casser – to break
Se faire mal à – to hurt
Se couper – to cut

Se casser – To break (+ a body part)

Je me suis cassé (la jambe) – I broke (my leg)
Tu t'es cassé – You broke (sing. / informal)
Il s'est cassé – He broke
Elle s'est cassé – She broke
On s'est cassé – We broke
Nous nous sommes cassé – We broke
Vous vous êtes cassé – You broke (plural / polite)
Ils se sont cassé – They broke (m / m+f)
Elles se sont cassé – They broke (f)

Key verbs in the perfect, present and future tenses

J'ai mangé – I ate
J'ai bu – I drank
J'ai joué – I played
J'ai fait – I did / made
Je suis allé(e) – I went
J'ai evité – I avoided
Je mange – I eat
Je bois – I drink
Je joue – I drink
Je fais – I do / make
J'évite – I avoid
Je vais manger – I am going to eat
Je mangerai – I will eat
Je vais boire – I am going to drink
Je boirai – I will drink
Je vais jouer – I am going to play
Je jouerai – I will eat
Je vais faire – I am going to do / make
Je ferai – I will do / make
Je vais aller – I am going to go
J'irai – I will go
Je vais éviter – I am going to avoid
J'éviterai – I will avoid

Le week-end dernier – Last weekend
La semaine dernière – Last week
Normalement – Normally
Chaque semaine – Each week
Le week-end prochain – Next week
La semaine prochaine – Next week

When using verb phrases to give opinions and refer to the future, the second verb in the phrase, must be in it's infinitive form.

In English, the infinitive has "to" in front of the verb.

In French, the verb will end in –er, ir or –re.

For example:
J'aime manger en famille
– I like to eat as a family
Je vais jouer au foot
- I am going to play football
Je voudrais faire de la danse
– I would like to do dance

Talking about meals

Mon repas préféré, c'est...
- My favourite meal is...
(Pour) le petit déjeuner
- (For) breakfast
(Pour) le déjeuner - (For) lunch
(Pour) le dîner - (For) tea/dinner...
une bouteille de... - A bottle of...
une boîte de... - a tin/can of...

Talking about our talents

Un bon ami / Une bonne amie – A good friend
La terre – The earth
La voiture – The car
Le foot – Football
Un chien – A dog
Un instrument – An instrument
Un concert – A concert
Une fête – A festival
La Fête de la musique – The festival of music
Une chanson – A song
Une montagne – A mountairn
La vie – Life
Les vêtements – Clothes
Un stylo – A pen
Un livre – A book
Une tablette – A tablet

, c'est pour – is for

Mon talent – My talent
Notre talent – Our talent
Ma rêve – My dream

, c'est – is

Je veux – I want
Je peux – I can
Je dois – I must
J'aime – I like
Je vais – I am going
Je voudrais – I would like

gagner (le concours) – winning/to win (the competition)
faire (de la magie) – doing/to do (magic)
être (riche/célèbre/une célébrité)
- being/to be (rich/famous/a celebrity)
jouer (au foot/au rugby/du piano/de la guitare)
– playing/to - play (football/rugby/piano/guitar)
aller – going/to go
dire – saying/to say
avoir – having/to have
boire – drinking/to drink
manger – eating/to eat
dormir – sleeping/to sleep
comprendre – understanding/to understand
écrire – writing/to write
croire – believing/to believe
essayer – trying/to try
espérer – hoping/to hope
mettre – putting/to put
prendre – taking/to take
pleurer – crying/to cry
vendre – selling/to sell
lire – reading/to read
adorer – loving/to love
entendre – understanding/to understand
sortir – going out/to go out
voir – seeing/to see
finir – finishing/to finish
promener – walking/to walk
vivre – living/to live
porter – wearing/to wear
chanter – singing/to sing
danser – dancing/to dance

Talking about how to win

Tu dois – You must
remplir (la fiche) – (to) fill in (the form)
avoir (confiance) – (to) have confidence
faire (un vidéo) – (to) make (a video)
répéter – (to) rehearse / repeat
aller (à l'audition) – (to) go (to the audition)
participer (au concours)
– (to) take part (in a competition)
faire (les devoirs) – (to) do (home work)

Talking about who is the best

Il est – He is
Elle est – She is
le meilleur / la meilleure – the best
le / la pire – the worst
le / la plus – the most
le / la moins – the least
beau/belle – good-looking
sûr de lui / sûre d'elle
– sure of himself / herself
travailleur / travailleuse - hardworking
Il a – He has
Elle a – She has
le plus de talent – the most talent
la plus belle voix – the most beautiful voice
Il / Elle chante faux / juste
– He / She sings off key / juste
Il / Elle a chanté faux / juste
– He / She sang off key / in tune
Le / La gagnant(e) – The winner is

Key ideas
Talents
Entering the competition
Who is the best?
Winning and future plans

Year 9 Topic 4: Quel talent! – What a talent!

When using verb phrases to give opinions, refer to the future, or express possibility, intention or necessity, the second verb in the phrase, must be in it's infinitive form.

In English, the infinitive has "to" in front of the verb.

In French, the verb will end in –er, ir or –re.

For example:
J'aime manger en famille
– I like to eat as a family
Je vais jouer au foot
- I am going to play football
Je voudrais faire de la danse
– I would like to do dance

Verbs in their infinitive form end in:

-er = chanter (to sing)
-re = prendre (to take)
-ir = finir (to finish

Year 9 Topic 4: Transferable language

Modal verbs, also called auxiliary verbs, are used to express possibility, intention or necessity and are followed by an infinitive.

Pouvoir – To be able (can)
Je peux – I can
Tu peux - You can (sing. / informaL)
Il peut – He can
Elle peut – She can
On peut – We can / One can
Nous pouvons – We can
Vouz pouvez – You can (plural / polite)
Ils peuvent – They can (m / m+f)
Elles peuvent – They can (f)

Vouloir – To want
Je veux – I want
Tu veux – You want (sing. / informaL)
Il veut – He wants
Elle veut – She wants
On veut – We want
Nous voulons – We want
Vous voulez – You want (plural / polite)
Ils veulent – They want (m / m+f)
Elles veulent – They want (f)

Devoir – To have to
Je dois – I must
Tu dois – You must (sing. / informaL)
Il dois – He must
Elle doit – She must
On doit – We must
Nous devons – We must
Vous devons – You must (plural / polite)
Ils doivent – They must (m / m+f)
Elles doivent – They must (f)

The perfect tense – A reminder

Use the correct part of avoir or être with the past participle

Past participles for each type of verb:
-er verbs -> é
-re verbs -> u
-ir verbs -> i

EG: **J'ai gagné – I won**
J'ai reçu – I received
Je suis allé(e) – I went

Using the superlative

We use the superlative to say that something is the worst or best:

Il est le meilleur – He is the best
Elle est la meilleure - She is the best
Il est le pire – He is the worst
Elle est la pire – She is the worst
Il est le plus ambitieux – He is the most ambitious
Elle est la plus ambitieuse – She is the most ambitious
Il a le plus de talent – He has the most talent
Elle a la plus belle voix – She has the most beautiful voice

Using a range of language improves the quality of our speaking and writing and allows us to access more challenging texts!

A conversation at the pharmacy

¿Cuál es el problema?
- What is the problem?
Me duele el estómago - I have stomach ache
Me duele el brazo - I have a sore arm
Me duele el dedo - I have a sore finger
Me duele el pie - I have a sore foot
Me duele el hombre - I have a sore shoulder
Me duele la cabeza - I have a head ache
Me duele la garganta - I have a sore throat
Me duele la pierna - I have a sore leg
Me duele la rodilla - I have a sore knee
Me duele la oreja – I have earache
Me duele la espalda - I have a sore back
Me duelen los dientes - I have teethache
Me duelen los pies - I have sore feet
Me siento enfermo/a - I feel ill
Me siento mal - I feel bad
Estoy cansado/a - I am tired
No estoy bien - I am not well/good
Tengo frío - I am cold
Tengo calor - I am hot
Tengo sed - I am thirsty
Tengo fiebre - I have a fever
Tengo gripe - I have the flu
Tengo un resfriado
I have a cold

Desde hace cuánto tiempo?
- How long for?
Desde un día - For a day
Desde dos días - For two days
Desde una semana - For a week
Desde un mes - For a month

Vaya al médico - Go to the doctor's
Quédese a la cama - Stay in bed
Beba agua - Drink water
Tome jarabe - **Take** some (cough) syrup
Tome aspirina - **Take** some aspirin

Key ideas

At the pharmacy
What happened?
Am I healthy?
Recommendations
Future plans

Talking about what happened

Jugaba al fútbol
I was playing football
Hacía *boxeo* - I was doing *boxing*
Volvía del instituto
- I was returning from school
cuando - when
me rompí *la nariz* - I broke *my nose*
me corté *el dedo* - I cut *my finger*
me quemé al sol - I got sunburnt
me hice daño en *el brazo* - I hurt *my arm*

Recommendations

Para estar en forma -To be in shape
Para mantenerse en forma -To stay in shape
se debe - you must
hay que - you have to
no se debe - you mustn't
no hay que - you mustn't
comer bien - (to) eat well
comer bastantes verduras / bastante fruta
- (to) eat enough vegetables / fruit
beber mucha agua - (to) drink a lot of water
hacer mucho ejercicio - (to) do a lot of exercise
hacer deporte - (to) do sport
ir al gimnasio - (to) go to the gym
dormir ocho horas cada noche –
(to) sleep 8 hours each night
evitar el estrés - (to) avoid stress

Am I healthy?

Estoy en forma - I am healthy
No estoy en forma - I am not healthy
Para estar en forma - To stay healthy
Afortunadamente - Fortunately
Desafortunadamente - Unfortunately
no fumo - I don't smoke
como mucha fruta - I don't eat a lot of fruit
bebo mucha agua - I drink a lot of fruit
nunca bebo coca cola - I never drink coke
muchas veces hago deporte
- I often do sport
no como bastantes verduras
- I don't eat enough vegetables
Es bueno para la salud - It's good for the health
Es malo para la salud - It's bad for the health
Llevo una vida sana - I lead a healthy life
No llevo una vida sana
- I don't lead a healthy life

Year 9 Topic 4: Transferable Knowledge

Key verbs in the preterite, present and future tenses

Desayuné – For breakfast I ate
Comí – I ate / For lunch I ate
Cené – For my evening meal I ate
Bebí – I drank
Jugué – I played
Hice - I did / made
Fui – I went
Evité – I avoided
Desayuné – For breakfast I eat
Como – I eat / For lunch I eat
Ceno – For my evening meal I ate
Bebo – I drink
Juego – I drink
Hago – I do / make
Evito – I avoid
Voy a desayunar – For breakfast I am going to eat
Voy a comer
– I am going to eat / For lunch I am going to eat
Voy a cenar – For my evening meal I am going to eat
Voy a beber – I am going to drink
Voy a jugar – I am going to play
Voy a hacer – I am going to do / make
Voy a ir – I am going to go
Voy a evitar – I am going to avoid

El fin de semana pasado – Last weekend
La semana pasada – Last week
Normalmente – Normally
Cada semana – Each week
La semana que viene – Next week
La próxima semana – Next week

Using a range of language improves the quality of our speaking and writing and allows us to access more challenging texts!

Key verbs in the present tense

Some verbs are radical, also called stem changing, verbs.

After removing the ending (-Ar, -Er, -Ir), the last vowel changes in all parts of the verb except for we and you plural / informal.

EG: Querer -> Quiero
*irregular first person

Verbs about being unwell

Dolerse – To be hurt
Me duele – I hurt (singular)
= Me duele la espalda – I have backache
Me duelen – I hurt (plural)
= Me duelen los pies – I have sore feet
Le duele – He/She hurts (singular)
Le duelen – He/She hurts (plural)

Sentirse – To feel
Me siento – I feel
Le siente – He/She feels

The – Definite Article

El – masculine singular
La – feminine singular
Los – masculine plural
Las – feminine plural

Talking about meals

Para desayunar – For breakfast
Para comer – For lunch
Para cenar – For my evening meal
Para beber – For my drink

De primero – As a 1st course/starter
De segundo – As a 2nd course /main
De postre – As a dessert

Estar – To be

Estoy – I am
Estás – You are (singular / informal)
Está – He/She is
Estamos – We are
Estáis – You are (plural / informal)
Están – They are

Tener – To have

*Tengo – I have
Tienes – You have (singular / informal)
Tiene – He/She has
Tenemos – We have
Tenéis – You have (plural / informal)
Tienen – They have

Querer – To want

Quiero – I want
Quieres – You want (singular / informal)
Quiere – He/She wants
Queremos – We want
Queréis – You want (plural / informal)
Quieren – They want

What Makes a Good Song?

Exploring Popular Songs and Musical Arrangements

A. Popular Song Structure

SONG STRUCTURE – How a song is made up of or divided into different sections (see below) and the order in which these sections occur. To work out the structure of a song, it's helpful to analyse the **LYRICS and** listen to a recording for the song (for instrumental sections).

INTRO – often shortened to 'intro', the first section of a song which sets the mood of the song and is sometimes, but not always, an instrumental section using the song's chord pattern.

VERSES – songs normally have several verses. Verses introduce the song's theme and have the same melody but different lyrics for each verse which helps develop the song's narrative and story. Songs made up entirely of verses are called **STROPHIC**.

LINK – a optional short section often used to join different parts of a song together, often instrumental, and sometimes joins verses together or appears at other points within a song.

PRE-CHORUS – an optional section of music that occurs before the **CHORUS** which helps the music move forward and "prepare" for what is to come.

CHORUS – occurs several times within a song and contains the most memorable **HOOK/RIFF**. The chorus relays the message of the song and is repeated with the same melody and lyrics each time it is heard. In popular songs, the chorus is often repeated several times towards the end of the song.

MIDDLE 8/BRIDGE – a section (often 8 bars in length) that provides contrasting musical material often featuring an instrumental or vocal solo using new musical material allowing the performer to display their technical skill on their instrument or voice.

CODA/OUTRO – The final section of a popular song which brings it to an end (Coda is Italian for "tail"!)

B. Key Words

LYRICS – The words of a song, usually consisting of **VERSES** and a **CHORUS**.

HOOK – A 'musical hook' is usually the 'catchy bit' of the song that you will remember. It is often short and used and repeated in different places throughout the piece. Hooks can be either **MELODIC, RHYTHMIC** or **VERBAL/LYRICAL**.

RIFF – A repeated musical pattern often used in the introduction and instrumental breaks in a song or piece of music. Riffs can be rhythmic, melodic or lyrical, short and repeated.

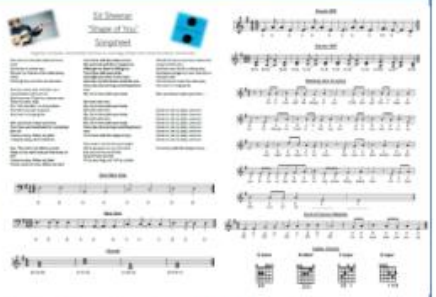
MELODY – The main tune of the song often sung by the **LEAD SINGER**.

COUNTER-MELODY – An 'extra' melody often performed 'on top of' the main melody that 'fits' with it a **DESCANT** or **INSTRUMENTAL SOLO**.

TEXTURE – The layers that make up a song *e.g., Melody, Counter-Melody, Hooks/Riffs, Chords, Accompaniment, Bass Line*.

C. Lead Sheet Notation and Arrangements

A **LEAD SHEET** is a form of musical **NOTATION** that contains only the essential elements of a popular song such as the **MELODY, LYRICS, RIFFS, CHORDS** (often as guitar chord symbols) and **BASS LINE**; it is not as developed as a ***FULL SCORE ARRANGEMENT*** and is open to interpretation by performers who need to use and adapt the given elements to create their own musical **ARRANGEMENT:** their "version" of an existing song.



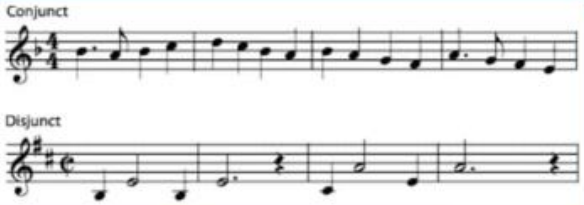
COVER (VERSION) – A new performance, remake or recording by someone other than the original artist or composer of the song.

D. Conjunct and Disjunct Melodic Motion

CONJUNCT MELODIC MOTION – Melodies which move mainly by step or use notes which are next to or close to one another.

DISJUNCT MELODIC MOTION – Melodies which move mainly by leap or use notes which are not next to or close to one another.

MELODIC RANGE – The distance between the lowest and highest pitched notes in a melody.



E. Song Timbre and Sonority (Instruments that are used to Accompany Songs)

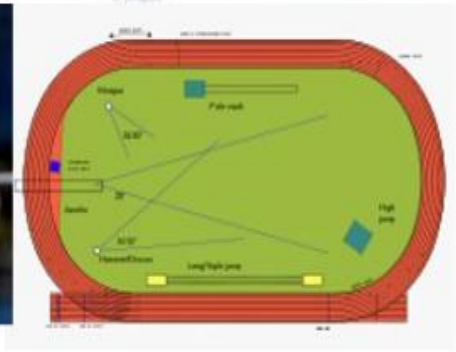
Pop Bands often feature a **DRUM KIT** and **PERCUSSION** to provide the rhythm along with **ELECTRIC GUITARS (LEAD GUITAR, RHYTHM GUITAR** and **BASS GUITAR)** and **KEYBOARDS**. Sometimes **ACOUSTIC INSTRUMENTS** are used such as the **PIANO** or **ACOUSTIC GUITAR**. **ORCHESTRAL INSTRUMENTS** are often found in pop songs such as the **STRINGS, SAXOPHONE, TROMBONE** and **TRUMPET.**

Singers are essential to a pop song - **LEAD SINGER** – Often the "frontline" member of the band (most famous) who sings most of the melody line to the song. **BACKING SINGERS** support the lead singer providing **HARMONY** or a **COUNTER-MELODY** (a melody that is often higher in pitch and different, but still 'fits with' the main melody) and do not sing all the time but just at certain points within a pop song e.g. in the chorus.

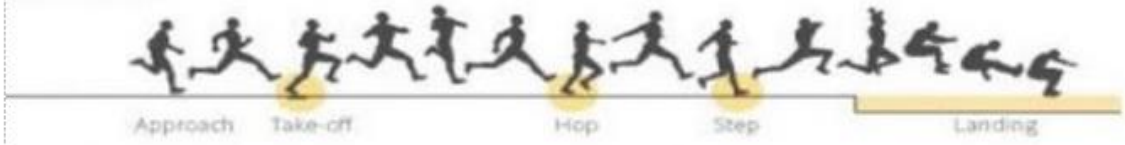
Westhoughton High SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: ATHLETICS

HIGH JUMP

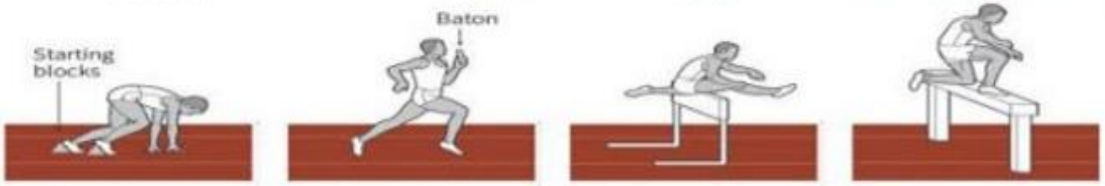
A raw test of human athleticism



TRIPLE JUMP



LONG JUMP



SPRINTS
100m, 200m, 400m, 800m, 1,500m
3,000m (W) 5,000m (M) 10,000m (M)

RELAYS
4 x 100m, 4 x 400m

Teams of four athletes, who must carry the baton, one after another.

HURDLES
100m (W) 110m (M)
400m

Athletes sprint and jump over ten hurdles per lane.

STEEPLECHASE
3,000m

Athletes sprint and must overcome five jumps, including a water jump, per lap.

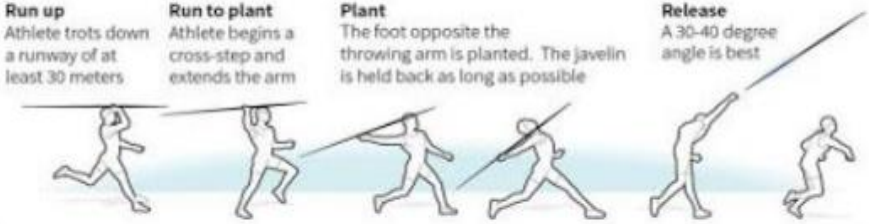
JAVELIN

Run up
Athlete trots down a runway of at least 30 meters

Run to plant
Athlete begins a cross-step and extends the arm

Plant
The foot opposite the throwing arm is planted. The javelin is held back as long as possible

Release
A 30-40 degree angle is best



DISCUS

Swing
Athlete swings discus back and forth

Spin
One-and-a-half-turn rotation. Thrower pushes off the opposite leg

Drive
Athlete's body and arms catch up with the legs in a twisting motion

Release
Thrower straightens body, releasing the discus as the arm whips around

HAMMER

Swing
Thrower lightly swings the hammer like a pendulum

Windmill
Thrower swings the hammer two or three times, gaining speed, staying relaxed

Spin
Thrower spins through three or four rotations, while swinging the hammer close to 45°

Release
Thrower's arms shoot upward, releasing the hammer at speeds of up to 110km/h

SHOT PUT

Grip
The shot is balanced on the fingers and pressed against the thrower's neck

Push off
Upper body relaxed with back to the field

Spin
The thrower spins a few as one or as many as three times.

Thrust
Sudden extension of arm propels shot.

Westhoughton High School– ACTIVITY: CRICKET

Batting: Basic Straight Drive

- Stand with feet shoulder width apart and parallel to the batting crease.
- Slightly flex knees and keep weight evenly distributed.
- Rest the hand and top of bat gently against the inside thigh of your front leg with the bat resting on the floor at a 45° angle.
- Keep your head over the front foot and face the bowler.
- As the bowler approaches, the bat should remain close to the body but brought upward, bending both elbows, until the bat is parallel to the shoulders.
- As the ball is released, move the front foot behind the front knee and chest and keep the back leg straight and foot planted.
- The head should be level with the front knee, with the back foot raised up to the toes.
- On contact, the bat accelerates vertically through a straight path, keeping elbows bent and locked, until the face of the bat is pointing to the sky.

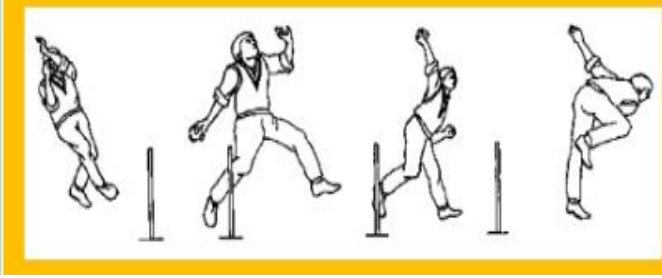
Bowling: Basic

Grip

- Place your thumb on the seam of the ball.
- Place your index finger on the seam, opposite your thumb.
- Hold the ball so that the seam is parallel to your index finger.
- Place your middle finger to the right of the seam, approximately a quarter of the way down the ball.
- Wrap your ring finger and pinky into a loose fit.

Release

- Carry the ball close to your chin. Coil your body and lean back.
- Drop your elbow and pant your leg bowling leg.
- Straighten your elbow and arm.
- Shift your weight to the lead leg.
- Thrust your bowling shoulder forward.
- Swing your arm like a windmill.
- Snap your wrist forward just before you release the ball.
- Release the ball.
- Follow through properly.
- Bend your elbow.



Fielding:

Catching

- **English (orthodox catch)-**Aim to catch at the base of your fingers. Bring the ball into your body
- **Australian (reverse cup)-** Attempt to catch at eye-level and keep your hand high. Watch the ball the whole time until it hits your hands.

Throwing

- **Overarm-** bring arm behind head, and transfer power from back foot to front foot. Used over longer distances
- **Underarm-** swing arm from back to front, release ball when hand pointing at target.

Long Barrier

- Long barrier: Kneel side on with foot next bent leg, pick ball up side on.

Short Barrier

- Short barrier- face on approach ball, foot behind and pick up ball.

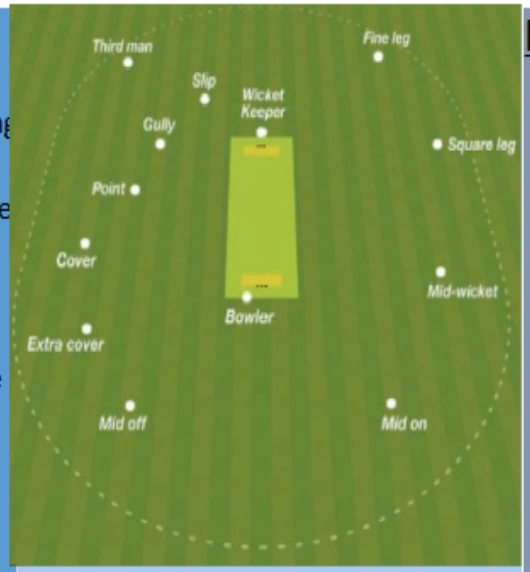
Westhoughton High School– ACTIVITY: Cricket

Rules:

➔ Two teams, play an innings of batting and bowling.
➔When one team is batting, try and score as many runs as they can by hitting the ball around a set boundary.
➔The bowling team can get the batsmen out by hitting the stumps or catching the ball.
➔Once the batting team is all out, the teams swap over and they then become the bowling side.

Scoring System:

➔One run is scored each time the batsmen cross and reach the set of stumps at the other end of the pitch.
➔Four runs can be scored if the ball reaches the perimeter of the field
➔Six runs if it crosses the perimeter without bouncing.



Key Words:

Wicket Keeper Batsman
Bowler
Long Barrier
Hand eye co-ordination
Catch
Stumps
Seam
Leg before wicket
Over
Spin
Umpire

Positions:

➔ **Wicketkeeper:** The wicket keeper stands behind the batsman, and is responsible for catching the ball in their gloves if the batsman edges, misses or leaves the ball.
➔ **Point:** Fielding position square of the wicket on the off side of the batsman.
➔ **Mid-off:** Fielder should be positioned just a bit wider than straight on the off side of
the field.
➔**Mid-on** is the same position as mid-off on the on side.
➔ **Cover:** Fielding position is just in front of square on the off side.
➔ **Square leg:** The fielder is located square of the wicket on the leg side of the field.
➔ **Mid-wicket** is a position in front of square on the leg side of the batsman

Tactics:

➔**Fielding:** Place players in positions where the batsman may give a catch, to a fielder and to save runs or to block the path of the ball from the batsman's scoring strokes Backing up the ball from a fielders throw.
➔**Bowling:** The location varies with the pace of the bowler, the state of the pitch, and the reach and technique of the batsman. The second is the direction. On this foundation a bowler may elaborate with variations of spin bowling
➔**Batting:** A forward stroke in which the batsman advances his front leg to the pitch of the ball and plays it in front of the wicket. This is the best way to score runs with control.

WESTHOGHTON HIGH SCHOOL -ORIENTEERING

Skills and Techniques:

➔ **Directions:** 4 key compass directions: North, South, East, West
More complex compass directions: North East, North West, South East and South West

➔ **Map Reading:** Recognise symbols on a map. Understand that maps and aerial view pictures are not the same. Recognise these features on aerial photographs

➔ **Human features:** Know that a human feature, is influenced by man (Road, cities, churches). Recognise these on a map

➔ **Physical Features:** Know that a physical feature, is natural (Forest, rivers, beaches, hills) Recognise these on a map

➔ **Directional language:** To describe the physical and human features in a location or a route.

Diagrams and Symbols:

Positions:

➔ The main aim of orienteering is to complete the set course by finding control markers in the correct order in the shortest time.

➔ Although it Is based on accurate map reading it is also a test of physical fitness.

➔ You must find all the controls you are told to visit and record them on your score sheet.

➔ You have to consider the terrain you are moving over ensuring your safety and the safety of any team members at all times, taking into account the varying fitness level of all your team members.

➔ In order to be given a finish time for finding controls the whole team has to finish together

Key Features:

➔ Orienteering control

➔ Orienteering Map

Key Words:

Location, Speed
Cardiovascular Fitness
Setting a Map
Navigation
Adventurous
Diverse Direction
Key
Catchment features
Terrain
Map
Compass
Control point
Thumbing
Attack points
Pacing

Key components:

➔ **Map**
A diagrammatic representation of an area showing physical features

➔ **Key**
Explains the meanings of symbols

➔ **Route**
A way from getting from a starting point to a destination

➔ **Location**
The place where something is

➔ **Orienteer**
To find your way across areas using a map.

➔ **Grid reference**
map reference indicating a location in terms of a series of vertical and horizontal grid lines

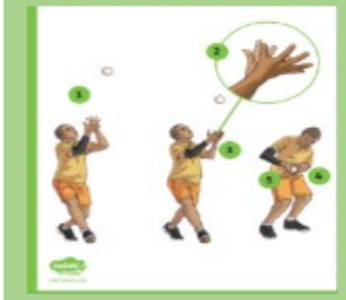
➔ **Latitude**
Imaginary lines north and south of the equator

➔ **Longitude**
Imaginary lines from East to West around the globe

WESTHOUGHTON HIGH SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: BOLTON ROUNDERS (FLATBAT)

Fielding: Catching

- Eyes focused on the ball.
- Feet move to place body in line with ball.
- Hands move to meet the object.
- Hands and fingers relaxed and slightly cupped to catch the ball.
- Catches and controls the ball with hands only (well-timed closure)
- Elbows bend to absorb the force of the ball.



Fielding: Throwing

Underarm throw used in a short distance.

- Stands face on to direction of throw.
- Eyes focused on target area..
- Steps forward with opposite foot to throwing arm.
- Well timed release.
- Follows through with straight arm.

Overarm throw used in a long distance.

Bowling

- Grip the ball between three fingers
- Step into the bowling action
- Release the ball at weight height
- Variation in speed and height will enable you to outwit the opponent
- To add spin, twist your wrist as you release the ball

Batting

Batting: One hand on the bat, have the fat side facing the bowler and with a slight tilt. Bend your knee and transfer your weight from the front to the bac

Barriers

Long barrier: On a bumpy outfield, or if the ball is travelling at speed

Short barrier: Used to pick the ball up at pace

Key Words:

Batting
Bowling
Deep Fielding
Obstruction Power
Accuracy Throwing
Catching Umpire
Stumping
No ball
Hit out
Running Out
Rounder Barrier
Variation
Reaction time
Spatial awareness
Momentum

WESTHOUGHTON HIGH SCHOOL KS3 PE KNOWLEDGE ORGANISER – ACTIVITY: BOLTON ROUNDERS (FLATBAT)

Tactics:

➔ Batters run round the **inside of the posts**

➔ fielders have a field in 'the slips' to the right of the batter

➔ Adapt fielding positions according to strengths and weakness of the batters

➔ Move your fielding position once you have established how each batter hits the ball is a sign of good fielding

➔ Always focus on the batter that has just hit the ball as they are scoring.

➔ Batters should think about how they hit ball according to the positioning of the fielders and also an understanding of how many points they need to win a point.

Rules:

➔ Each team can have a minimum of 6 players on the pitch at any one time.11 players are on a team.

➔ Bowler must bowl the ball in the bowlers pitch

➔ Lawn tennis balls must be used

➔ The ball must be bowled above the knee of the batter, below the top of their head. Batter can only hold the bat with one hand

➔ The batters foot must be on the edge of the batters square and stay planted when hitting the ball.

➔ The ball can be hit forwards or backwards

➔ A batter will be out if, after making a scoring shot from a good ball, the ball is caught by a fielder without it touching the ground.

➔ The batter, while running to a base, is out if she is touched by the fielder
ball from one of the fielding side.

➔ A batter is out if first base is stumped before she reaches it.

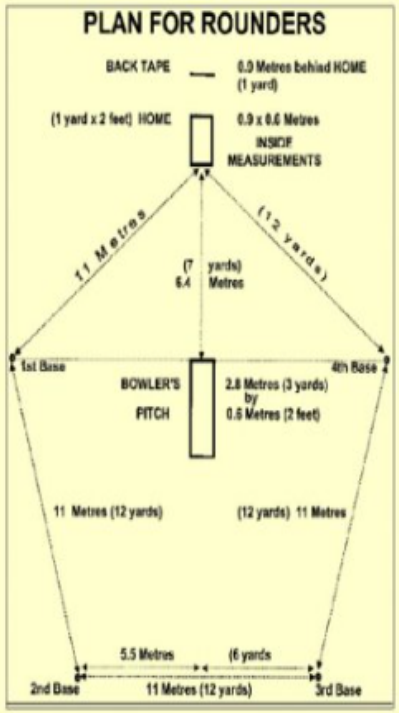
Positions:

➔ **First base** this is the only base you can stump and player out.

➔ **Baller** must bowl the ball in the bowlers pitch

➔ **Fielders** spread out around the pitch

➔ **Backstop** must stand on the line behind the batting square



Scoring System:

➔ The batter will receive **1** point for every base they reach.

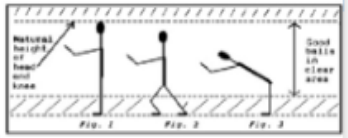
➔ If the touch all four base without being caught out they receive **6** points.

➔ If the batter is out they keep the points reward until that point. E.g. if the batter is touched by the all between 3rd and 4th base they would achieve **3** points and out.

➔ If the bowler bowls a 'bad ball' the batting team receive 1 point.

Key Words:

Batting
Bowling
Deep Fielding
Obstruction Power
Accuracy Throwing
Catching Umpire
Stumping
No ball
Hit out
Running Out
Rounder Barrier
Variation
Reaction time
Spatial awareness
Momentum



USER GROUPS in Sport/Fitness

- Young children
- Teenagers
- People with disabilities
- Parents (singles or couples)
- People who work
- Unemployed/economically disadvantaged people
- Gender
- People from different ethnic groups
- Retired people/people over 60
- Families with children
- Carers
- People with family commitments

Barriers faced by user groups

□ Employment and unemployment
□ Family commitments
□ Lack of disposable income
□ Lack of transport
□ Lack of positive sporting role models
□ Lack of positive family role models or family support
□ Lack of appropriate activity provision
□ Lack of awareness of appropriate activity provision
□ The lack of equal coverage in media in terms of gender and ethnicity by the media

Year 9
Term 3: Health
Knowledge Organiser

SOLUTIONS TO BARRIERS

•Appropriate programmes
•Specific sessions
•Suitable activities
•Appropriate timings
•Targeted promotions
•Use of role models
•Access to facilities
•Appropriate pricing
•Access to transport
•Initiatives

sky sports

OPEN 24 HOURS

NUTRITION:

A balanced diet consists of six essential nutrients:

1. **Carbohydrates** – The body's main energy source, found in foods like grains, fruits, and vegetables.
2. **Proteins** – Essential for growth, repair, and muscle maintenance, sourced from meat, beans, and dairy.
3. **Fats** – Provide long-term energy and support cell function, found in nuts, oils, and fatty fish.
4. **Vitamins** – Support immune function, metabolism, and overall health, present in fruits, vegetables, and dairy.
5. **Minerals** – Aid in bone strength, nerve function, and hydration, including calcium, iron, and potassium from leafy greens, dairy, and meat.
6. **Water** – Essential for hydration, digestion, and temperature regulation, making up a large portion of the body.

ROLE OF MACRO NUTRIENTS IN SPORT

Carbohydrates – The primary energy source for athletes, carbohydrates fuel endurance and high-intensity activities by providing glucose, which is stored as glycogen in muscles and the liver. They help maintain stamina, delay fatigue, and support quick recovery.

Proteins – Essential for muscle repair, recovery, and growth, proteins aid in rebuilding muscle fibers damaged during exercise. They also support immune function and contribute to enzyme and hormone production necessary for athletic performance.

Fats – A secondary energy source, fats provide sustained energy for long-duration, low- to moderate-intensity activities. They help preserve glycogen stores and support overall endurance, particularly in endurance sports like marathon running or cycling.

NUTRITION:

- Carbohydrates are essential in sporting activity because they provide a quick and efficient source of energy, fueling muscles and sustaining performance during exercise.
- Hydration is crucial as it regulates body temperature, maintains electrolyte balance, and prevents dehydration, which can impair endurance, strength, and overall athletic performance

Year 9
Term 3: Health
Knowledge Organiser

CARBOHYDRATE LOADING

Carbohydrate loading is a strategy used by endurance athletes to maximize glycogen stores in muscles before a long-duration event (e.g., marathon, triathlon). It involves increasing carbohydrate intake 3-7 days before competition while tapering exercise intensity. This ensures sustained energy levels, delays fatigue and enhances performance.

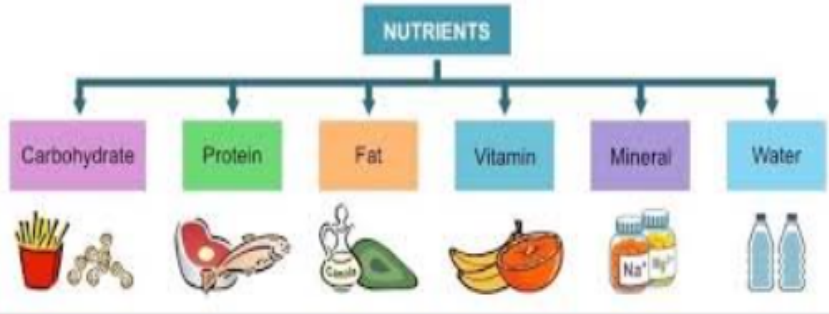
Method (6-7 Days Before Competition)

- **Days 1-3**: Low-carb diet (10-15% of total calories) with high-intensity training to deplete glycogen stores.
- **Days 4-7**: High-carb diet (70-80% of total calories) with reduced training to super compensate glycogen levels.

EATING PROTEIN:

The timing of protein intake is crucial for muscle recovery, repair, and growth.

- **Pre-Workout**: Consuming protein before exercise helps reduce muscle breakdown and provides amino acids for sustained performance.
- **Post-Workout (Within 30-60 minutes)**: Aids in muscle protein synthesis, reduces soreness, and accelerates recovery.
- **Before Sleep**: A slow-digesting protein (e.g., casein) supports overnight muscle repair and prevents muscle breakdown.



TRAINING PRINCIPLES:

Training thresholds refer to intensity levels that determine the effectiveness of an exercise program. There are two key thresholds:

1.Aerobic Threshold (50-70% of maximum heart rate) – The point where the body starts using oxygen efficiently for sustained activity, improving endurance.
2.Anaerobic Threshold (80-90% of maximum heart rate) – The intensity at which lactic acid accumulates faster than it can be cleared, enhancing high-intensity performance and muscle strength.

KARVONEN PRINCIPLE

The **Karvonen Principle** calculates target heart rate for optimal training intensity using the **Heart Rate Reserve (HRR)** method:

- **HRR** = Maximum Heart Rate (220 - age) - Resting Heart Rate
- **Intensity %** = Desired effort level (e.g., 60-85% for aerobic training)
- **Resting Heart Rate (RHR)** = Measured at rest, indicating baseline fitness

This formula personalizes training zones, ensuring workouts are effective and aligned with fitness goals.

FITT Principle

The **FITT Principle** is a guideline for structuring effective workout programs. It stands for:

1.Frequency – How often you exercise (e.g., 3-5 times per week).
2.Intensity – How hard you work out (e.g., moderate or high intensity, based on heart rate or weight resistance).
3.Time – Duration of the exercise session (e.g., 30-60 minutes).
4.Type – The kind of exercise performed (e.g., cardio, strength training, flexibility).
:

Year 9
Term 3: Health
Knowledge Organiser

Age-predicted maximum heart rate (APMHR)

HRmax = 220 - age

Karvonen formula

% HRR = ([HRmax – RHR] x % intensity) + RHR

Individual needs -

All athletes/people are different. Training must be related to the athlete's age and *gender*, their injury status and fitness level. Any training that fails to be relevant to the individual will fail to motivate the athlete and will prove to be unsuccessful in the long term.

FREQUENCY

INTENSITY

TIME

TYPE

Life Lessons – Summer Term KS3 - Living in the Wider World	
Topics	**For Further Information and Advice**
Money Matters £	• **Stepchange:** Free debt advice charity 0800 138 1111 • **The Kings Trust:** use the QR code to access budgeting and saving resources.
Responsible internet use	**Are you worried about online sexual abuse or the way someone has been communicating with you online?** • Contact **CEOP** (Child Exploitation and Online Protection). Use the QR code of search for CEOP online.
The protected characteristics	**The 9 protected characteristics in the Equality Act 2020 are:** Age Disability Gender Reassignment Race Religion or Belief Sex Sexual Orientation Pregnancy & Maternity Marriage & Civil Partnership For more information about the **Equality Act**, scan the QR code. **Citizens Advice**: Provides information and advice on issues such as discrimination because of race and/or religion 0800 144 8848.
Your Rights	**The Universal Declaration of Human Rights** is a document that protects the rights of every individual, everywhere. It was created by the United Nations in 1948, in response to the "barbarous acts" of the Second World War. Its adoption recognized human rights to be the foundation for freedom, justice and peace. **Scan the QR code to see all 30 of your Human Rights.**
Young Carers	**You're a young carer if you're under 18 and help to look after a relative with a disability, illness, mental health condition, or drug or alcohol problem.** • For advice and support with care issues, call the **Carers Direct** helpline on 0300 123 1053. • Search for **Carers Trust** and find the Young Carers Page.
Criminal Behaviour (County Lines and Kinfe Crime)	You can report an incident of knife crime by calling **101** or talking to us via **LiveChat** at www.gmp.police.uk. Always dial **999** in an emergency. Help is also available via **CrimeStoppers** on 0800 555 111, or using the QR code for the **Fearless** anonymous reporting. What is county lines? County lines is a criminal activity where drug dealers in big cities use other people (typically young and/or vulnerable) to carry, store, and sell their drugs in smaller towns and rural areas. Use the QR code to find out more.

Y9 Atomic Structure and the Periodic Table

An **atom** is the smallest part of an element that cannot be broken down chemically.

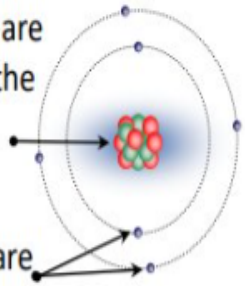
An **element** is made up of one type of atom and is found in the Periodic Table.

A **compound** consists of 2 or more different types of atoms chemically joined together and are difficult to separate.

A **mixture** is made up of two or more elements **NOT** chemically joined together. They can be separated easily.

Protons and neutrons are found in the nucleus

Electrons are found in shells



Particle	Mass	Charge
proton	1	+1
neutron	1	0
electron	almost 0	-1

Properties of metals and non-metals

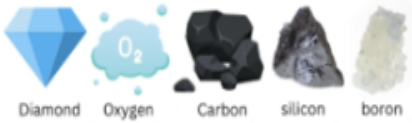
Metals

- normally good **conductors of heat** and **electricity**
- **shiny** when cut
- **Malleable**
- **dense** and **sonorous**
- most have **high melting points**

Non-Metals

Often have properties the opposite of metals

- **low boiling points**, so are gases at room temperature
- **poor conductors** of **electricity and heat**
- **dull** in appearance
- **low density**
- **brittle** and **not sonorous**

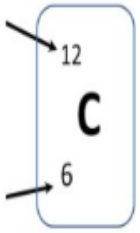


Keywords

- Periodic Table
- Element
- Groups
- Periods
- Alkali Metals
- Transition Metals
- Halogens
- Noble Gases
- Atoms
- Electrons
- Protons
- Neutrons
- Nucleus
- Electron Shells
- Properties

Mass number = Number of protons + neutrons

Atomic number or proton number = Number of protons



Isotopes

Isotopes are different forms of elements that have the **same** number of protons, but **different** number of neutrons.

The **relative atomic mass** of an element is an average value that takes account of the abundance of the isotopes of the element.

The **number of electron** is always equal to the **number of protons** for a given element. Atoms have no overall charge.

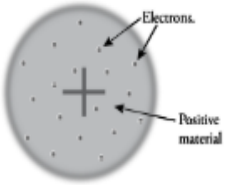
Atoms are very small. Their radius is 1×10^{-10} m.
The radius of the nucleus is 1/10 000 the size of an atom.

Y9 Atomic Structure and The Periodic Table

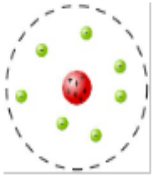
Atomic Model Development

- New experimental evidence and technology may lead to scientific models being changed.
- Before the electron was discovered, atoms were thought to be tiny solid spheres that could not be divided.

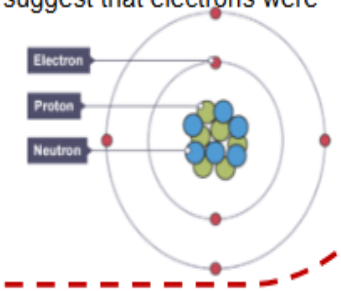
- When JJ Thomson discovered the electron, he modified the atomic model to the Plum Pudding Model.
- The Plum Pudding model suggested the atom to be a solid positive sphere with negative electrons embedded throughout it.



- Rutherford's Alpha Scattering Experiment led to the conclusion that the mass of an atom is concentrated at the centre (nucleus) and that the nucleus was positively charged.
- The Nuclear Atomic model replaced the Plum Pudding Model.

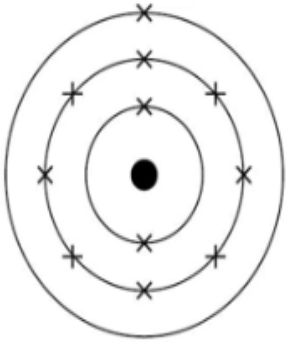


- Neils Bohr adapted the nuclear model to suggest that electrons were held at specific distances from the nucleus, creating the Planetoid Model.
- Further experiments identified neutrons as a particle found within the nucleus.



Electron Structure

- Electrons in an atom occupy the lowest available energy level (shell).
- The electronic structure of an atom can be represented by numbers or by a diagram, as shown on the right (Sodium).
- This shows that 2 electrons fill the lowest energy level 8 the second, and one in the third energy level.



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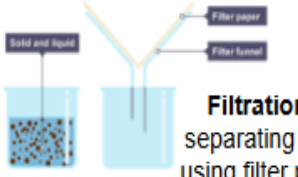
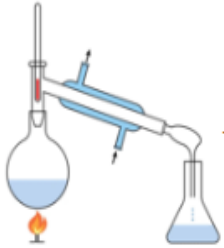
Separating Techniques

Mixtures are easily separated by the following physical processes which do not involve chemical reactions, and no new substance is made.



Filtration – separating solid using filter paper

Crystallisation – liquid is evaporated leaving a solid crystal

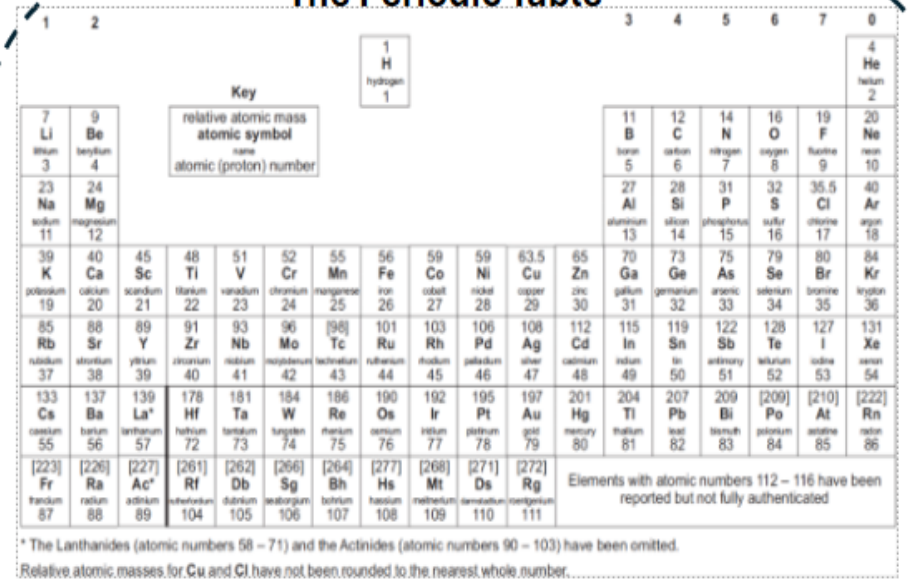


Distillation – separating liquids from liquids based on different boiling points. This can be simple distillation (ink and water) or fractional distillation (crude oil)

Chromatography – separating coloured substances (e.g. food colourings) based on molecular size.

Y9 Atomic Structure and The Periodic Table

The Periodic Table

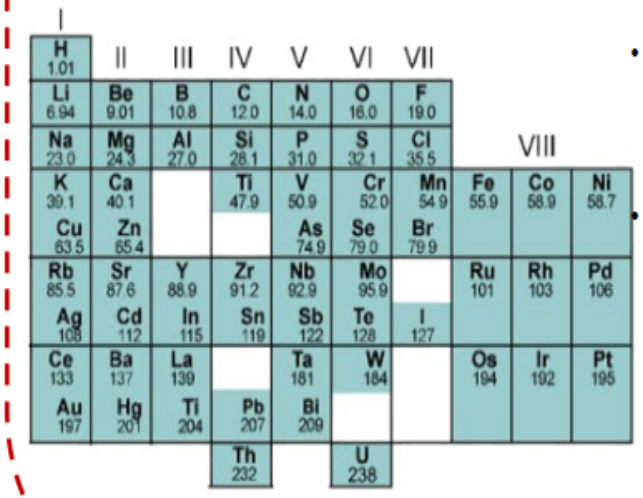


The **Periodic Table** consists of every known element.

- The modern periodic table is arranged according to increasing **atomic number**.
- It is called Periodic Table because similar properties occur at regular intervals (periodically).
- Columns of elements are called **groups** and have the same number of electrons on their outer shell.
- Groups of elements have similar properties.
- Rows of elements are called **periods** and have the same number of electron shells.

Development of the Periodic Table

- Before protons, electrons, and neutrons were discovered, scientists tried to organize the known elements.
- In the early Periodic Tables elements were largely arranged in atomic weight but the tables were largely incomplete (many elements were still undiscovered).
- Some elements were placed in the wrong groups.
- Dimitri Mendeleev overcame some of the problems by leaving gaps where he though undiscovered elements might lay. He also changed the order of some of the elements.



- Elements that Mendeleev predicted were discovered and filled the gaps.
- When isotopes were discovered, they explained why the order of elements was not strictly according to atomic weight but atomic mass.

Y9 Atomic Structure and The Periodic Table

The Periodic Table Properties

Li Lithium
Na Sodium
K Potassium
Rb Rubidium
Cs Cesium
Fr Francium

- **GROUP 1** elements are the **Alkali Metals**
- They have 1 electron on the outer shell, making them all highly reactive.
- Reactivity increases going down the group.

- **GROUP 7** elements are called the **Halogens** and are non-metals.
- They have seven electrons on their outer shell.
- Reactivity decreases going down the group.
- Relative molecular mass, melting and boiling points increase going the group.
- A more reactive halogen can displace a less reactive halogen from an aqueous solution of its salt.

F Fluorine
Cl Chlorine
Br Bromine
I Iodine
At Astatine

He
Ne
Ar
Kr
Xe
Rn

- **GROUP 0** are called the **Noble Gases** and a full outer electron shell.
- They are largely unreactive and do not easily form molecules.
- They have 8 electrons on their outer shell, except Helium that has 2.
- The boiling points increase with increasing relative atomic mass (going down the group).

- The transition metals are the central block of metals on the Period Table, and all have similar properties, which are different to Group 1 metals.
- They do not show group trends like other groups.

Physical Properties

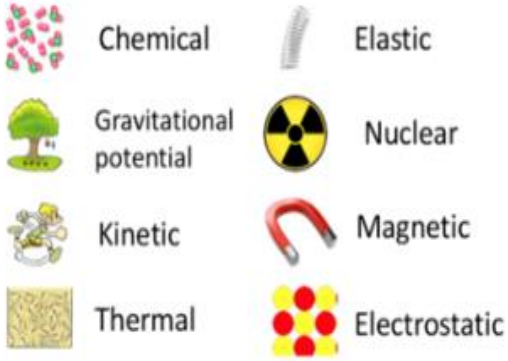
- Good conductors of heat and electricity
- Malleable (can be hammered) and ductile (can be deformed without losing their toughness)
- Very high melting points (except Mercury)
- Usually hard and tough
- High densities

Chemical Properties

- Less reactive than Alkali metals.
- Form coloured ions of different charges.
- Can be very unreactive (e.g. silver, gold, and platinum).
- Many can be used as catalysts.

Y9 Energy Resources

8 Energy Stores



Energies that are always transferred: Light and Sound

Conservation of Energy

Energy cannot be created or destroyed. Energy can only be **stored**, usefully **transferred**, or **dissipated**.

The total energy before and after a change in a **system** is constant.

A **system** is an object or group of objects where the net energy change is 0J.

Keywords

- Energy store
- Transfer
- System
- Dissipation
- Efficiency
- Biomass
- Geothermal
- Energy
- Insulation
- Fossil Fuel
- Renewable
- Non-renewable
- Power
- Work done
- Temperature
- Thermometer

Energy Transfers

Energy is transferred when it moves from one store to another. For example, when a ball rolls down a hill, gravitational potential energy transfers to the kinetic energy store.

Reducing unwanted transfers

- Energy that is transferred to the surroundings has been dissipated.
- Insulation, lubrication, sound proofing can all reduce energy dissipation.

SOURCES OF ENERGY

Renewable: replenished as quickly as they are used

Non-renewable: Finite resources, will eventually run out.

Y9 Energy Resources

Required Practical 2:

Insulation Material Thickness method:

1: Wrap 2 layers of newspaper around small beaker and use a rubber band to keep it in place. **Do not** cover the bottom.

2: Boil 80cm^3 of water and place into the beaker.

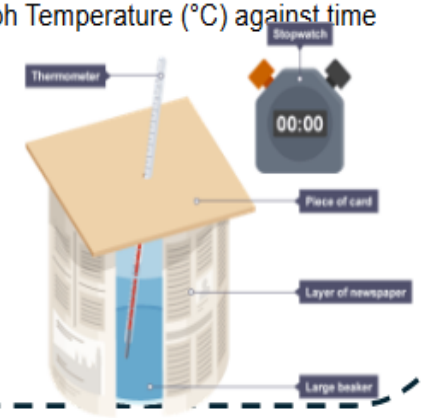
3: Add cardboard lid with hole for thermometer and record starting temperature.

4: Start the timer.

5: Record temperature every 3 minutes for 15 minutes.

6: Repeat steps 2-6 adding 2 layers of newspaper each time to a maximum of 8 layers.

7: Plot graph Temperature (°C) against time (mins).



Power

Power is the rate energy is transferred. It is measured in WATTS (W).

$$Power\ (W) = \frac{Energy\ transferred\ (J)}{time\ (s)}$$

$$Power\ (W) = \frac{Work\ done\ (J)}{time\ (s)}$$

Efficiency

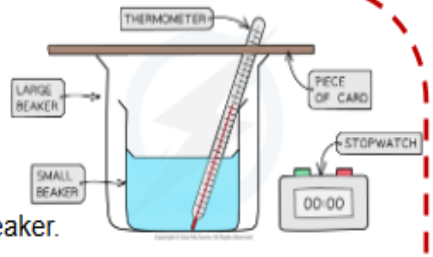
The ratio of the useful energy (or power) output from a system to its total energy (or power) input.

$$efficiency = \frac{useful\ energy\ output}{total\ energy\ input}$$

$$efficiency = \frac{useful\ power\ output}{total\ power\ input}$$

Required Practical 1

Insulation Material method:



1: Put small beaker in a large beaker.

2: Boil 80cm^3 water and place in small beaker.

3: Use a cardboard lid with a hole for the thermometer and record the starting temperature.

4: Start the timer.

5: Record temperature every 3 minutes for 15 minutes.

6: Repeat steps 2-6, placing different insulation materials between beakers.

7: Plot graph Temperature (°C) against time (mins).

Renewable energy resources

Advantages:

- Renewable
- No CO_2 gas released
- Not reliant upon Earth's natural resources

Disadvantages:

- Destroy habitats
- Many are weather dependent (wind, solar)
- Expensive to build and run

Non-renewable energy resources

Advantages:

- High energy stored
- Readily available

Disadvantages:

- Releases greenhouse gases (fossil fuels only)
- Finite (will run out)
- Makes Radioactive waste (nuclear only)

KS4 Biology: Transport Systems

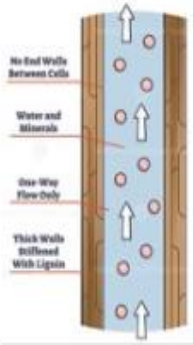
Diffusion is the movement of a fluid (a gas or a liquid) from a high to a low concentration along a concentration gradient.

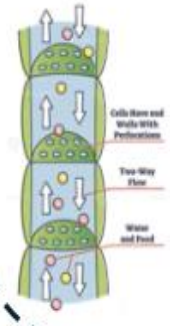
Osmosis is the movement of water from a high to a low water concentration along a concentration gradient.

Active transport is the movement of a substance from a low to a high concentration. It requires energy.

Transport in plants

The transport of water is **transpiration.** It occurs in xylem vessels (non-living).

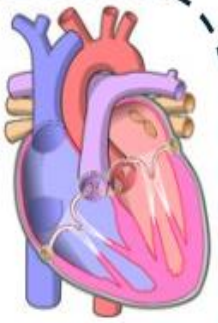




The transport of sugar solution is **translocation**. This occurs in phloem vessels (living tissue).

Transport in humans

The heart pumps blood to the lungs and to the rest of the body. A **double circulatory system** keeps oxygenated and deoxygenated blood separate.



Arteries take blood away from the heart, **veins** take it to the heart.

Keywords

- Diffusion
- Osmosis
- Active transport
- Concentration gradient
- Xylem
- Transpiration
- Phloem
- Translocation
- Atrium
- Ventricle
- Double circulatory system
- Artery
- Vein
- Capillary