

ESSENTIAL KNOWLEDGE BOOK

Name:

Form:

Year 9

**Booklet One
(Higher Maths)**

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- P**- Write in pen- black ink, in legible handwriting.
- R**- Use a ruler to draw all straight lines and rule off finished work.
- O**- Oops! Draw a neat line through mistakes with a ruler.
- U**- Underline the title and full date.
- D**- Draw in pencil.

BE P.R.O.U.D OF YOUR WORK!

SPaG for Life

1	Use capital letters correctly: at the start of sentences and for proper nouns.
2	Use punctuation accurately. For example: full stops, question marks and exclamation marks.
3	Spell common words correctly.
4	Use homophones correctly. For example: there/their/they're.
5	Use paragraphs to structure your writing.



My Timetable

Username/Password Information

Platform	Username	Password Reminder
School email		
School PC logon		
Class Charts		
GCSE Pod		
Carousel		
Sparx		
Educake		
Isaac Physics		

Todmorden High School Student ARCH agreement

You and your parents have chosen for you to attend our school. Todmorden High school is a three-time Ofsted judged 'Good' high school. We have four values that create the acronym ARCH. You should use these values to guide you in your decisions in school and in your wider life.



If you follow the expectations in the agreement below you will leave Todmorden High School with the skills, qualifications and confidence required to be successful adults who contribute positively to society.

To achieve our value of **Ambition**:

- I will arrive on time to school and attend all lessons on time.
- I will complete all home learning set on time and to the best of my ability.
- I will have high expectations of myself, now and for the future, so I can unlock my unique potential.
- I will join in with some extra-curricular activities throughout the year to expand my experiences.
- I will celebrate my achievements at home.

To achieve our value of **Respect**

- I will wear **the correct school uniform**, including travelling to and from school.
- I will not wear jewellery to school, other than a pair of plain studs and a watch (optional).
- I will bring the correct equipment each day.
- I will attend detentions if they are set.
- I will speak to all staff members with respect following instructions given by staff without argument or delay.

To achieve our value of **Care**

- I will ensure I behave in a considerate manner not only whilst at school but also on the journey to and from school and within the wider community.
- I will move around the school in a calm manner, following the one-way system and walking on the left.
- I will approach lessons silently ready for silent retrieval.
- I will ensure I do not share actions and thoughts out of line with our values.
- I will ensure my mobile phone and smart watch are not seen or heard on the school site and are placed in the bottom of my school bag when before I arrive in school and until I leave the school site at the end of the day.

To achieve our value of **Honesty**

- I will be honest about my actions.
- I will accept personal responsibility for my mistakes.
- I will ensure all members of our school community feel valued, I will not accept discrimination and bullying in school.
- I will make school aware if members of our school community are not upholding our values.

Signed: _____ Date: _____

Todmorden High School

learning DNA



Silent retrieval

You enter lessons in silence and complete a retrieval activity independently, using your knowledge organiser. You put all your equipment on your desk.



Ambitious content

You work through an ambitious and broad curriculum across all of your subjects. You have high expectations of yourself and you do your best in lessons. Teachers direct your activities and outline whether tasks are collaborative and with discussion or silent independent work.



Assessment and Feedback

Your understanding is checked and teachers' planning is based on assessment of your work. Teachers regularly look at your work. All assessments are carefully planned to support your progress.



Skilful questioning

Teachers use "no hands" strategies to check your understanding and learning. You answer questions to the best of your ability so that teachers have an accurate picture of your understanding.



Oracy and literacy

Your oral responses use formal vocabulary and ambitious academic language. Teachers will do this too. You project your voice so all can hear you. You have high standards of written English, you use SPaG for Life codes to identify errors and proof read your work. You are polite and respectful to staff who are here to help you make progress.



Self-regulated ARCH learners

You watch demonstrations from teachers so you have a clear understanding of what is being taught. Over time you effectively **plan, monitor and evaluate** your work. You understand thinking involves effort. You value and use the feedback teachers give you. You complete home learning because it is a key tool used to support long-term learning.



Responsive teaching

You are honest when answering questions so that teachers can adapt their teaching to help you understand or be more ambitious. You sit in seating plans specifically designed by your teachers to support your learning.



ARCH learners and ARCH teachers

In order to promote our core values of ARCH, your actions and words match the values of Ambition, Respect, Care and Honesty. This will support you to unlock your unique potential.



Orderly dismissal

You stand silently behind your desks and, when dismissed, leave in an orderly fashion. Corridors are calm.



A guide to your Knowledge Organiser

What is a knowledge organiser?

A knowledge organiser is a place where your teachers have put all the **core knowledge** that you need to know for a particular topic. They are designed to support you to become self-regulated learners.

It is your first point of reference in lessons to check your understanding. You can use your knowledge organiser to:

- Check your understanding of key vocabulary in a lesson.
- Check your knowledge of a particular topic.
- Self-check quizzing and revision.

A knowledge organiser is **not** everything you are going to learn about a topic; this information will come from your lessons.

How to use your knowledge organiser

In lesson



Unless told otherwise, have your knowledge organiser on the desk, open at the subject you are currently in. This will make it simpler for you to check your understanding of key vocabulary.

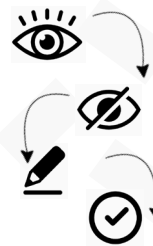


If you are struggling with a knowledge question, refer to your knowledge organiser before asking your teacher. This will also develop your research skills.



When planning your written answers in lessons, refer to your knowledge organiser for that subject to ensure you have correct and detailed knowledge.

As revision



Look-Cover-Write-Check

1. Choose one section of your knowledge organiser.
2. Study it carefully. I find that reading it out works to embed it into memory.
3. Cover the section with a paper, or turn the KO over.
4. Write the sentence/information out from memory.
5. Check it against your KO.

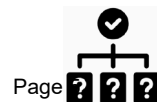


Timeline/diagrams

Use the information from your knowledge organiser and transform it into something else. This can be a timeline, storyboard or diagram.

Self-quizzing

Choose a section of the knowledge organiser you want to learn. Create a set of questions to test yourself with. These can be on flashcards, or even Quizlet. Use the sections of your KO to chunk the knowledge together and make it manageable.



Key themes (big ideas)

Fatherhood & masculinity – Blackman uses the novel to explore ideas about fatherhood and masculinity, such as the expectations that fathers are disciplinarians in families, and the need for men to hide their feelings for fear of appearing weak.

Growing up – in some ways the novel is a 'coming of age' novel and reflects many of the complex emotional difficulties facing young people in modern society.

Family – Through the Bridgeman family, Blackman explores many aspects of the modern family; emotional issues such as loss of a parent, conflict over identity and the financial difficulties faced by single parents.

Tolerance – a lack of tolerance leads to expressions of anger and violence throughout the novel. For instance, Dante comes to realise late in the novel that he has tolerated his friend's casual homophobia by calling it 'just a word'.

Vocabulary	Definition
beseech	beg
contempt	dislike or hatred
diabolical	evil
disorientated	confused, bewildered
dual narrative	a story with two different narrators
irate	angry
obligation	duty, responsibility
preposterous	ridiculous
protagonist	leading character
relinquish	give up
resentful	bitter, offended
scathing	extremely critical
volatile	unpredictable

Contexts and concepts

Malorie Blackman was Children's Laureate from 2013 until 2015. She was born in London but her parents were originally from Barbados. Until she wrote her best-selling Noughts and Crosses series ethnicity had never been central to her protagonists' lives. "I wanted to show black children just getting on with their lives, having adventures, and solving their dilemmas, like the characters in all the books I read as a child." In Boys Don't Cry, the family's ethnicity is only casually revealed halfway through.

Sexuality – there has been a notable increase in the acceptance of homosexuality in the UK in recent years and the LGBTQ movement now holds regular Gay Pride events across the country. Legislation during the latter part of the 20th and the early part of the 21st century made any kind of discrimination on the basis of sexuality illegal and in 2014 legislation was finally passed to allow same sex marriage.

Single parents – Unlike the early part of the 20th century, single parent families are far more commonly accepted in the 21st century. They make up nearly a quarter of families with dependent children in the UK.

Race - In the 1970s and 1980s, black people in Britain were the victims of racist violence perpetrated by far-right groups such as the National Front. Racism in Britain in general, including against black people, is considered to have declined over time and any discrimination on the basis of race has been enshrined in British law as an offence since 1976. However, incidents such as the Grenfell fire have brought to the forefront issues of poverty and inequality amongst BAME communities.

Education – there has been a continued rise in the number of young people going to university; in the 1960s it was 4%, now it is closer to 50%. Young people now have to stay in education or further training until they are over 18, and A Levels are seen as the gateway to further education, rather than an end in themselves.

The Welfare State is a system whereby the state provides support to its citizens, and government expenditure on the welfare state is intended to improve societal areas such as health, education, employment and social security.

Key characters

Macbeth	Eponymous protagonist, ambitious, ruthless.
Lady Macbeth	Defies expectations, strong and ambitious.
Witches	Supernatural beings, prophecy, could represent conscience.
Banquo	Macbeth's friend, sons prophesized to rule, killed and returns as a ghost.
Duncan	Great King, loves Macbeth at the start, gets killed in Act 2.
MacDuff	Wife and children killed, vengeful, kills Macbeth, born by Caesarean.

Plot

Act 1	Macbeth and Banquo meet the witches, Cawdor executed, Lady Macbeth reads letter and taunts Macbeth, Duncan arrives.
Act 2	Macbeth kills Duncan, Macbeth is crowned, Malcolm flees.
Act 3	Banquo suspects Macbeth, Banquo murdered, Fleance escapes, Macbeth is haunted by Banquo at a banquet.
Act 4	Witches show Macbeth future Kings – Sons of Banquo, Macduff's family murdered.
Act 5	Lady Macbeth goes mad and sleepwalks, Lady Macbeth dies, Macbeth is killed by Macduff and Malcolm is crowned King.

Key Quotes

Unnatural	Lady Macbeth "Come you spirits...Unsex me here"
Hallucination	Macbeth "Is this a dagger I see before me?"
Cyclical	Macbeth "Blood will have blood".
Guilt / Anxiety	Lady Macbeth: "All the perfumes of Arabia will not sweeten this little hand".
Betrayal of prophecy	Macbeth "I bear a charmed life".

Motifs - write down key quotes that match the motifs

Nature

Light and Dark

Children

Blood

Sleep

Dreams

Themes – tick them off when you have seen them in the play

Fate and free will	Is the action pre-decided?	<input type="radio"/>
Ambition	The Macbeths' ambition drives the play.	<input type="radio"/>
Appearance and reality	People and events are not always what they seem.	<input type="radio"/>
Supernatural	Witches, ghosts, prophecies.	<input type="radio"/>
Violence	Many battles throughout the play.	<input type="radio"/>

Debate	A structured argument where two sides speak alternately for and against a particular contention.
Proposition	The side which agrees with the title of the debate.
Opposition	The side which disagrees with the title of the debate.
Rebuttal	When you give a statement or evidence against an argument raised by the other side.
Verbatim	Word for word.
Content	What you actually say in your speech. This will include facts, opinions, evidence and anecdote.
Clarity	Being clear in the points you are making. Expressing the complex issues so they make sense and are focused on the argument you are making.
This house believes ...	The start of any formal debate title. The title will always take a side so the proposition and opposition know which side they are on.

Useful Formal Debate Phrases

Opening the debate:

Ladies and Gentlemen, welcome to this debate.

Welcome from this side of the house...

The motion for debate today is: ... defining the motion:

Now we as today's proposition/opposition strongly believe that this is true/not true.

Presenting the team-line

I, as the first speaker, will be talking about ...

Our second speaker, ..., will elaborate on the fact that ...

Introducing arguments

My first/... argument is:

The first/... reason why we're prop/opposing this motion is:

There are many examples for this/for ..., for instance.

In fact, you can find many examples for this in real life. Just think of...

And there are similar cases, such as..., ...

So in this simple example we can clearly see the effect of ...

Now because of this ..., we have to support this motion.

Summarising and ending your speech

So ladies and gentlemen, what have I told you today? And for all of these reasons, the motion must stand/fall.

And for all these reasons, I beg you to prop/oppose

Speak Up

When you take a stand and say what you choose,
Without hesitation, or being confused,
Not holding a fear of what others may say,
But to say what you mean in everyway.

- 5 It liberates your soul, by setting you free,
No longer a prisoner of insecurity,
But a teacher to others who sometimes hold back,
By seeing in you the strength that they lack,
Releases their fears and doubts that they hold,
10 And helps them now see its ok to speak bold,
Just do it with dignity, kindness and love,
Give all of your fears to our friends up above.

- Don't compromise yourself to collude with the rest,
Speak truth in your words and remain at your best,
15 If others don't like the control that they lack,
Because of your strength to speak truth and talk back.

- Let that be their issue, don't lose who you are,
Keep making that stand and you're sure to go far.
We all have the right to express our beliefs,
20 Our ideas, opinions, happiness and grief.

But we must allow others to do just the same,
Respect them and their wishes without drama and pain.
So keep trying hard to find that strength deep within,
And let old habits go, so new ones can begin.

Higher – Unit 1 - Number

Integer – a whole number can be positive or negative -4, -3, -2, -1, 0, 1, 2, 3, 4,

Terminating Decimal – a decimal that ends 0.5, 1.2, 1.245, 1.689

Recurring Decimal – the digits after the point continue for ever in some way (sequence or not in a sequence) $0.333\bar{3}$, $0.\dot{3}4\dot{5}$, π , $\sqrt{2}$

Significant figures – the digits that carry meaningful contributions

Decimal places – the digits after the point

Multiplying with Decimal places – ignore the decimal places, do the multiplication then put decimal places back
 $3.\underline{2} \times 2.\underline{4}$ do $32 \times 24 = 768$ put decimals back in $3.\underline{2} \times 2.\underline{4} = 7.\underline{68}$

Dividing with decimal places – write as fraction then multiply top and bottom by 10, 100, 1000 until you get whole numbers – then divide
 $6 \div 0.5 = \frac{6}{0.5} = \frac{60}{5} = 12$

5 > 3 3 < 5 2.01 < 2.1 etc.....

You can use the > and < signs to show which number is bigger

Factors – Numbers that divide into a number exactly.

Multiples – Extended times tables

Number of ways of doing two tasks	m ways of doing one task and n ways of doing a second task, the total number of ways of doing the first task then the second task is m x n.
Dealing with a fraction in BIDMAS	For $\frac{\text{calculation 1}}{\text{calculation 2}}$ treat as brackets work out (calculation 1) then (calculation 2) using the priority of operations (BIDMAS) before dividing.
Cube Root	Cube root is the inverse of cubing. "What number was multiplied by itself, then again to get this?"
Base numbers	This is the number that is too the power
Multiplying powers	Add the indices if base numbers the same
Dividing powers	Subtract the indices if base numbers the same
Power to a power	Multiply the indices
Negative in a power	Means 1 over
Anything to the power zero	Is one
A unit fraction in a power (e.g. $\frac{1}{2}$)	Means a root. A $\frac{1}{2}$ means the square root, $\frac{1}{3}$ means the cube root etc...
A fraction in the power (e.g. $\frac{2}{3}$)	Use the denominator for the root, and then the numerator is a power. E.g. for $\frac{2}{3}$ do the cube root and then square it.
Prefix	Some powers of 10 have a prefix – e.g. 1000 is kilo
Standard form	Used to write big numbers quickly or small numbers quickly.
Not equal sign	The not equal to sign is an equal sign with a line through it.
Surd	A number written as a root.
Rational number	It can be written as a fraction
Rationalising the denominator	Multiply by the denominator over the denominator (in other words by 1)

Higher – Unit 2 - Algebra

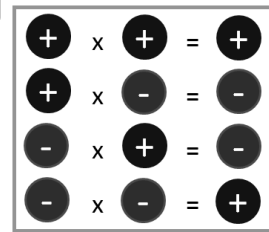
Order of Operations	BIDMAS – The order in which we do calculations. Brackets first then indices. Division and multiplication same time left to right. Finally Addition and subtraction same time left to right.
Base numbers	This is the number that is too the power
Multiplying powers	Add the indices if base numbers the same
Dividing powers	Subtract the indices if base numbers the same
Negative in a power	Means 1 over
Anything to the power zero	Is one
A unit fraction in a power (e.g. $\frac{1}{2}$)	Means a root. A $\frac{1}{2}$ means the square root, $\frac{1}{3}$ means the cube root etc...
A fraction in the power (e.g. $\frac{2}{3}$)	Use the denominator for the root, and then the numerator is a power. E.g. for $\frac{2}{3}$ do the cube root and then square it.
Expanding double brackets	Multiply each term in the first bracket by each term in the second.
Consecutive Integers	One after the other.
Even Integers	Any even integer is ibn the 2 times table and can be written as $2n$.
Substitution	Swapping an algebraic letter for its value.
Standard Form	Used to write big numbers quickly or small numbers quickly.
Linear Sequence	A list of numbers that increases or decreases by the same amount each time.
Geometric Sequence	Terms increase (or decrease) by a constant multiplier.
Arithmetic Sequence	Terms increase (or decrease) by a fixed number (common difference).

Integer – a whole number can be positive or negative

... -4, -3, -2, -1, 0, 1, 2, 3, 4 ...

Negative number: a real **number** that is less than zero.

Negatives: multiplying and dividing:
 1. When the signs are different the answer is **negative**.
 2. When the signs are the same the answer is positive.



BIDMAS – The order in which we do calculations.
Brackets first then **indices**. **Division and multiplication** same time left to right. Finally **Addition and subtraction** same time left to right.

Square root – Finding a number that times itself to given that number. You can have positive and negative square roots.

To simplify a fraction, divide the top and bottom by the highest common factor.

The nth term of an arithmetic sequence is common difference $\times n$ + zero term.

Expand brackets: multiply each term inside the bracket by the term outside.

Factorise: divide each term by the highest common factor, writing the HCF outside the bracket.

Higher – Unit 3 – Interpreting and Representing Data

Midpoint of two numbers: add the two values and divide the result by 2.

A tally chart should have titles on columns and clearly drawn tallies.

A year – contains 12 months
A quarter – refers to a 3 month period.

Increase – the values are going up.
Decrease – the values are going down.
Constant rate – going up or down by the same value each time.



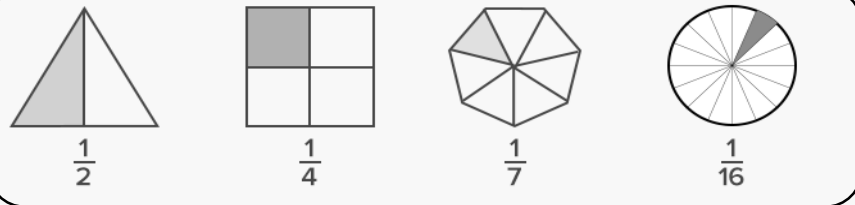
Frequency – The amount of times something occurs

Stem and Leaf Diagram – Splits values by place value. Shows spread. Needs a key.

A bar chart should have a title, titles on both axes, equal scale on the y axis and gaps between the bars.

Mean	Total of the set of values divided by the number of values.
Median	When n data values are written in order, the median is the $\frac{n+1}{2}$ th value.
Line Graphs	Useful for tracking changes over time.
Pie Charts	Useful when comparing parts of a whole.
Bar Charts	Used to compare the frequencies of two sets of data.
Frequency Polygon	You can join the midpoints of the tops of the bars in a frequency diagram with straight lines. OR plot the midpoint for each class against the frequency.
Two Way Table	Divides data into groups in rows across the table and in columns down the table.
Outliers	Individual points which are outside the overall pattern of a scatter graph. If they are likely to be from incorrect readings you can ignore them.
Correlation	A scatter graphs shows a relationship (correlation) between variables.
Positive Correlation	As one value increases, so does the other.
Negative Correlation	As one value increases, the other decreases.
No (or zero) Correlation	No linear relationship between x and y.

A **unit fraction** is a rational number written as a **fraction** where the numerator is one and the denominator is a positive integer.



To get the **reciprocal** of a number, we divide 1 by the number.

The **multiplier** is the **single** decimal value used to multiply the amount you are working with. Firstly, consider what the overall percentage would be after the figure has had its percentage increase or decrease added or subtracted. Then convert this amount to a decimal, before finally multiplying by the number in question.

Ratios can be fully **simplified** just like fractions. To **simplify** a **ratio**, divide all of the numbers in the **ratio** by the highest common factor.

Two **ratios** that have the same value are called **equivalent ratios**. To find an **equivalent ratio**, multiply or divide both quantities by the same number.

Reciprocal	The reciprocal of a number is 1 divided by the number.
Unit Ratios	One part of the ratio is 1. Unit ratios make them easier to compare.
Appreciate	In financial terms means to gain value.
Depreciate	In financial terms means to lose value.
VAT (Value Added Tax)	VAT is tax charged at 20% on most goods and services.
Ratio	A comparison of two or more quantities.
Simplifying Ratios	Divide all of the numbers in the ratio by the highest common factor.
Equivalent Ratios	Multiply or divide both quantities by the same number.
Recurring Decimals	A decimal representation of a number whose digits are periodic (repeating its values at regular intervals).
Direct Proportion	As one amount increases, another amount increases at the same rate.
Inverse Operations	They are the operation that reverses the effect of another operation.
Per Annum	Each year.

Higher – Unit 5 – Angles and Trigonometry

Angles in a triangle add to 180° .

Angles in a quadrilateral add to 360° .

An **Interior Angle** is an angle inside a shape.

The **Exterior Angle** is the angle between any side of a shape, and a line extended from the next side.

Sum of Interior Angles	Total sum of angles inside a polygon (n is the number of sides)
Tessellation	Shapes fit together. The angles where the shapes meet must add up to 360° .
Interior Angle	An angle inside a shape.
Exterior Angle	The angle between any side of a shape, and a line extended from the next side.
Pythagoras' Theorem	Used to find missing lengths in a right-angled triangle. The square of the hypotenuse is equal to the sum of the squares of the other two sides.
Angle of Depression	Angle measured downwards from the horizontal.
Angle of Elevation	Angle measured upwards from the horizontal.
Hypotenuse	The side opposite the right angle.
Opposite	The side opposite the angle θ .
Adjacent	The side next to the angle θ .
Sine	Ratio of the opposite side to the hypotenuse.
Cosine	Ratio of the adjacent side to the hypotenuse.
Tangent	Ratio of the opposite side to the adjacent side.
Sin^{-1}	Inverse sine function, used to find missing angles.
Cos^{-1}	Inverse cosine function, used to find missing angles.
Tan^{-1}	Inverse tangent function, used to find missing angles.

Higher – Unit 6 – Graphs

The equation of a straight line is given by $y=mx+c$.
 Horizontal lines have the equation $y=$ ____
 Vertical lines have the equation $x=$ _____

A quadratic expression is an **expression** that has a variable that's squared and no variables with powers higher than 2 in any of the terms.

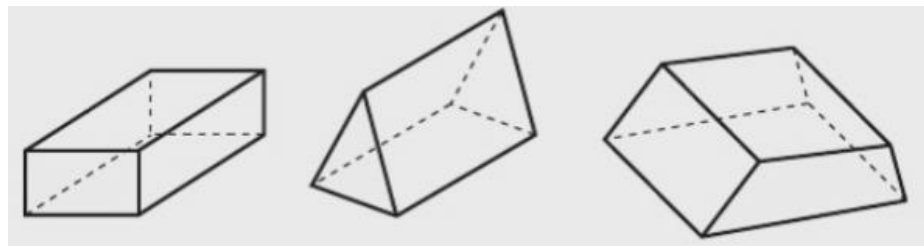
A table of values is used to calculate the y value by substituting the x value into the equation.

Linear Equation	Generates a straight-line (linear) graph. The equation for a straight line graph is written as $y=mx+c$.
Linear Function	Has a graph that is a straight line,
Velocity	Speed in a particular direction.
Velocity-Time Graph	Shows how velocity changes over time.
Line Segment	Section of a line.
Midpoint of a line segment	The point exactly in the middle.
Perpendicular	Lines which cross at 90° The product of the two gradients is -1. When a graph has gradient m , the perpendicular gradient is $-1/m$
Quadratic Equation	Contains a term in x^2 but no higher or negative power of x . The graph is a curve called a parabola.
Quadratic Function	Has a graph which is a parabola.
Minimum / maximum point	A quadratic graph has a point where the graph turns.
Solutions	A quadratic equation can have 0, 1 or 2 solutions. A cubic equation can have 1, 2 or 3 solutions.
Cubic Function	Contains a term in x^3 but no higher power of x . It can also have terms in x^2 and x , and number terms.
Reciprocal Function	In the form k/x (where k is a number). The x and y axes are asymptotes to the curve.
Asymptote	A line that the graph gets very close to but never actually touches.
Equation of a circle	With a centre $(0,0)$ and radius r , the equation of a circle is $x^2 + y^2 = r^2$

Higher – Unit 7 – Area and Volume

A prism is a 3D solid that has the same cross-section all through its length.

Volume is measured in mm^3 , cm^3 or m^3 .
Volume of a prism = area of cross-section x length.



The **circumference** of a circle is its perimeter.

Angles around a point add up to 360° .

The net of a cylinder is made up of 2 circles and a rectangle.

Pythagoras' Theorem:
 $a^2 + b^2 = c^2$ where c is the longest side in a right-angled triangle.

BIDMAS – The order in which we do calculations.
Brackets first then **I**ndices. **D**ivision and **M**ultiplication same time left to right. Finally **A**ddition and **S**ubtraction same time left to right.

1 Hectare	The area of a square 100m by 100m. $1 \text{ ha} = 100\text{m} \times 100\text{m} = 10000\text{m}^2$ Areas of land are measured in hectares.
Truncate	To truncate, remove the other digits without rounding.
Error Interval	A measurement could be 10% larger or smaller than the one given.
Dimensions	Length, width, height. Measurements of the object.
Surface area	The total area of all the faces of a 3D solid.
Capacity	The amount of liquid 3D object can hold. Measure in millilitres and litres.
Arc	Part of the circumference of a circle.
Sector	A slice of a circle, between an arc and two radii.
Area conversion	$1\text{m} = 100 \text{ cm}$ $1\text{m} \times 1\text{m} = 1\text{m}^2$ $100\text{cm} \times 100 \text{ cm} = 10000\text{cm}^2$ To convert cm^2 to m^2 , divide by 10000.
Isosceles Trapezium	A trapezium in which the non-parallel sides are equal in measure. The bases are parallel and the non-parallel sides are equal in length.
Spheres	Volume of a sphere = $\frac{4}{3}\pi r^3$

A **graph quadrant** is one of **four** sections on a Cartesian plane. Each of the **four** sections has a specific combination of negative and positive values for x and y.

An **arc** is any smooth curve joining two points.

Parallel lines are always the same distance apart for their entire length. **Perpendicular lines** cross each other at right angles.

In **geometry**, bisection is the division of something into two equal or congruent parts, usually by a line, which is then called a **bisector**.

The graph of a relation of the form $x = 5$ is a line parallel to the y-axis because the x value never changes. A line parallel to the y-axis is called a **vertical line**.

Isometric drawing is way of presenting designs/**drawings** in three dimensions.

The graph of a relation of the form $y = 5$ is a line parallel to the x-axis because the y value never changes. A line parallel to the x-axis is called a **horizontal line**.

Transformation	Move a shape to a different position.
Enlargement	A transformation where all the side lengths of a shape are multiplied by the same scale factor.
Scale factor	Describes the size of an enlargement or reduction.
Fractional Scale Factor	Multiply all the side lengths by the scale factor.
Locus/Loci	A locus is a set of points that all obey a certain rule. Often a locus is a continuous path.
Centre of Enlargement	The position of the enlarged shape is described by the centre of enlargement.
Reflection	A reflection can be thought of as folding or "flipping" an object over the line of reflection.
Rotation	Rotation turns a shape around a fixed point called the centre of rotation.
Object	An original shape.
Image	When the object is transformed, the resulting shape is the image.
Resultant Vector	The vector that moves the original shape to its final position after a number of translations.
Invariant Point	Invariant point on a line or shape is a point that does not vary/move under a single transformation or combined transformation.
Describing an enlargement	State it is an enlargement and give the scale factor and coordinates of the centre of enlargement.
Describing a reflection	State it is a reflection and include the mirror line. The mirror line may require an equation.
Describing a rotation	State it is a rotation, give the coordinate of the centre of rotation, and the angle and direction.

Inequalities are the relationships between two expressions which are not equal to one another.

Factors are numbers that divide exactly into another number.

When a value is square rooted, the answer can be positive or negative.

Factorising is the reverse of expanding bracket. The first step of factorising an expression is to 'take out' any common factors which the terms have.

Solve a quadratic by factorising:
 •**Step 1:** Rearrange the given quadratic so that it is equal to zero
 •**Step 2:** Factorise the quadratic
 •**Step 3:** Form two linear equations and solve each.

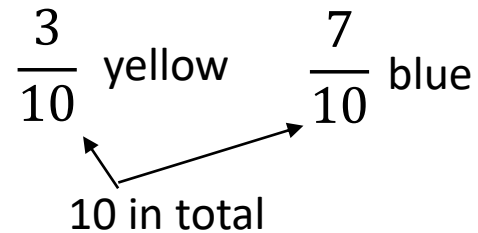
Substitution is the name given to the process of swapping an algebraic letter for its value.

A bracket squared means the bracket times the bracket, and then expand it as you normally word for two brackets.

Solving an equation or inequality	Means find the values for the unknown that fit
Roots of a function	Solution when it is equal to zero.
Quadratic expression	In the form ax^2+bx+c , where a, b and c are numbers.
Quadratic formula	Can be used to find solutions to a quadratic equation $ax^2+bx+c = 0$
Perfect Squares	A number made by squaring a whole number.
Simultaneous Equations	When there are two unknowns, you need two equations to find their values.
Elimination	Solving simultaneous equations – making the coefficients of one variable the same in both equations, and then adding or subtracting to eliminate this variable.
Substitution	Solving simultaneous equations – substituting an expression for x or u from on equation into the other equation.
Surd	When we can't simplify a number to remove a square root (or cube root) then it is a surd.

A **ratio** says how much of one thing there is compared to another thing.

To write a **ratio** as **fractions**, add the total parts in the **ratio** to find the denominators and write each part of the **ratio** as the individual numerators.



You can simplify a fraction if the numerator (top number) and denominator (bottom number) can both be divided by the same number.

To add fractions there are Three Simple Steps: Make sure the bottom numbers (the denominators) are the same. **Add** the top numbers (the numerators), put that answer over the denominator. Simplify the **fraction** (if needed)

Probabilities can be written as fractions, decimals or percentages on a **scale** from 0 to 1.

To **multiply decimals**, first **multiply** as if there is no **decimal**. Next, count the number of digits after the **decimal** in each factor. Finally, put the same number of digits behind the **decimal** in the product.

A **Venn diagram** shows the relationship between a group of different things (a set) in a visual way.

Probability	$\frac{\text{successful outcomes}}{\text{total possible outcomes}}$
Sample Space Diagram	Shows all possible outcomes of two events.
Mutually Exclusive	Two events which cannot happen at the same time.
Experimental Probability	$\frac{\text{frequency of outcome}}{\text{total number of trials}}$
Theoretical Probability	The number of ways the event can occur (favorable outcomes) divided by the number of total outcomes.
Expected Outcomes	Number of trials x probability
Frequency Tree	Shows two or more events and the number of times they occur.
Probability Tree Diagram	Shows two or ore events and their probabilities.
Dependent Events	If one event depends upon the outcome of another.
Conditional Probability	The probability of a dependent even. The probability of the second outcome depends on what has already happened in the first outcome.

Substitution is the name given to the process of swapping an algebraic letter for its value.

Distance = speed x time.
To work out what the units are for speed, you need to know the units for distance and time.

Mass = density x volume.
Density is normally measured using units of g/cm^3 for smaller amounts, and kg/m^3 for larger amounts.

Area of a circle is $\pi \times \text{radius}^2$.
It is measured in _____².

In a linear equation (equation of a straight line) the gradient is the coefficient of x.

A prism has the cross section the same all along its length, with sides that are all parallelograms (4-sided shape with opposites sides parallel).
Volume = area of cross section x length

To calculate a percentage of an amount, use combinations of simple calculations.

Iteration	Carry out a process repeatedly.
Compound Interest	The interest earned each year is added to money in the account and earns interest the next year.
Growth	Increases in quantity.
Decay	Decreases in quantity.
Density	The mass of a substance contained in a certain volume. It is usually measure in grams per cubic centimetre g/cm^3 .
Pressure	The force of newtons applied over an area in cm^2 or m^2 . It is usually measure in newtons N per square metre N/m^2 or square centimetre N/cm^2 .
Kinematic Formulae	The features or properties of motion in an object.
Velocity, v	Speed in a given direction; possible units are m/s.
Initial velocity, u	Speed in a given direction at the start of the motion.
Acceleration, a	Rate of change of velocity, m/s^2

If one shape can become another using Turns, Flips and/or Slides, then the shapes are **Congruent**.

When two objects are similar then the length, area and volume scale factors are related with squaring and cubing.

The *Pythagorean* (or *Pythagoras'*) *Theorem* is $a^2 + b^2 = c^2$ where **c** is the hypotenuse while **a** and **b** are the legs of the triangle.

Angles in a triangle add to 180°.

Lines of equal length are marked with dashes.

An equilateral **triangle** has 3 sides of equal length. The **dashes** on the **lines** show they are equal in length.

An isosceles **triangle** has 2 sides of equal length. The **dashes** on the **lines** show they are equal in length. The angles at the base of the equal sides are equal.

Enlarging a shape changes its size.

When the **scale factor** is fractional and the shape decreases in size, we still call it an **enlargement**.

Congruent Triangles	Triangles are congruent if they are the same shape and size but reflected, rotated or translated.
SSS	Side, Side, Side: all three sides equal.
SAS	Side, Angle, Side: two sides and the included angle are equal.
AAS	Angle, Angle, Side: two angles and a corresponding side are equal.
RHS	Right angle, Hypotenuse and Side: right angle, hypotenuse and one other side are equal.
Perimeter	When a shape is enlarged by a linear scale factor, k, the perimeter is multiplied by scale factor k.
Alternate angles	Alternate angles are angles that are in opposite positions relative to a transversal intersecting two lines.
Corresponding Angles	When two lines are crossed by another line (which is called the Transversal), the angles in matching corners are called corresponding angles.

The Pythagorean (or **Pythagoras'**) **Theorem** is the statement that the sum of (the areas of) the two small squares equals (the area of) the big one.

The trigonometric ratios are special measurements of a right triangle (a triangle with one angle measuring 90°)

A bearing is the angle in degrees measured clockwise from north. Bearings are usually given as a three-figure bearing.

To calculate the **area** of a **triangle**, multiply the height by the width (this is also known as the 'base') then divide by 2.

The area of a circle is:
 π (Pi) times the Radius squared: $A = \pi r^2$

The trigonometric ratios for the angles 30°, 45° and 60° can be found using two special triangles.

A right-angled isosceles triangle with two sides of length 1 cm can be used to find exact values for the trigonometric ratios of 45°.

An equilateral triangle with side lengths of 2 cm can be used to find exact values for the trigonometric ratios of 30° and 60°.

angle θ	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	not defined

Upper Bound	The upper bound is the smallest value that would round up to the next estimated value.
Lower Bound	The lower bound is the smallest value that would round up to the estimated value.
$Y = f(-x)$	A reflection of $y=f(x)$ in the y-axis.
$Y = -f(x)$	A reflection of $y=f(x)$ in the x-axis.
$Y = -f(-x)$	A reflection of $y=f(x)$ in the x-axis and then the y-axis (or vice versa). These two reflections are equivalent to a rotation of 180° about the origin.
$Y = f(x) + a$	The translation of $y = f(x)$ by $\begin{pmatrix} 0 \\ a \end{pmatrix}$
$Y = f(x + a)$	The translation of $y = f(x)$ by $\begin{pmatrix} -a \\ 0 \end{pmatrix}$
Plane	A flat surface. For example the surface of your desk lies in a horizontal plane.

Discrete Data can only take certain values.

Continuous data is data that can take any value.

There are many methods on how to multiply fractions with whole numbers. One method is:

1. Rewrite the whole number as a fraction.
2. Multiply the numerators of the fraction.
3. Multiply the denominators of the fraction.
4. Reduce/simplify the answer, if possible.

A **Stem and Leaf** Plot is a special table where each data value is split into a "stem" (the first digit or digits) and a "leaf" (usually the last digit).

Inequality tells us about the relative size of two values.

To estimate the mean from grouped frequency: find the midpoint, multiply by the frequency for each class, add the total, divide by the total frequency,

The **modal class** is the group with the highest frequency.

Box Plot (Box and whisker)	Displays data to show the median and quartiles.
Summary Statistics	The averages, range and quartiles.
Cumulative Frequency Table	Show how many data values are less than or equal to the upper class boundary of each data class.
Upper Class Boundary	Highest possible value in each class.
Cumulative Frequency Graph	Data values on the x-axis and cumulative frequency on the y-axis.
Histogram	A type of frequency diagram used for grouped continuous data. For unequal class intervals, the area of the bar represents the frequency,.
Frequency Density	The height of each bar in a histogram.
Comparative Box Plots	For two different sets of data drawn on the same diagram.

To solve a linear equation, use inverse operations.

To solve a quadratic equation, use either factorise, use the quadratic formula, or complete the square.

To solve a linear inequality, use inverse operations.

The y intercept is where a graph crosses the u axis. The x intercept is where a graph crosses the x axis.

When the graph of a circle has the centre at (0,0), the equation of the circle is $x^2+y^2=r^2$ where r is the radius.

To expand double brackets, multiply each term in one brackets by each term in the other bracket. Simplify where you can.

An integer is a whole number.

Turning Point	The lowest of highest point of the parabola where the graph turns. It is either a minimum or a maximum.
Roots	The x-values where the graph intersects the x-axis are the solutions of the equation $y=0$.
No Real Roots	If a graph does not cross the x-axis.
One Repeated Root	If the graph just touches the x-axis.
Cubic Function	Highest power of x is x^3 . It is written in the form $y=ax^3+bx^2+cx+d$. The graph intersects the y-axis at $y=d$. The roots can be found by finding x when $y=0$.
Simultaneous Equations	You can solve a pair of simultaneous equations graphically by plotting the graphs and finding the point(s) of intersection.
Iterative Process	To find an accurate root of a quadratic equation you can use an iterative process. Iterative means carrying out a process repeatedly.
Sketch a quadratic	Calculate the solutions to the equation $y=0$. Find the y-intercept. Find the coordinate of the turning point (maximum or minimum).

Angles in a triangle add to 180°.

To calculate the gradient of a line: $\frac{\text{change in } y}{\text{change in } x}$

The equation of a straight line is in the form $y=mx+c$ where m is the gradient and c is the y -intercept.

You can use substitution to find missing parts of an equation of a straight line.

Perpendicular lines cross at 90°. If two lines are perpendicular, the product of their gradients is -1.

To accurately draw a circle, you will need a pencil, ruler and compass.

Congruent shapes are the same shape and size but reflected, rotated or translated.

Triangles are congruent if 1 of the 4 rules of congruence applies.

Arc	An arc is a part of the circumference.
Sector	When an arc is bounded by two radii, a sector is formed.
Segment	The area between an arc and a chord.
Circumference	The distance around the outside of a circle (perimeter).
Radius	Straight line from the centre to the edge of a circle.
Diameter	Straight line across a circle through the centre.
Cyclic quadrilateral	A quadrilateral with all four vertices on the circumference of a circle.
Subtended	Opposite – and angle subtended by an arc is an angle opposite an arc.
Chord	A straight line connecting two points on a circle.
Tangent	A straight line which touches a circle at one point.

Higher – Unit 17 - More Algebra

Subject of a formulae – is the variable that is being worked out. It can be recognised as the letter on its own on one side of the equals sign.

For example, in the formula for the area of a rectangle $A = L \times W$, the subject of the formula is A.

You can change the subject of a formulae or an equation.

We have changed the subject of the equation from "v" to "u"

Factorising – Is when you put brackets back into your expression.

$$25x^3 + 15x^2 + 20x = 5x(5x^2 + 3x + 4)$$

Factorising a quadratic – Is when you put the expression into 2 brackets.

$$x^2 + 7x - 8 = (x + 8)(x - 1)$$

Dividing Fractions – Dividing by a fraction is the same as multiplying by the reciprocal.

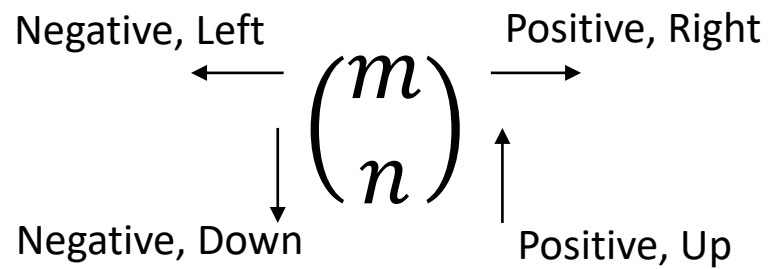
Equation and Identity – In an **identity** the two expressions are equal for *all* values of the variables. An **equation** is only true for certain values of the variable.

Substitution – Substitution is when you replace the letters in an expression with their correct value.

Multiplying algebraic fractions	When multiplying algebraic fractions, cancel common factors in numerators and denominators before multiplying the fractions together.
Simplifying algebraic fractions	To simplify an algebraic fraction, cancel any common factors in the numerator and denominator.
Factorising before simplifying algebraic fractions	You may need to factorise before simplifying an algebraic fraction: - Factorise the numerator and denominator. - Divide the numerator and denominator by any common factors.
Lowest Common Multiple	The lowest common denominator of two algebraic fractions is the lowest common multiple of the two denominators.
Proving and Identity	To show a statement is an identity, expand and simplify the expressions on one or both sides of the equals sign, until the two expressions are the same.
Proof	A proof is a logical argument for a mathematical statement.
Prove something true	To prove a statement is true, you must show that it will be true in all cases.
Dis-prove	To prove a statement is not true you can find a counter-example — an example that does not fit the statement.
Integer in a proof	For an algebraic proof, use n to represent any integer.
Even/odd in a proof	Even numbers = $2n$ Odd numbers = $2n+1$ or $2n-1$
Evens/odds in a proof	Consecutive Even = $2n, 2n+2, 2n+4, ..$ Consecutive Odd = $2n+1, 2n+3, 2n+5, ..$
Solve equations with fractions	To solve an equation involving algebraic fractions, first write one side as a fraction in its simplest form.
Solve quadratic	To solve a quadratic equation, rearrange it into the form $ax^2 + bx + c = 0$.
Function notation	A function is a rule for working out values of y for given values of x. The notation $f(x)$ is read as 'f of x'. f is the function. $f(x) = 3x$ means the function of x is 3x.
Composite function	fg is a composite function. To work out $fg(x)$, first work out $g(x)$ and then substitute your answer into $f(x)$.
Inverse function	The inverse function reverses the effect of the original function. $f^{-1}(x)$ is the inverse function of $f(x)$.

The midpoint is **the middle point of a line segment**. It is equidistant from both endpoints.

Translation – a type of transformation which moves the object. Usually shown with a vector.



Expand brackets: multiply each term inside the bracket by the term outside.

Simplify algebraic expressions: collect like terms (terms with the same variable).

Surd	A number written as a root.
Displacement Vector	Shows a change in position. From A to B is written as \overrightarrow{AB}
Vectors	Written as bold lowercase letters. When handwriting, underline them.
Magnitude	The size of a vector.
Scalar	A number.
Collinear	Collinear points all lie on the same line.

Higher – Unit 19 – Proportion and Graphs

A velocity-time graph **shows the speed and direction an object travels over a specific period of time**. Velocity-time graphs are also called speed-time graphs.

The slope of a velocity graph represents the acceleration of the object.

The horizontal axis is the time from the start.

The vertical axis of a velocity-time graph is the velocity of the object.

Two quantities are said to be in **direct proportion** if they increase or decrease in the same ratio.

Exponential Function	Expressions in the form a^x or a^{-x} where $a > 1$.
Tangent to a Curve	A straight line that touches the graph at a point. The gradient at a point on a curve is the gradient of the tangent at that point.
Chord	A straight line that connects two points on a curve. The gradient of the chord gives the average rate of change and can be used to find the average rate of change between two points.
Area under a velocity-time graph	The area under a velocity graph represents the displacement of the object.
Area of a trapezium	Used to estimate the area under a curve.
$Y = f(x) + a$	The graph of $y=f(x)$ is transformed by a translation of a units parallel to the y -axis, or by a translation $\begin{pmatrix} 0 \\ a \end{pmatrix}$
$Y = f(x + a)$	The graph of $y=f(x)$ is transformed by a translation of a units parallel to the x -axis, or by a translation $\begin{pmatrix} -a \\ 0 \end{pmatrix}$
$Y = f(-x)$	The graph of $y=f(x)$ is transformed by a reflection in the y -axis.
$Y = -f(x)$	The graph of $y=f(x)$ is transformed by a reflection in the x -axis.
$Y = a f(x)$	The graph of $y=f(x)$ is transformed by a stretch of scale factor a parallel to the y -axis.
$Y = f(ax)$	The graph of $y=f(x)$ is transformed by a stretch of scale factor $\frac{1}{a}$ parallel to the x -axis.

Y9 Science – Biology – Topic 1 Key Concepts

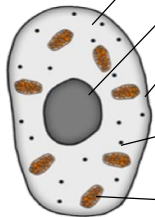
Eukaryotes complex organisms

cytoplasm	<i>Site of chemical reactions in the cell.</i>	Gel-like substance containing enzymes to catalyse the reactions.
nucleus	<i>Contains genetic material.</i>	Controls the activities of the cell and codes for proteins.
cell membrane	<i>Semi-permeable.</i>	Controls the movement of substances in and out of the cell.
ribosome	<i>Site of protein synthesis.</i>	mRNA is translated to an amino acid chain.
mitochondrion	<i>Site of respiration.</i>	Where energy is released for the cell to function.

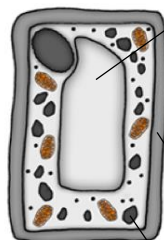
Prokaryotes

cell membrane	<i>Semi-permeable.</i>	Controls the movement of substances in and out of the cell.
chromosomal DNA Plasmid DNA	<i>Not in nucleus. Floats in the cytoplasm.</i>	Controls the function of the cell. Can be found as chromosomal DNA and plasmid DNA (small rings).
cell wall	NOT made of cellulose.	Supports and strengthens the cell.
cytoplasm	<i>Site of chemical reactions in the cell.</i>	Gel-like substance containing enzymes to catalyse the reactions
flagella	<i>Whip-like tail.</i>	Allows the bacterial cell to move.
ribosome	<i>Site of protein synthesis.</i>	mRNA is translated to an amino acid chain.

animal cell



plant cell



contains all the parts of animal cells plus:

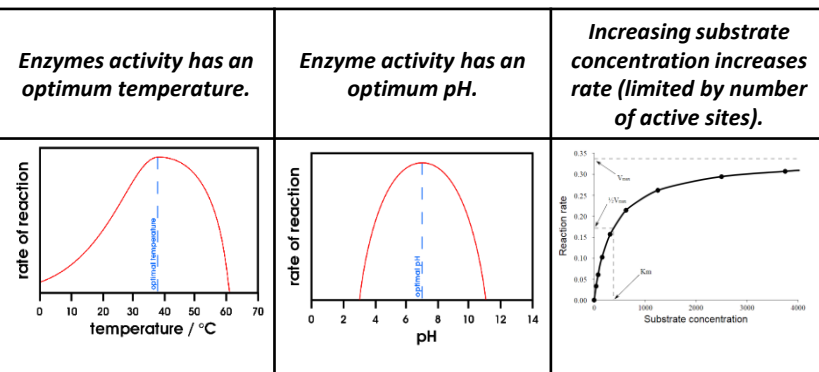
permanent vacuole	<i>Contains cell sap.</i>	Keeps cell turgid, contains sugars and salts in solution.
cell wall	<i>Made of cellulose.</i>	Supports and strengthens the cell.
chloroplast	<i>Site of photosynthesis.</i>	Contains chlorophyll, absorbs light energy.

Transporting substances

Diffusion	<i>Movement of particles from a higher to a lower concentration e.g. O₂ and CO₂.</i>
Osmosis	<i>Movement of water from a dilute solution to a more concentrated solution e.g. Plants absorb water from the soil.</i>
Active transport ENERGY required	<i>Movement of particles from a dilute solution to a more concentrated solution e.g. movement of mineral ions into roots of plants.</i>

Enzymes catalyse (increase the rate of) specific reactions.

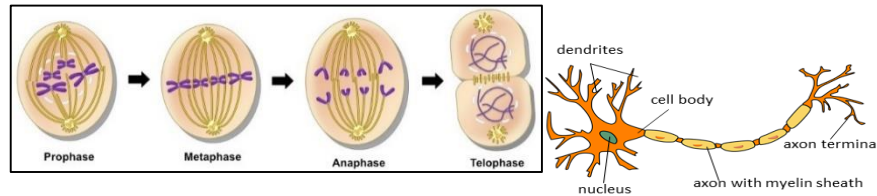
The activity of enzymes is affected by changes in temperature, pH and substrate concentration.





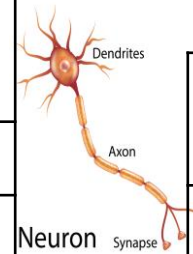
Y9 Science Biology Topic 2 – Cells and Control

Mitosis



Key Terms / Words	Definition
asexual reproduction	Producing new organisms from one parent only. These organisms are genetically identical to the parent.
cancer cell	Cell that divides uncontrollably.
cell cycle	A sequence of growth and division that happens in cells. It includes interphase and mitosis and leads to the production of two daughter cells that are <u>genetically</u> identical to the parent cell.
interphase	The stage when the cell prepares itself for the process of cell division, and DNA replication takes place. The cell also makes more of its sub-cellular structures.
mitosis	The process of cells dividing to produce two daughter cells that are genetically identical to the parent cell.
differentiation	When a group of similar things, such as cells, become different in form from each other.
meristem	A small area of undifferentiated cells in a plant, near the shoot tips and root tips, where cells are dividing rapidly by mitosis.
sensory neurone	Neurone that carries impulses from receptor cells, towards the central nervous system.
motor neurone	Neurone that carries impulses to effectors.

Stage 1	Interphase (not part of mitosis)	Before mitosis: Increase the number of sub-cellular structures e.g. ribosomes, mitochondria. DNA replication makes copies of chromosomes.
Stage 2	Prophase	Nucleus breaks down and spindle fibres appear.
Stage 3	Metaphase	Chromosomes are lined up on spindle fibres on the equator (middle) of the cell.
Stage 4	Anaphase	Chromosome copies are separated and pulled to opposite ends of the cell.
Stage 5	Telophase	A new nuclear membrane forms around each set of chromosomes.
Stage 6	Cytokinesis	Cell surface membrane forms to separate the cells (+new cell wall in plants).



Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS)	
The CNS is the brain and the spinal cord.	
Reflex actions are automatic and rapid.	
Stimulus	Touch hot object
Receptor	Cells in skin
Sensory neurone	CNS
Relay neurone in CNS	CNS
Motor Neurone	CNS
Effector	Muscles connected to arm
Response	Hand moves

Human Embryonic stem cells	Can differentiate into any cell type	Therapeutic cloning of stem cells to produce new tissue uses same genes so the body does not reject the tissue. Can be a risk of infection
Adult stem cells	Can differentiate into a limited number of human cells e.g. blood cells	Tissue made from adult stem cells is matched to avoid rejection, risk of infection. Only a few types of cells can be formed.
Meristems (plants)	Can differentiate into any plant cell type throughout the life of the plant.	Used to produce clones quickly and economically, e.g. rare species, crop plants with pest /disease resistance

The Periodic Table of the Elements

1		2												3	4	5	6	7	0
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Key relative atomic mass atomic symbol <small>name</small> atomic (proton) number </div>										<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 H hydrogen 1 </div>							<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 4 He helium 2 </div>
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10		
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18		
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36		
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54		
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86		
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated								

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

Y9 Science – Chemistry – Topic 1 – Key concepts in chemistry – Atomic structure and periodic table

Key information	
atom	Made up of a nucleus containing protons and neutrons, surrounded by electrons. They have neutral charge.
nucleus	Very small central region of an atom containing protons and neutrons. Most of the atom's mass is found in the nucleus.
proton	Found in the nucleus. Have a relative charge of +1 and a relative mass of 1. Elements of the same type have the same number of protons in their nuclei.
neutron	Found in the nucleus. Relative charge of 0 and a relative mass of 1.
electron	Found on shells around the nucleus. Have a relative charge of -1 and a relative mass of 1/1835 (negligible)
All atoms have a neutral charge	Atoms contain equal numbers of positively charged protons and negatively charged electrons. This gives them a neutral charge or charge equal to zero.
mass number (A)	Represents the total number of protons and neutrons in the nucleus of an atom (symbol A). Also known as the nucleon number.
atomic number (Z)	Represents the number of protons in the nucleus of an atom (symbol Z). Also known as the proton number. This number is unique to the element e.g. only oxygen atoms have an atomic number of 8.
isotope	Atoms of the same element that have the same numbers of protons but different numbers of neutrons (in their nuclei)
electronic configuration	Refers to the number of electrons found on each electron shell of an atom and is related to the position of atoms in the periodic table.
Relative atomic mass (Ar)	The mean relative mass of the atoms of different isotopes in an element. It is the number of times heavier an atom is than 1/12 of a carbon-12 atom. e.g. relative mass of magnesium atom is 24. This means it is 24 times heavier than 1/12 of a Carbon-12 atom.

The periodic table

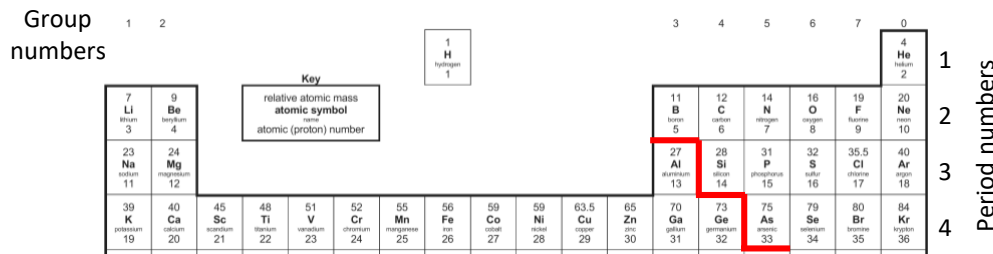
Series	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
1	H 1							
2	Li 7	Be 9.4	B 11	C 12	N 14	O 16	F 19	
3	Na 23	Mg 24	Al 27.3	Si 28	P 31	S 32	Cl 35.5	
4	K 39	Ca 40	? 44	Ti 48	V 51	Cr 52	Mn 55	Fe 56 Ni 59 Co 59 Cu 63
5	(Cu 63)	Zn 65	? 68	? 72	As 75	Se 78	Br 80	
6	Rb 85	Sr 87	Y 88	Zr 90	Nb 94	Mo 96	? 100	Ru 104 Pd 106 Rh 104
7	(Ag 108)	Cd 112	In 113	Sn 118	Sb 122	Te 125	I 127	
8	Cs 133	Ba 137	Di 138	Ce 140				
9								
10			Er 178	La 180	Ta 182	W 184		Os 195 Ir 197 Pt 198 Au 199
11	(Au 199)	Hg 200	Tl 204	Pb 207	Bi 208			
				Th 231		U 240		

The early periodic table (left) was developed by Mendeleev.

- Mendeleev placed the elements in order of increasing relative atomic mass.
- He switched the order of some elements to line up elements up with similar chemical properties (pair reversal – Iodine and tellurium)
- He also left gaps for undiscovered elements.
- He used his table to predict the existence and properties of undiscovered elements.

Modern periodic table

- Elements are arranged in order of increasing atomic number (number of protons), in rows which are called periods.
- Elements with similar properties are found in the same vertical columns which are known as groups.
- The **group number** tells us the **number of electrons in the outer shell** of the element e.g. Lithium is in group 1 so it has 1 electron in its outer shell.
- The **period number** tells us the **number of electron shells** occupied e.g. Aluminium is in period 3 so has electrons occupying three electron shells.
- 'steps' - left of steps are metals and to the right of the steps are non-metals



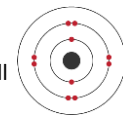
Electron configuration (elements 1-20 ONLY)

Electrons occupy the shells in order starting with the shell closest to the nucleus.

Shell	Max. number of electrons
First	2
Second	8
Third	8

The electron arrangement of an atom can be worked out from its atomic number. For example, the atomic number of sodium is 11. Sodium atoms have 11 protons and so 11 electrons.

- 2 electrons occupy the first shell
- 8 electrons occupy the second shell
- 1 electron occupies the third shell



2.8.1
Group 1
Period 3

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

So, for chlorine:

$$\text{Relative atomic mass} = \frac{(75 \times 35) + (25 \times 37)}{100} = 35.5$$

Calculating protons, neutrons and electrons in

- Protons = atomic number
- Electrons = protons
- Neutrons = mass number – atomic number

Diagram illustrating the calculation of protons, neutrons, and electrons for a Sodium (Na) atom. The mass number (A) is 23, and the atomic number (Z) is 11. The atom symbol is Na.

Sodium (Na) atom

- Protons = atomic number = **11**
- Electrons = protons = **11**
- Neutrons = mass number – atomic number = **23 – 11 = 12**

Relative atomic mass

Chlorine appears to have a mass number of 35.5 however, this **does not mean it has half a neutron**.

Instead, it represents the mean mass of all the chlorine atoms in the universe.

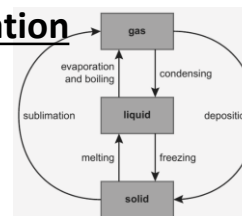
Scientists discovered that 75% of all Cl atoms had a relative mass of 35 and the remaining 25% had a relative mass of 37 (the percentage is referred to as the abundance). **The mean mass can be calculated and is referred to as the relative atomic mass**. See the calculation of relative atomic mass to the right →

Y9 Science – Chemistry – Topic 2 - States of matter and separation

Changes of state (physical changes)

Evaporation, melting and sublimation all require energy to be transferred from the surroundings to the particles.

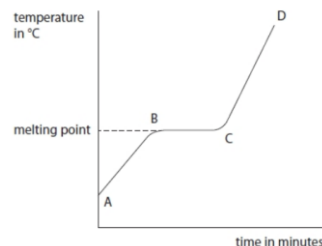
Condensing, freezing and deposition require energy to be *transferred from the particles to the surroundings*.



Particle arrangement and movement

State	Particle diagram	Arrangement of particles	Movement of particles
Gas		random far apart	fast in all directions
Liquid		random close together	move around each other
Solid		regular close together	vibrate about fixed positions

Heating curve



A to B - Solid phase

Particles held in a fixed position, begin to vibrate more as temperature increases.

B to C – Melting point

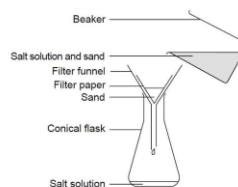
Energy is used to overcome forces of attraction between particles. Particles become randomly arranged.

C to D – Liquid phase

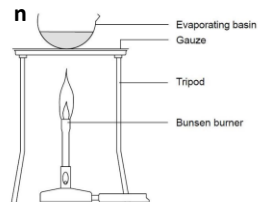
Particles can move past each other and are moving more rapidly.

Key information	
States of matter	Solid, liquid and gases are the three states of matter.
Physical change	A reversible process that does not result in the formation of a new substance e.g. melting
Chemical change	Difficult to reverse (irreversible) result in the formation of new substance e.g. chemical reactions result in chemical changes.
melting point	Temperature at which a substance changes from the solid state to the liquid state when heated; or from the liquid state to the solid state when cooled.
boiling point	Temperature at which a substance changes from the liquid state to the gas state when heated; or from the gas state to the liquid state when cooled.
Solute	Substance dissolved in a solvent to form a solution.
Solvent	Liquid used to dissolve a solute to form a solution.
Solution	Formed when a solute dissolves into a solvent
Soluble	A substance that can dissolve (in a given solvent) e.g. salt in water
Insoluble	A substance that cannot dissolve (in a given solvent) e.g. sand in water
Pure substance	A single element or compound that has a fixed composition.
Mixture	Mixtures contain two or more different elements and/or compounds that are not chemically bonded together. Mixtures can be separated relatively easily.
Potable	Used to describe water that is suitable for drinking.

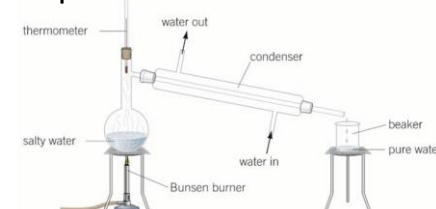
Filtration



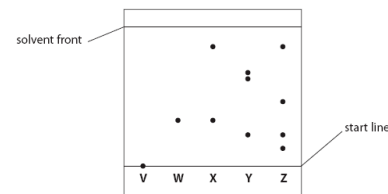
Crystallisation



Simple distillation



Core practical - Chromatography



The chromatography paper is placed in a solvent, the solvent has to be below the start line (drawn in pencil) as the solvent (mobile phase) is absorbed through the paper (stationary phase) the mixture of colour compounds separate at different rates. More soluble substances travel further up the paper.

Drinking water and water treatment

Waste water can be used to produce potable drinking water.

The processes used include:

1. Sedimentation – where impurities settle to the bottom of their container
2. Filtration – to remove insoluble substances
3. Chlorination – Chlorine added to kill microorganism

Y9 Science Physics Topic 1 Key concepts

Total Energy in = Useful Energy out + Wasted Energy



distance travelled = average speed × time	
acceleration = change in velocity ÷ time taken	$a = \frac{(v-u)}{t}$
force = mass × acceleration	$F = m \times a$
weight = mass × gravitational field strength	$W = m \times g$

$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$	$v^2 - u^2 = 2 \times a \times x$
---	-----------------------------------

power = work done ÷ time taken	$P = \frac{E}{t}$
--------------------------------	-------------------

power = energy transferred ÷ time taken	$P = \frac{E}{t}$
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change in gravitational potential energy = mass × gravitational field strength × change in vertical height	$\Delta GPE = m \times g \times \Delta h$
kinetic energy = $1/2 \times \text{mass} \times (\text{speed})^2$	$KE = \frac{1}{2} \times m \times v^2$
efficiency = $\frac{(\text{useful energy transferred by the device})}{(\text{total energy supplied to the device})}$	
wave speed = frequency × wavelength	$v = f \times \lambda$
wave speed = distance ÷ time	$v = \frac{x}{t}$
work done = force × distance moved in the direction of the force	$E = F \times d$

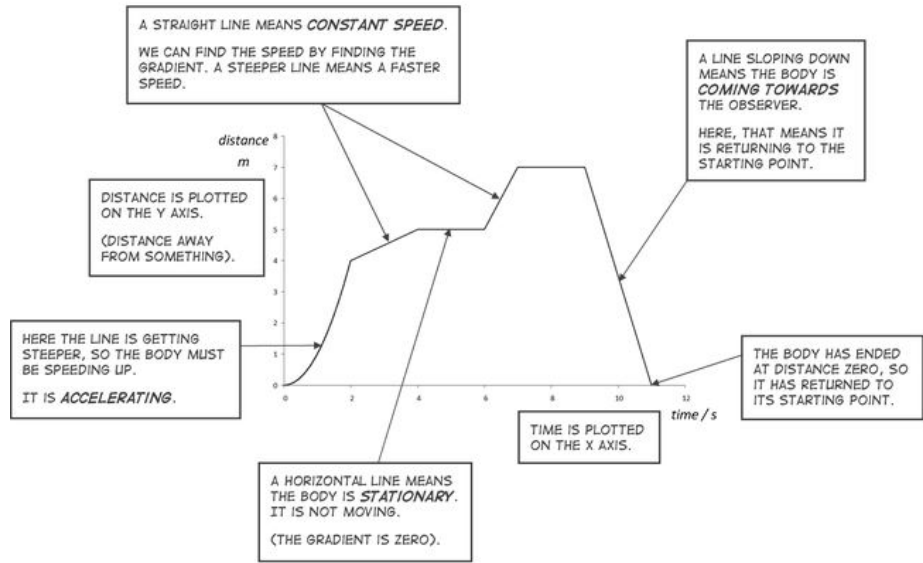
Useful prefixes (but always remember kg is the exception to the rule!)

tera	giga	mega	kilo	Standard unit	centi	milli	micro	nano	pico
T	G	M	k		c	m	μ	n	p
$\times 10^{12}$	$\times 10^9$	$\times 10^6$	$\times 10^3$		$\times 10^{-2}$	$\times 10^{-3}$	$\times 10^{-6}$	$\times 10^{-9}$	$\times 10^{-12}$

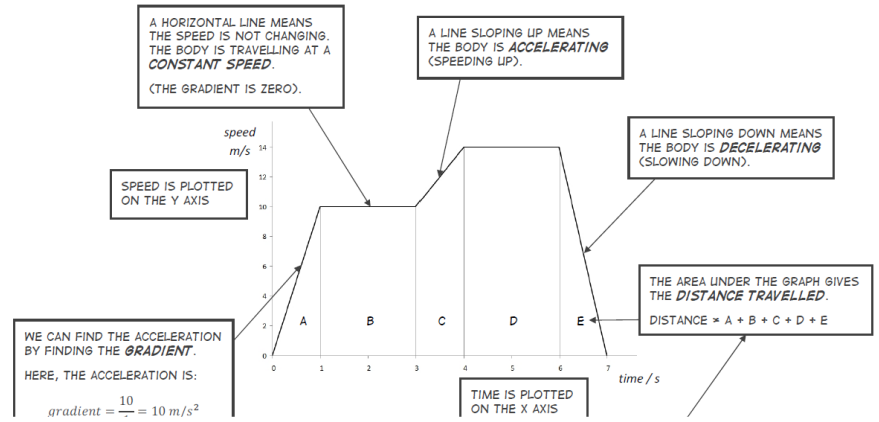
Y9 Science Physics Topic 2 Motion and Forces



THE ANATOMY OF A DISTANCE-TIME GRAPH



THE ANATOMY OF A SPEED-TIME GRAPH



Key Term	Definition
Vector quantities	Have magnitude and direction e.g. force, velocity, displacement, and weight
Scalar quantities	Have magnitude only e.g. distance, speed, mass and energy
velocity	Speed in a stated direction. (m/s)
Weight	$W=mg$ (g is 10N/kg on Earth) W, weight (N) m, mass (kg) g, gravitational field strength (N/kg)
Average speed	Speed = distance travelled / time taken

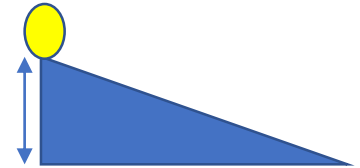
Key Term	Definition
Resultant force	The overall force acting on an object, i.e. the vector sum of all the forces acting on an object.
Acceleration	$a = \frac{v - u}{t}$ a, acceleration (m/s ²) v, final velocity (m/s) u initial velocity (m/s) t, time taken (s)
Suvat equation	$v^2 - u^2 = 2 a x$ X is the displacement of the object. NB this equation only apply for constant acceleration.
Resultant force	$F = ma$ F, force (N) M, mass (kg) a, acceleration (m/s ²)

Y9 Physics Topic 3 Conservation of Energy.

The Key Ideas

Energy is an accounting system.
 Energy is measured in joules (J).
 Work done = energy transferred.

Practical
 Explaining the energy changes of a can of soup rolling down a ramp.



At the top of the ramp the can has no K.E. but some G.P.E.

At the bottom of the ramp G.P.E. store has decreased. Energy has been transferred **mechanically** to the K.E. store of the can and the thermal energy store in the can and surroundings.

The loss of GPE is calculated using $\Delta G.P.E = m \times g \times \Delta h$

The KE at the bottom of the ramp is calculated using :
 $K.E. = 0.5 \times m \times (v)^2$

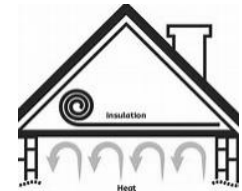
The speed at the bottom of the ramp has to be determined by measuring distance and time and using the equation speed = distance / time. Light gates and a data logger could be used to do this.

The difference between ΔGPE and KE will be the energy lost to the thermal energy store.

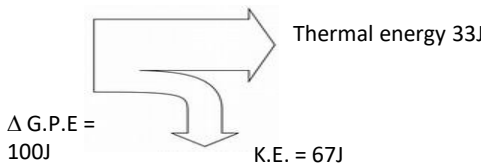
Key Term	Definition
Law of conservation of energy	Energy cannot be created or destroyed, but it can be transferred between stores. No energy transfer is 100% efficient, some energy is always wasted.
Thermal conductivity	The rate at which heat is transferred through a substance. Low thermal conductivity materials are good insulators.
Main energy stores	Kinetic, thermal, gravitational, nuclear, elastic electrostatic and magnetic energy stores.
Energy pathways	Are the ways in which energy is transferred i.e: * Mechanically (when a force does work on an object) * Electrically when a force does work on an electric charge * Radiantly, when a wave (e.g. light or sound) transfers energy from one place to another. * Thermally, when a difference in temperature between objects causes a change in temperature of the objects.
dissipated	When energy is transferred to the surroundings and is less concentrate and so less useful.
Efficiency definition	The ratio of useful energy out to total energy in.
Efficiency equation	$Efficiency = (\text{useful energy out}) / (\text{total energy in})$
Closed system (a group of objects)	has no energy transfers in or out of the system so there is no net energy change for the system.

Key term	Equation
Law of conservation equation	Total energy in = useful energy out + wasted energy out
Efficiency equation	$Eff = (\text{useful energy out}) / (\text{total energy in})$ Efficiency is always a decimal less than 1.00 It's only a % when multiplied by 100.
Change in gravitational potential energy store	$\Delta G.P.E = m \times g \times \Delta h$ ΔGPE : change in gravitational potential energy (J) m, mass (kg) g, gravitational field strength (N/kg) Δh , change in vertical height above ground.(m)
Kinetic Energy Store	$K.E. = 0.5 \times m \times (v)^2$ K.E. Kinetic energy store (J) m, mass (kg) v, speed or velocity (m/s)
Work done (energy transferred)	$E = F \times d$ E, energy or work done (J or NM) F, force (N) d, distance moved in the direction of the force (me)

Unwanted energy losses are reduced by, streamlining, lubrication insulation.



Sankey Diagrams show energy transfers e.g.

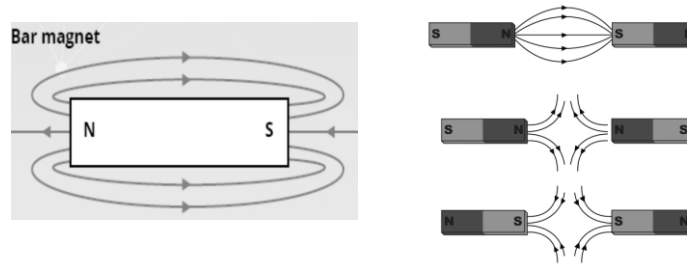




Todmorden High Science Y9 Rotation - Magnetism

Key term	Definition
Permanent magnets	Produce a magnetic field around them which exerts a non-contact force on a magnetic material (or a moving electrical charge).
Induced Magnet	A material which can be made temporarily magnetic. An electromagnet is an example of this.
Magnetic materials	Can be attracted by permanent magnets. Not all metals are magnetic. Iron, nickel and cobalt are the three magnetic metals.
Magnetic field lines.	These are not real but represent the strength and direction of the magnetic force on a North pole of a magnet, they always point from N to S. The closer the lines the stronger the magnetic field.
Independent Variable	The variable that is changed in an experiment.
Dependent Variable	The variable that is measured in an experiment.
Control Variable	Variables that are controlled in an experiment to ensure a fair test.

Magnetic field lines run from north to south.

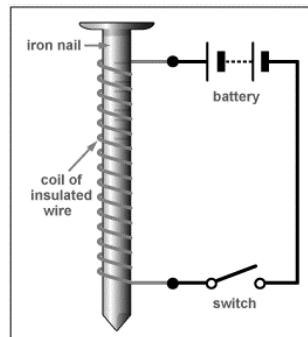


Magnetism is a non-contact force. All magnets have a north and a south pole. Like poles repel. This means that the two poles will push away from each other. Opposite poles attract. This means that the invisible magnetic force between the magnets will force the poles together. The Earth has a magnetic inner core made of iron.

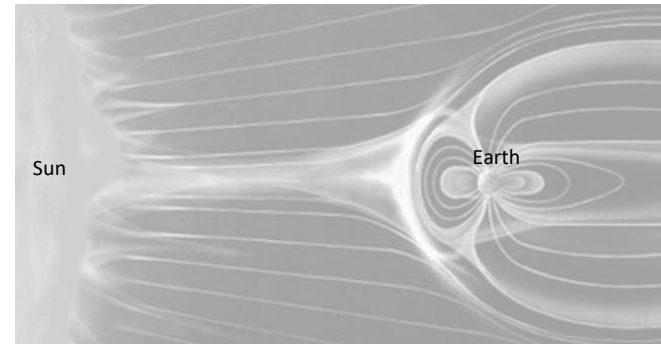
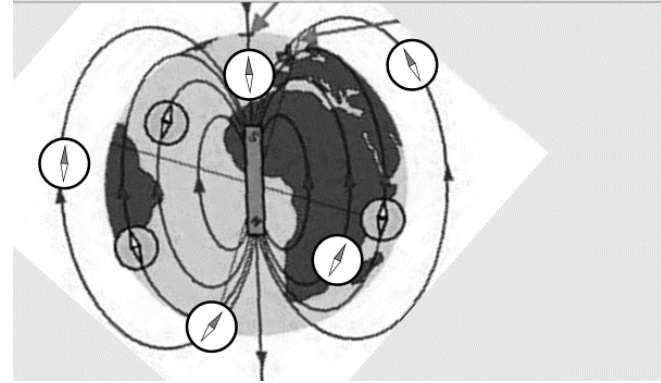
Electromagnets

The magnetic field strength of the electromagnet can be increased by,

- Increasing the current.
- Increasing the number of turns in the coil.
- Using a thicker iron core.



The needle of the compass aligns with the magnetic field, point in the direction of North Magnetic Pole telling you which direction is North.



Earth's **magnetic field** deflects most of the solar wind, whose charged particles would otherwise strip away the ozone layer that protects the Earth from harmful ultraviolet radiation.






Todmorden High Science

Rocks and Space

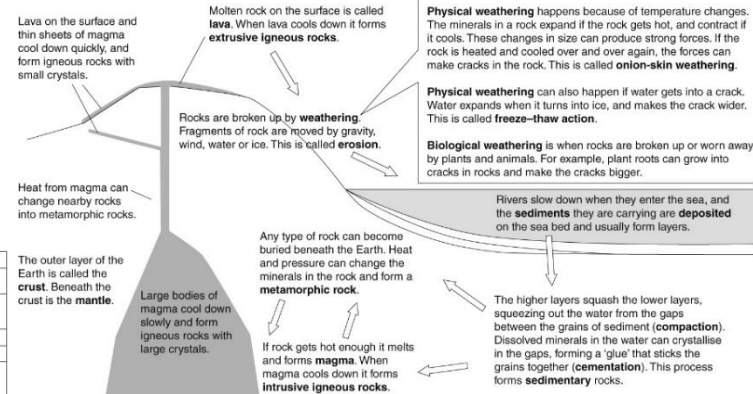
Key term	Definition
eruption	When lava or ash comes out of a volcano.
cement	A building material made using limestone and other materials. It also means 'to stick things together'.
porous	Porous rocks have tiny holes in them. They are permeable and let water soak through them.
igneous rock	Rock made from interlocking crystals that are not in layers. Formed when magma or lava cooled down and solidified.
sedimentary rock	A rock formed from grains stuck together. The grains are often rounded.
metamorphic rock	A rock formed from interlocking crystals that are often lined up in layers. It is formed when existing rocks are heated or compressed.
extrusive	Igneous rocks formed when lava freezes above the ground.
intrusive	Igneous rocks formed when magma freezes underground.
weathering	When rocks are broken up by physical, chemical or biological processes.
orbit	The path that a planet takes around a star, or the path that a moon or satellite takes around a planet.
planet	A large object orbiting a star. The Earth is a planet.
Solar System	A star with planets and other objects orbiting around it.
elliptical	oval-shaped
moon	A natural satellite of a planet.
phases of the Moon	The different shapes the Moon seems to have at different times.
northern hemisphere	The half of the Earth with the North Pole in it. The UK is in the northern hemisphere.

Rock textures

Rocks are made of **grains**. Each grain is made of a naturally occurring compound called a **mineral**. The **texture** of a rock is a description of the size and shape of the grains.

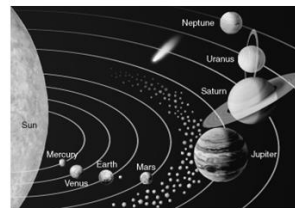
Type of rock	Sedimentary	Igneous	Metamorphic
Examples	limestone, sandstone, mudstone, chalk.	basalt, gabbro, granite, schist, gneiss	marble, quartzite, slate, schist, gneiss
Grains or crystals?	separate grains	interlocking crystals that are not lined up	interlocking crystals, often lined up in bands of different colours
Hard or soft?	often soft or crumbly	hard	hard
Porous?	often	not usually	not usually
Example of texture			

The rock cycle

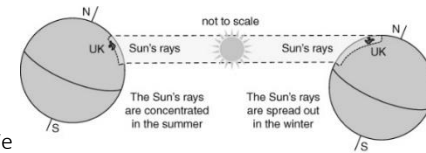


The Solar System

We live on a planet called the Earth. The Earth gets energy from the Sun. The Earth spins on its axis once every 24 hours. The side of the Earth facing the Sun has daylight, and it is night on the side facing away from the Sun. The Earth orbits around the Sun. It takes one year to go around once. The Moon is a satellite of the Earth. We can see the Moon because it reflects light from the Sun. The Moon seems to change shape. The different shapes are called phases of the Moon. The phases happen because we cannot always see all of the part that is lit by the Sun. There are eight planets in elliptical (oval-shaped) orbits around the Sun. Most of the planets have moons orbiting around them. The Sun, the planets and their moons make up the Solar System.



Our current model of the Solar System



Seasons

The Earth's axis is tilted. When the **northern hemisphere** is tilted towards the Sun it is summer in the UK. Days are longer than nights, and the Sun is higher in the sky. The Sun's rays are more concentrated, so it feels hotter.

This is why we get different seasons.

The eight planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

YEAR 9 - TERM 1

PORTRAITS & DAY OF THE DEAD



During this term you will be learning about the Mexican festival of Day of the Dead and the cultural significance of the festival. You will also be developing your skills with drawing realistic portraits. We will then join these topics together by creating your own half face and half sugar skull final piece using shading techniques and coloured ink.

KEY WORDS

COMPOSITION – The layout of a piece of work.

PROPORTION – The size of parts of something compared to other parts.

SKETCH– Creating light lines when starting out a drawing.

tone – Adding areas of shadow or dark to an image, another word for shading.

SCALE – The size or level of something.

REFINE– Last finishing touches to a piece of work to improve it.

MONOCHROME – Black and white or many shades of the same colour.

ELEMENTS OF ART

The elements of art are the key terms that a piece of work will always link to. A piece may not link to all but will always link to some of these.

LINE – Sketching or creating any outline in our work.

SPACE – Creating the sense of an area in our work like a landscape.

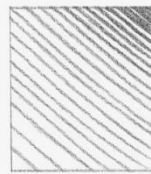
FORM – Three dimensional shapes.

SHAPE – Two dimensional shapes

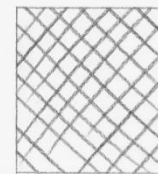
tone – Any area of shading

COLOUR – Adding of pigment

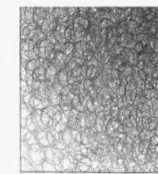
TEXTURE – How something feels like fur or scales



Hatching



Cross-hatching



Circulism



Contouring

SHADING TECHNIQUES

Shading or tone helps to add depth to our work and make things look three dimensional. There are different ways you can apply tone using shading techniques called **HATCHING, CROSS HATCHING AND CONTOUR HATCHING.**

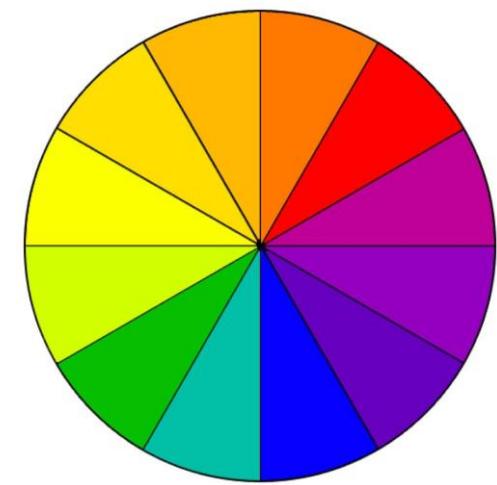


Blend out these shading techniques by spacing out the lines and applying less pressure.

REFERENCE IMAGE

A reference image is the picture we use to create a piece of work from. You should always fold a reference image into sections and then section your drawing page in the same way.

We do this because we can then draw box by box and concentrate on smaller sections. It also helps with accuracy and proportion of our drawing.



COLOUR THEORY

Colour theory helps us use colour more effectively. We use a colour wheel to help us with this. You can find out how to mix a colour by looking at the colours either side of it on a colour wheel.

PRIMARY COLOURS – The base colours that cannot be mixed are RED, BLUE and YELLOW.

SECONDARY COLOURS – Created when mixing two primary colours together are ORANGE, GREEN and PURPLE.

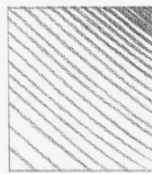
COMPLIMENTARY COLOURS – Opposite each other on the colour wheel and work well together in artwork.

HARMONIOUS COLOURS – Next to each other on the colour wheel and blend easily together.

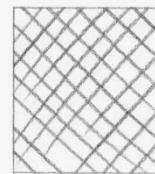
YEAR 9 - TERM 2

STILL LIFE & ROY LICHENSTEIN

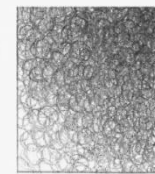
During this term you will be learning about the work of Roy Lichtenstein and the Pop Art movement. We will be learning about still life art work and how to draw a piece of Lichtenstein's work accurately and apply acrylic paint effectively. We will then combine this style of work with a photograph of a still life to create a unique Pop Art still life.



Hatching



Cross-hatching



Circularism



Contouring

SHADING TECHNIQUES

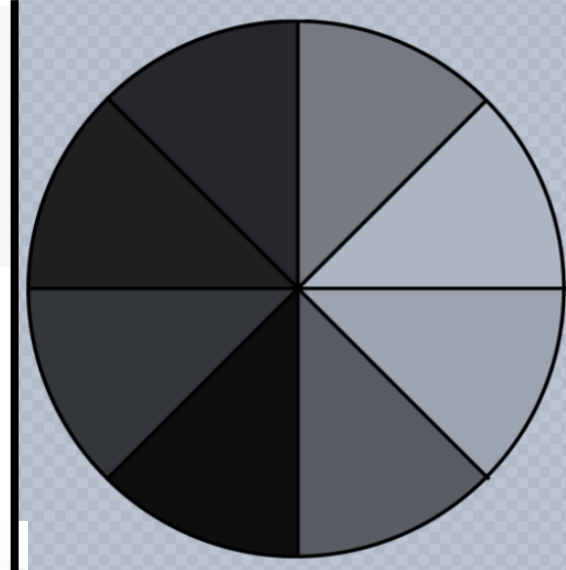
Shading or tone helps to add depth to our work and make things look three dimensional. There are different ways you can apply tone using shading techniques called **HATCHING, CROSS HATCHING AND CONTOUR HATCHING.**



Blend out these shading techniques by spacing out the lines and applying less pressure.

REFERENCE IMAGE

A reference image is the picture we use to create a piece of work from. You should always fold a reference image into sections and then section your drawing page in the same way. We do this because we can then draw box by box and concentrate on smaller sections. It also helps with accuracy and proportion of our drawing.



COLOUR THEORY

Colour theory helps us use colour more effectively. We use a colour wheel to help us with this. You can find out how to mix a colour by looking at the colours either side of it on a colour wheel.

PRIMARY COLOURS – The base colours that cannot be mixed are RED, BLUE and YELLOW.

SECONDARY COLOURS – Created when mixing two primary colours together are ORANGE, GREEN and PURPLE.

COMPLIMENTARY COLOURS – Opposite each other on the colour wheel and work well together in artwork.

HARMONIOUS COLOURS – Next to each other on the colour wheel and blend easily together.

KEY WORDS

COMPOSITION – The layout of a piece of work.

PROPORTION – The size of parts of something compared to other parts.

SKETCH– Creating light lines when starting out a drawing.

tone – Adding areas of shadow or dark to an image, another word for shading.

SCALE – The size or level of something.

REFINE– Last finishing touches to a piece of work to improve it.

MONOCHROME – Black and white or many shades of the same colour.

ELEMENTS OF ART

The elements of art are the key terms that a piece of work will always link to. A piece may not link to all but will always link to some of these.

LINE – Sketching or creating any outline in our work.

SPACE – Creating the sense of an area in our work like a landscape.

FORM – Three dimensional shapes.

SHAPE – Two dimensional shapes

tone – Any area of shading

COLOUR – Adding of pigment

TEXTURE – How something feels like fur or scales

KEY VOCABULARY	
IDE	A piece of software used to help a programmer develop programs (e.g., MU).
Algorithm	A step-by-step set of rules or instructions to complete a task.
Pseudocode	An algorithm written in the style of a programming language but using plain English.
Syntax	The rules/grammar of a programming language.
Variable	Is a memory location to hold a value in a program (eg, Score = 1).
Iteration	A programming statement which makes the program repeat a set of instructions.
Selection	A programming statement which cause the program to make a choice and flow in a given direction.
String	A data type to store text.
Integer	A whole number which can be either positive or negative
List (Arrays)	Lists are used to store multiple items in a single variable.
Mathematical Operators	Are symbols used in programming to carry out calculations (eg, / * + DIV MOD).
Boolean Operators	A logical system using AND, OR and NOT. Takes one or two inputs resulting in a TRUE or FALSE output.

Programming Concepts (Term 1)

Knowledge

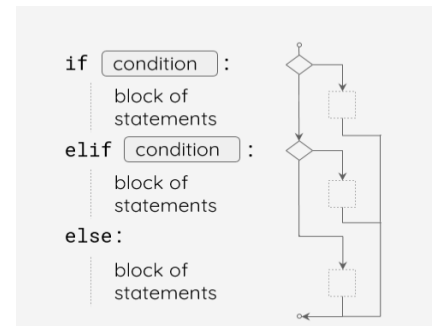
Lists:

```

1  days = ["Monday", "Tuesday",
2  "Wednesday", "Thursday",
3  "Friday", "Saturday",
4  "Sunday"]
5  print(days[0])
                
```

Lists store multiple items in one variable. Each item in a list is accessed using an index 0,1,2 etc.... Indexing always starts at (Zero). So in the above example, line 5 will print out Monday – which is the first item in the list called days[]

Selection:



Conditional Loops (Iteration)

For

```

1  shopping = ["Pasta", "Tomatoes",
2  "Onions", "Basil",
3  "Parmesan"]
4  print("Buy:")
5  for item in shopping:
6  print(item)
                
```

A **for** loop will repeat a section of code for a set number of times. In the example above the program will print out each (item) **for** every item in the list (i.e. 5 times)

While

```

password = input("Please Enter Password")

while password != "Dave":
    password = input("Please Enter Password")
                
```

A **while** loop will repeat a section of code until a condition is met. In the example above the user is asked to enter a password. Then until the user enters the password "Dave" it will continue to ask the user for their password.

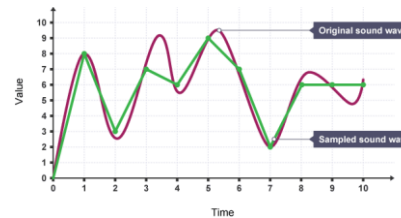
Data Representation II (Term 2)

KEY VOCABULARY	
Audio	
Analogue	Continuous data that can have a range of values.
Digital	Information that can be stored as discrete numbers (e.g. Binary 0s and 1s).
Sample	Digital representation of an analogue signal.
Sample rate	How many samples are taken per second.
Bit rate	The number of bits stored per second.
Compression	Reducing the size of a file.
Visual	
Bit	Smallest amount of data a computer can store.
Pixel	Short for Picture Element. Is the smallest individual square that can be displayed on a screen.
Resolution	The number of pixels that can be displayed in a given area of the screen.
Meta Tag (Data)	Extra information that is contain in the image file. e.g. the date the photo was taken.
Colour Depth	The number of colours used in an image.
RGB	Short for Red, Green and Brown. The main colour pallet used in digital images.
Hexadecimal	Number system used to store pixel colour data.

Knowledge

Audio

Sampling is the process of taking measurements of an analogue sound wave at regular intervals. These measurements can then be stored as a series of binary digits (Bits)



Source:
<https://bam.files.bbci.co.uk/bam/live/content/zyg72hv/large>

If these measurements are taken more frequently, this will result in a more accurate representation of the original analogue sound wave. However, this will also lead to larger file sizes as more bits will need to be stored.

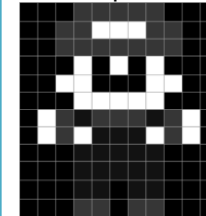
Bit Rate is a measure of how much data is processed for each second of sound.

Bit Rates for **MP3** files range from 16 kilobytes per second (kbps) to 320 kbps.

Visual

Representing images in digital format

Digital pictures are formed out of individual pixels (*picture elements*), just like the Greek and Roman mosaics are formed out of individual pieces of glass or stone. However, unlike their ancient counterparts, the elements in digital pictures are aligned in rows and columns, with the colour of each element represented as a sequence of binary digits.



```

1111111101010101111111
111110100000010101111
1111101010101010101111
111110011001100111111
111000011111000011111
111110000000001111111
1100100110101001100011
1100100001010100100011
111110101010101111111
111110101010101111111
111110101110101111111
111111010110101111111
    
```

Resolution

Is the number of pixels displayed on a screen. The more pixels that can be displayed, the better the picture quality. **4K resolution**, at least the way most TV companies define it, is 3840 x 2160 pixels, or 2160p. That means the screen will have approx. 8 million pixels.

Databases

KEY VOCABULARY	
Database	Large collection of data. Can be paper or computerised
Field	Single piece of data about a person or an object.
Record	All of the data about a person or an object.
Table	Contains a set of database records.
Query	A search result based on specific criteria.
Form	User-friendly way to enter data into a database.
Validation	Check to see what has been entered is allowable.
Data Type	Tells the database how you want the data to be stored.
Primary Key	Field within a database which enables every record to be uniquely identified.

Data types

Type	Description	Example
Number	Can be positive, negative and decimals.	2.56 (Average number of thefts)
Currency	Number including monetary values.	£2.00 (Price)
Boolean	Value that can either be true or false.	Yes (Do you have food allergies)
Auto number	Generates a unique number.	14526 (Student ID Number)
Date and time	Date and times in different formats.	05/06/10 (Student Date of Birth)

Advantages and disadvantages of computerised databases

Advantages:

- Easy to make backup copies.
- Changes are updated automatically.
- Easy to sort data into order eg, alphabetically
- Search thousands of records quickly

Disadvantages:

- Can be difficult to set up and you may have to get a professional to make it.
- Can be accessed and changed illegally (hacked)
- You need to have a computer.

Real world examples



Patient Records



Pupil Data

Online product list

amazon



Police database

HARDWOODS

They are deciduous trees which means that in winter, they lose their leaves.

These trees are broadleaved, bushy and slow growing.

Overall they tend to be harder to work with and more expensive than other types of timbers.

They are less porous and denser cell structure which makes them harder wearing and less prone to rotting.



TYPES:

Name	Characteristics	Uses
Ash 	Flexible, tough and shock resistant, laminates well. Pale brown/cream.	Sports equipment and tool handles.
Beech 	Fine finish, tough and durable. Dense close grain with an	Children's toys, models and furniture.
Mahogany 	Easily worked, durable and finishes well. Rich reddish brown in	High end furniture and joinery.
Oak 	Tough, hard and durable, high quality finish possible. Light brown with variable grain.	Flooring, furniture, and railway sleepers.

SOFTWOODS





They are coniferous trees which means that they keep their leaves in winter = evergreen.

These trees are tall and 'Christmas tree' tree shaped.

Overall they tend to be easier to work with and less expensive than other types of timbers. They are more porous (holes) and if unprotected will rot. They have cones for leaves and grow quickly.



TYPES:

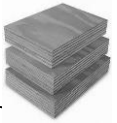
Name	Characteristics	Uses
Pine 	Lightweight, easy to work but can split.	Interior construction, cheaper furniture and decking.
Spruce 	Easy to work, high stiffness to weight ratio.	Construction, furniture and musical instruments
Redwood 	Easy to work and machines well, some rot resistance.	Outdoor furniture, beams, posts and decking.
Cedar 	Easy to work, can blunt tools, finishes well and naturally resistant to rot.	Outdoor furniture, fences and cladding for buildings.

MANUFACTURED BOARDS


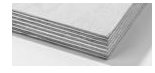
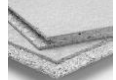


They are sheets of processed natural timber and adhesives - so they are human made boards

These are usually made from waste wood, low-grade and recycled timber.

Can be covered by thin slices of high quality wood known as veneer to make it look aesthetically pleasing. Cheaper than natural timber. They come in boards and have no grain.



TYPES:

Name	Characteristics	Uses
MDF 	Rigid and stable, good value with a smooth easy to finish surface.	Flat pack furniture, toys and kitchen units.
Plywood 	Stable in all directions as alternating layers. Flexible versions available.	Furniture, shelving, toys, interior and exterior construction.
Chipboard 	Good compressive strength, not water resistant and prone to chipping on edges.	Flooring, low end kitchen units and worktops.
Block board 	Stable, tough and heavy. Finishes well.	Furniture, doors, shelving and indoor construction.
Hardboard 	Flexible, even strength and easily damaged by water.	Furniture and photo frame backing.

ENVIRONMENTAL IMPACT

SOURCE/ORIGIN

Timber comes from **trees** - this is known as the source or origin of the material. This is how we change into timber.



1. When trees are cut down, this is known as **fell**ing. This can be through machine or chain saws, just like the image.



2. Branches are cut off and the logs are stored until they are transported to a **sawmill**.



3. When at the sawmill, machines such as **band saws** and **circular saws** are used to create boards/planks.


Wood is considered a **sustainable resource** as new trees can be grown to replace those felled. Here are some **issues and positives** surrounding the impact that wood is having on the environment:

X - In many places, wood is being used at a greater rate which means it is unsustainable.

✓ - To make sure you are buying sustainable timber, you need to make sure it is approved by the **Forest Stewardship Council** or the **Endorsement of Forest Certification**.

X - Illegal felling is leading to deforestation as people aren't replanting trees.

✓ - Deforestation helps with global warming.



Drama

Features of Kneehigh's work:

- Visual storytelling.
- Adaptation.
- Archetypical characters.
- Chorus.
- Inventive use of props.
- Physical theatre.
- Puppetry.
- Dance.
- Song/music.
- Audience interaction.
- Pre-show.
- Multi-role.
- Comedy.

Kneehigh's Beliefs:

- The script is only a starting point.
- The work should be playful.
- Everyone contributes to rehearsals.
- Use the skills and talents of your company.
- Produce work for non theatre-goers.
- The work should be relevant to modern issues.

Greek Theatre:

Performed in amphitheatres.

Only male actors.

Originally, plays were just a Chorus – a group of 50 speakers who recited a story in verse.

Traditional drama really began when an actor named Thespis had the idea for one person to break away from the chorus and reply to what they said.

The Chorus would narrate the drama and comment on what was happening. They would be asking the questions the audience would want to ask.

Masks helped to amplify actors' voices, communicate the main emotion and gender of the character.

Performance fundamentals:

- Be safe
- Be seen
- Be heard

Stage positions are from the performer's point of view.

Job title	Responsibilities
Puppeteer	Manipulates the puppets so that they look like they are alive.
Director	Has the overall vision for the production. Auditions and casts production. Tells the cast what to do vocally and physically (blocks the scenes). Runs rehearsals and gives notes to actors. Liaises with designers.
Playwright	Writes the play, including characters, plot and stage directions.
Musical Director	Leads the orchestra. In charge of all music in the production.
Actor	Auditions. Learns lines/songs/dances and attends all rehearsals. Performs the show.

Key terms

Dharma	The teaching of the Buddha
Dukkha	Suffering
Anicca	Impermanence (things don't last)
Anatta	No permanent soul
Jataka	Book containing stories about the life of Buddha
Buddha	An enlightened being
Ascetic	Harming your body to free your mind- IE starving yourself
Enlightenment	Finding out & understanding the truth about the universe and existence
Siddharta Gautama	The birth name of the Buddha
Mahayana	A branch of Buddhism associated with Tibet and China
Therevada	The 'original' Buddhism that started in India
Paticca Samuppada	Dependent origination- each life/ origin depends on the one before
Meditation	Focussing deeply
The 4 Sights	Old man, sick man, dead man and holy man
Tanha	Craving
Nirvana	Escape from the cycle of rebirth and dukkha
Rebirth	After you die, your karma will begin another person's life
Buddha-nature	The idea that we all have what it takes to be a Buddha!
Samsara	The trap of rebirth (shown visually by the wheel)
Arhat	The final life where you become a Buddha in Therevada
Bodhisattva	Where you choose to 'reincarnate' and return to Samsara instead of going to Nirvana in order to help others.

Key teachings

The 8 Fold Path

8 things that must be done 'right' to gain good karma to get to Nirvana. Buddha called it a 'raft' to escape Samsara (UT-SAL-EMC)

The 4 Noble Truths

The first thing Buddha taught to the ascetics who became the first converts. Dukka (suffering), Tanha (craving), Nirvana (non-existence), Magga (The 8 Fold Path) DTNM

The 5 Skandhas

The 5 parts that make up a person. When we die, these piles fall apart and the next life starts as we have no soul and do not carry on (anatta). The Skandhas are taught using the chariot analogy from Nagasena II. Mental Form (thoughts), Consciousness (awareness), Physical Form (your body), Sensations (the 5 senses), Perception (recognition) MC PSP

The 3 Marks of Existence

Three things that harm us simply because we exist. Dukkha (suffering is inevitable such as getting old, sick and dying), Anicca (things are impermanent like relationships and possessions) and anatta (we have no soul- we cease when our skandhas fall apart) DAA

The 5 Precepts of the Laity

Vows of regular Buddhists- No killing, no stealing, no sexual misconduct, no substances that cloud the mind, no false speech (lies).

The 5 Precepts of the Sangha (monks)

Vows of monks (bikkhus) Own nothing, no sex, no high bed, no self-beautification, no eating after mid-day.

The 6 Realms of Existence

The 6 Realms (mindsets) you can be born into including the Hungry Ghosts, Animals, Angry Gods, Gods, Hell and Humans. You can only reach enlightenment from the Human Realm on the Wheel of Dependent Origination.

The 12 Niddanas

12 images on the outside of the Wheel of Dependent Origination that show how dukkha is caused (eg, the monkey eating fruit is craving).

The 3 Poisons

Shown in the middle of the wheel, hatred (snake), green (board and arrogance/ ignorance (cockerel) need extinguishing to escape rebirth.

Key Quotes

Walpola Rahula

Nirvana is 'cool water that calms the fever'

Do not engage in 'foolish babble and gossip'

Escape the 'round of rebirth'

Buddha

Nirvana is 'the end'

The 8 Fold Path is a 'raft' from Samsara to Nirvana.

Meditation 'frees us from Mara's fetter'

Nagasena II

The Chariot Analogy

The Candle Analogy

The turtle Analogy'

Ninian Smart

Nirvana is 'the end'

Jataka

Siddhartha has '3 mansions'

His 'legs were like bamboo, his back was like a rope'



Key terms

Aims of Punishment	The reasons we punish criminals (RRPD)
Community service	Completing free work in the community as a punishment. It helps the criminal to reform and benefits society.
Corporal punishment	Physical punishment- e.g. The Cane, physical beatings.
Crime	Breaking the law. It can be committed against a person (e.g. assault), property (e.g. arson) or the state (e.g. terrorism).
Capital punishment	The death penalty/ execution.
Deterrence	To deter/ put off a 'would be' criminal.
Evil intention	Morally wrong thinking- planning to do something to harm others.
Forgiveness	Letting go of anger towards someone who has wronged you.
Hate crime	A crime committed because of prejudice- e.g. beating up a person because they are homosexual. This can double your sentence in the UK.
Law	The rules which a government has to keep up safe.
Reformation	Where the punishment aims to change/reform the criminal.
Retribution	Where the punishment aims to make the criminal suffer. This also includes getting justice for the victims.
Protection	Where the punishment helps to protect society.
Greed	Wanting to possess goods or items of value that you don't need
Mental illness	A medical condition that affects a person's feelings, emotions, mood or ability to relate to others.
Addiction	Dependency on a substance which is difficult to overcome
Free will	The ability to make decisions freely.

Key teachings

Purpose of the law	The point and purpose of having laws is to ensure a society works well to benefit its citizens. For example, we need laws on tax to fund the NHS and Education. We need laws on traffic to prevent crashes (such as stopping for a red light) and we need laws to protect life such as murder being illegal.
Purpose of punishment	Punishments exist to make sure people follow the law for the benefit of society. It also helps them develop and understanding of right and wrong through experiencing the rewards of good behaviour or the consequences of negative behaviour.
Moral agency	As humans, we are 'moral agents.' This means we are individuals (agents), who are capable of making good or wicked choices (morality). As we grow and develop, we gain a better understanding of right and wrong and aim to become 'fully moral agents.' some people are more morally developed than others (a less morally developed agent). Some people may never become 'fully moral agents' as they don't have a common sense of morals- EG a serial killer.
Corporal Punishment	Physical punishment uses the 'pain vs pleasure' principal to humiliate and cause pain to deter 'would be' wrong doers. Punishments could include whipping, birching, beating and caning (the cane/rod was used in English schools until 1986 for state schools and 1999 for religious ones).
Capital Punishment	Known as the 'ultimate punishment.' It is only used for the most serious criminals. Methods could include gas chambers, hanging, beheading, the firing squad and lethal injection as well as the electric chair. In England, it was banned in 1965 (with the exception of treason- banned 1998). Around half of the world still allows its use.
Forgiveness	In order to keep harmony in a society and support people emotionally (including mental health), we need forgiveness. We need to let go of our anger otherwise it drains us and makes us bitter/ resentful. Corrie Ten Boom (A Holocaust Survivor) says 'forgiveness is setting the prisoner free only to find out the prisoner was me.' Often, we try make the other person suffer, but we suffer too.
Hate Crimes	A hate crime is committed against an individual or group because of who they are (their protected characteristics). Crime that is considered a 'hate crime' is given a higher sentence/ penalty. Protected characteristics include a person's religion, sex, sexual orientation/preferences, race, age, disability or gender reassignment.

Key Quotes

General quotations

'An unjust law is no law at all' **Thomas Aquinas**
 'It is our duty to break and unjust law' **Martin Luther King**
 The conscience is the voice of God and must be obeyed according to the **Bible and Church**
 'Right not to be discriminated against' **UN Declaration of Human Rights**
 The punishment should fit the crime' **Cicero**
 God will 'reward the good and punish the wicked'
Psalms
 'Those who spare the rod hate their Children' **Old Testament**
 'Give to Caesar' **Jesus**

Capital Punishment

'By killing a murdered you do not decrease the amount of murderers' **Churchill**
 'The Death Penalty has a 100% non-reoffending rate'
Donald Trump
 We have the 'right to live' and the 'right to not be tortured' **UN Declaration of Human Rights**
 'An eye for an eye' **Old Testament**
 'Thou shalt not kill' **Ten Commandments**

Forgiveness

'Let he who has no sin cast the first stone' **Jesus**
 'Forgive 70x7' **Jesus**
 'An eye for an eye makes the whole world blind'
Gandhi

Terminology

- Food poisoning
- Contamination
- Religious diets
- Factory farming
- Food poverty
- Food bank
- Halal
- Kosher
- Free Range
- Organic
- Bacteria
- Onset time

Food Poisoning

Main bacteria:

Salmonella, E-Coli, Campylobacter, Staphylococcus Aurous, Clostridium Botulinum.

Key symptoms

Nausea, vomiting, diarrhoea, stomach pain, fever, tiredness, loss of appetite.

Onset time

From consumption to first symptom. Different for each bacteria - can range from a few hours to a few days.

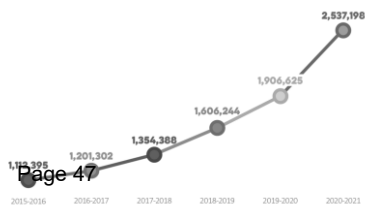
Vulnerable groups (risk of serious illness)

Elderly, young children, pregnant women, immune compromised individuals.

Food Poverty

Where an individual is unable to obtain or buy food and maintain good health.

Food bank usage over the last 5 years



Religious dietary rules

Islam	Meat must be halal. Fast during Ramadan. No pork or alcohol allowed.
Judaism	Abide by Kosher rules and slaughter. Meat and dairy must be avoided together.
Buddhism	Mainly vegetarian. Avoids alcohol. Some fast between noon and sunrise of the following day.
Sikhism	Mainly vegetarian. Do not overindulge – eat only what is required. Not allowed other religiously slaughtered meat.
Christianity	No strict rules – some denominations are stricter. Lot of symbolism with food – blood (wine) and body (bread) of Christ.

Types of factory farming

Battery Farming	Large barns, no natural light, short life span, crowded conditions. Increased incidence of death and disease. Cheaper meat.
RSPCA Assured	Large barns, less crowded, access to better food, access to stimulation, less disease and death. Slightly longer lifespan.
Free Range	Access to outside, medical care, better food, far less crowded, longer life span, more expensive.
Free Range Organic	Same as free range but not given antibiotics for health and given organic food.

Year 9 Geography - Natural Hazards

NATURAL HAZARDS

Natural Hazard	Natural process threatens people or property.
Tectonic Hazard	Earthquake and volcanoes threatening people or property.
Risk	People's vulnerability, capacity to cope and nature of hazard.



TECTONIC HAZARDS

Primary Effect	Immediate. Buildings destroyed, people die.
Secondary Effect	Later. Homeless, lack of clean water, disease.
Immediate Response	Evacuate, search and rescue, provide clean water.
Secondary Response	Rehouse, rebuild, improve monitoring.
Destructive Margin	Oceanic crust subducts under continental crust. V+E.
Constructive Margin	Oceanic crust moves apart creates new land as magma rises. V+E.
Conservative Margin	Plates slide past each other with friction. E.
Reasons people live in tectonic areas	Always lived there, confident of monitoring, tourism, fertile soil.
Risk management	Monitoring, Prediction, Protection and Planning.
Hazard poor part of world	Haiti: Jan 2010, Richter 7, 200 000+ dead.
Hazard rich part of world	New Zealand: Sept 2010, Richter 7.1, 1 died initially [185 in aftershock].



TECTONIC THEORY

Key Term	Definition
Continental	Relating to a continent, eg Africa, Asia, Europe.
Convection current	A movement within the Earth's mantle caused by the heat of the core.
Dense	Crowded closely together.
Mantle	The semi molten layer of rock underneath the Earth's crust. This is the largest layer in the Earth's structure.
Lava Magma	Molten rock that is released from the Earth's core in a volcano or fissure. Molten rock that is still under the Earth's surface.
Molten	A term used to describe a liquid substance (eg rock, glass or metal) formed by heating a solid.
Plate boundary	The region where two or more tectonic plates meet. It is a zone of intense seismic activity.
Glossopeteris	A plant that existed 200-300 million years ago. The fossil of this plant helps prove Pangea existed.
The Wallace Line	A line between Asia and Australasia where the ecosystems change and the flora and fauna are completely different.
Pangaea 2.0	The predicted reforming of a supercontinent in approximately 200 million years.
Composite volcanoes	The typical pointy cone style volcano that has explosive eruptions.

Plate Movement

Volcanoes

Plates either move towards each other (**destructive margin**) away from each other (**constructive**) or past each other (**conservative**).

Destructive margin

Constructive margin

Conservative margin

Year 9 Geography - Earthquakes

Plate Boundaries

Tectonic plate	One piece of the earth's crust.
Plate boundary	The point at which two tectonic plates meet.
Conservative	Two plates move past each other in opposite directions or the same direction at different speeds.
Constructive	Two plates move apart, allowing magma to rise and cool, forming new rock.
Destructive	An oceanic and continental plate collide. The oceanic plate is denser and is plunged into the mantle where it is destroyed.
Collision	Two plates collide and one is pushed upwards, creating fold mountains.

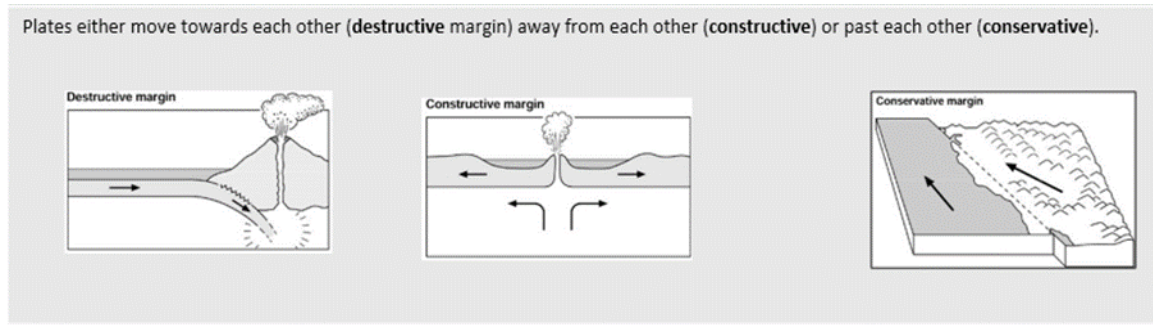


Preparing for earthquakes

Earthquake proof building	Buildings that are designed and built to withstand an earthquake.
Resource	Anything that is useful to people.
Seismometer	A machine that detects seismic waves caused by earthquakes.
GIS	(Geographical information system) Electronic maps with layers added to display information about the area.
Logarithmic	A scale on a graph where numbers increase exponentially, e.g. 1,10,100,1000 instead of 1,2,3,4.
Reasons people live in tectonic areas	Always lived there, confident of monitoring, tourism, fertile soil.

Measuring earthquakes

Epicentre	The measure by which the strength of an earthquake is determined.
Intensity	The concentration or strength of something.
Shockwave	A rapid flow of energy that is sent through the earth after an earthquake.
Magnitude scale	The size or severity of something, like an earthquake.
Richter scale	The measure by which the strength of earthquakes is determined.



Year 9 Geography – How fair is the world for the people who live within it?

Key Term

Gross National Income per Capita (GNI per capita).
 This is the total amount of money a country makes divided by the total population.
 A High Income Country is set at greater than \$12,500.
 A Low Income Country is below \$1,035.
 A Middle Income Country is between \$1,035 and \$12,500.

Development Indicators

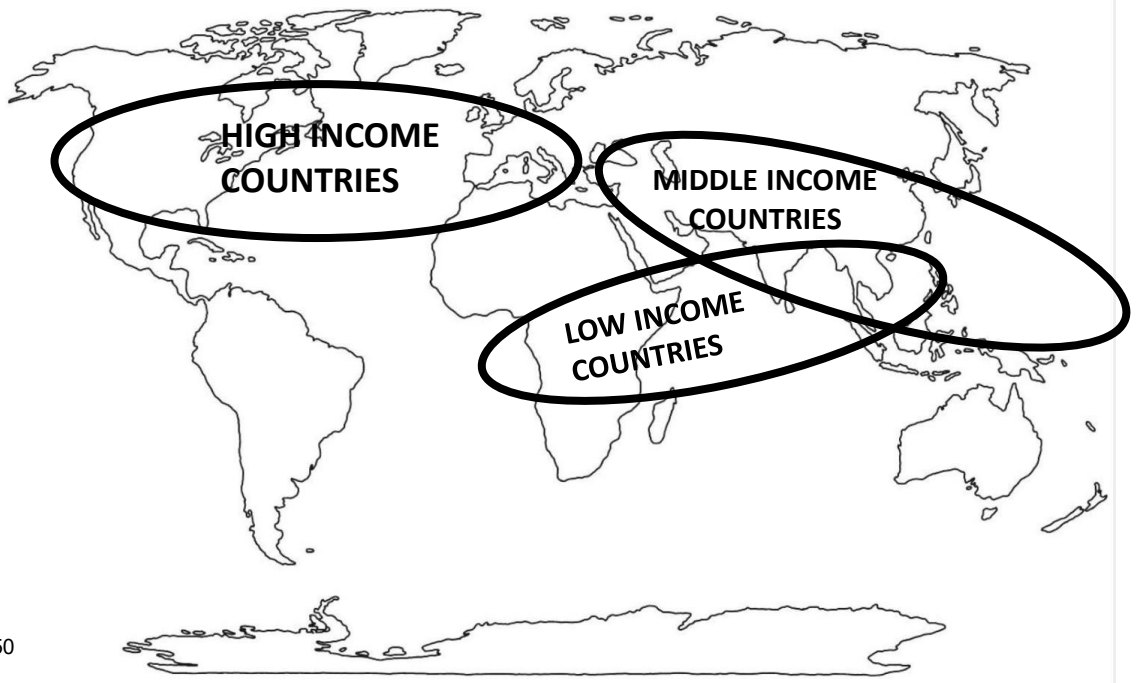
Life Expectancy	The average age that a person dies in a population.
Infant mortality rate	The number of babies that die before age 1 out of every 1000 live births.
% of population with access to clean water, education, electricity etc.	The % of a population that have access to basic social needs.
GNI	Gross National Income – The total amount a country earns through its goods and services.
GNI per capita	The GNI divided by the total population.
Infer	Using the information from a development indicator to judge quality of life in a country. For example, low life expectancy is the result of a lack of clean water, lack of regular food, exposure to pollution etc.
HDI	Human development Index. A holistic view looking at education, health and wealth in a country.

Key Terms

Social	Something that relates to people.
Economic	Something that relates to money.
Quality of life	The standard of health, comfort, and happiness experienced by an individual or group.
Development	Advancement in terms quality of life, both in social and economic terms
Inequality	The unfair situation in society when some people have more opportunities, money, etc. than other people.
Inequality fact	The richest 8 people have more wealth than the poorest 4 billion people combined.
Demographics	The statistical characteristics of the structure of human populations (such as age, ethnicity or income).

Cotton Industry Investigation

Primary Industry	The stage involved with the extraction of raw materials, in this case, cotton farms.
Secondary Industry	Manufacturing of products
Tertiary Industry	Sales and services.
Quaternary Industry	Digital, high tech, space age production.
Sweatshops	Cramped, dangerous factories which exploit workers with low wages.
Globalisation	The means of production of a product that spans the globe in its components, manufacture and sales.
Fairtrade	Global trade organised so that everyone involved receives a living wage.
Hypocrisy of Nike	They advertise as a company that represents human empowerment, but exploit people and the environment when they can to maximise profit.
Consumerism/ Fast fashion	The ideology that makes people want to continue buying things, long after they have what they need.
'Someone is paying for cheap clothing'	A £5 pair of jeans will have been paid for by someone's freedom, or means the worker isn't earning a living wage.



Year 9 History

Half term 1: The British Empire

Source skills

- Content** | What can be seen in the source.
- Provenance** | Who created the source and why?

Key people

Empire Builders

Queen Victoria

Queen of England (1838-1901) was queen of England at the height of the British Empire and was head of state for nearly a third of the globe. In 1876, she took the title of Empress of India.

James Cook

First Englishman to discover coast of Australia and charter the land. Established New South Wales as a British penal colony.

Australia

Arthur Phillips

Phillips was the first governor of New South Wales and oversaw the penal colony. He ensured that people were treated fairly. It was so successful that, once criminals served their sentence, they stayed as Australian citizens.

Africa

Cecil Rhodes

English businessman who made his fortune selling diamonds mined from south Africa. He became so wealthy he named the country after himself, Rhodesia (now Zimbabwe). He remains a controversial figure.

India

Robert Clive

English businessman who seized large areas of Bengal for the East India Company. This later became part of British controlled India.

Key terms

Indigenous Australian

Original inhabitants of Australia.

Britannia

A female figure used to symbolise the British Empire.

Colony

A country that is part of an empire.

East India Company

Trading company that gradually took control of India.

Empire

A group of countries, people or land ruled by one single country referred to as the "mother" country.

Famine

A shortage of food.

Jewel in the crown

The largest and richest part of Britain's Empire.

Imperialism

The act of building an empire.

Nationalism

Wanting your country to be the best or to be free from someone's empire.

Penal colony

A territory used as a place for housing prisoners.

The Raj

The period of British rule in India after 1857. From the Hindi word for reign.

Key events

Australia

- In 1768 James Cook charts the coast of Australia, claiming Botany Bay for the British Empire. English settlers cast out Aboriginal Australians.
- Australia was set up as a penal colony to house British convict population. Governor Arthur Phillip oversaw the colony, which was a success. This resulted in some wanting to remain in Australia as citizens.
- In 1851, Edward Hargreaves found gold in an Australian river. This sparked a mass movement of people to Australia: the population of Melbourne reached 123,000 by 1854.

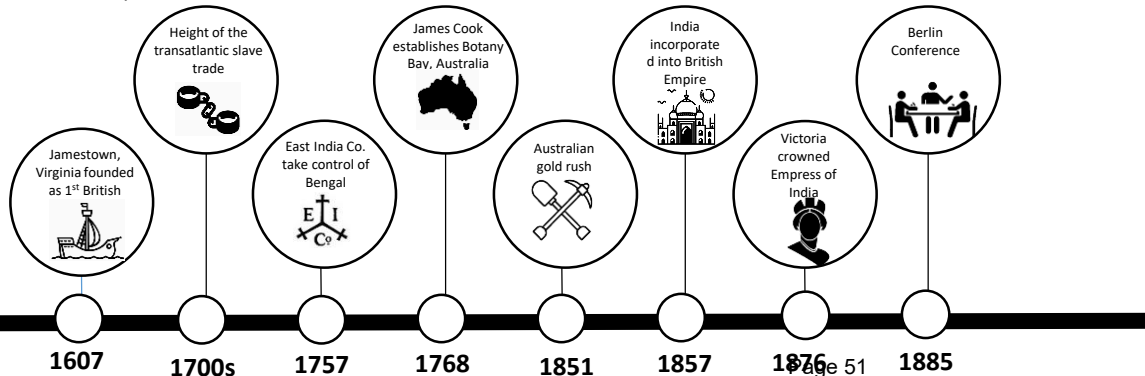
Africa

- English traders had been involved with the slave trade since 16th century.
- By the mid-1800's European countries began competing for African land. A large empire meant international power and recognition.
- In 1854 *The Times* named this hunt for African territories the "Scramble for Africa".
- In 1885, the European powers came together at the Berlin Conference. Here, Africa was carved up and distributed to the different European countries. There was not a single representative from Africa present at these talks.
- Britain controlled 32% of Africa.

India

- India was regarded as the 'Jewel in the Crown of the British Empire'.
- Originally, the East India Company (a trading company set up under Elizabeth I) controlled large parts of India. Robert Clive seized Bengal for the company, raiding its treasury and increasing the wealth of the East India Co.
- In 1857 there was a mass uprising by Indian soldiers. The Indian Mutiny led to thousands of deaths (both Indian and British). When order was restored, the British government took control of India, making it part of the British Empire. This signaled the start of the British Raj in India.
- In 1876, Queen Victoria was proclaimed Empress of India, despite never visiting the country.

Timeline



Content | What can be seen in the source.

Provenance | Who created the source and why

Key people

Central Powers

Kaiser Wilhelm II (1859-1914)
Grandson of Queen Victoria, Kaiser Wilhelm was emperor of Germany. His foreign policy of *Weltpolitik* brought him into conflict with other European powers. He abdicated at the end of the war, fleeing to the Netherlands.

Archduke Franz Ferdinand (1863-1914)
Ferdinand was heir to Austro-Hungarian throne. He was assassinated by Gavrillo Princip in 1914. His death sparked a chain of events that led to World War One.

Allied Powers

David Lloyd George (1863-1945)
British politician responsible for Britain's ammunition during the war. Became Prime Minister of Great Britain in 1916 and saw Britain to victory.

Gavrillo Princip
Serbian nationalist who was part of terrorist organisation the Black Hand Gang. This group opposed Austrian expansion and were responsible for the death of Archduke Franz Ferdinand

Alliances

Triple Entente – Britain, France and Russia (with Serbia).

Triple Alliance – Germany, Austria-Hungary and Italy.

Key terms

Imperialism
Extending a country's influence by building a large overseas empire – usually using military force.

Nationalism
A feeling of being superior to other countries and pride in your country.

Militarism
The belief that a country should keep a strong military and be prepared to use it to defend the country's interests.

Weltpolitik
'World politics' – an aggressive empire building policy.

Alliance
A group of countries that are formally united or working together for a similar aim or common purpose.

Annexe.
To take over another country.

Kaiser
Rule of Germany

Ultimatum
A final demand with a threat of force if you don't agree.

Mobilise
To get troops ready for battle.

Key events

Causes of World War One

Militarism; Spending on armies rose by 300% in Europe between 1890-1914. Naval Arms Race – Germany aimed to have more dreadnoughts than Britain.

Alliances: By 1914, Europe had formed two opposing alliances. The need for allies increased tension.

Imperialism; The Kaiser's *Weltpolitik* led to conflict in Morocco in 1905 & 1911. Austro-Hungarian expansion in the Balkans led to tension with Russia in 1908.

Nationalism; All countries were seeking to exert their dominance over others.

The First Moroccan Crisis

Morocco was one of the few African countries not controlled by Europe. France claimed, however Germany also wanted to expand it's empire – through 'Weltpolitik'.

1905 - The Kaiser visits Tangier in Morocco and announced that Germany would support an independent Morocco. He called for an international conference to discuss Morocco.

At the Agadir Conference, Germany was unable to prevent France from getting a foothold in Morocco. Also, France and Britain began secret military talks.

In 1908, Austria-Hungary annexed Bosnia, a small Slavic state next to Serbia. Serbia asked its ally Russia for help.

Germany said it would support Austria-Hungary in any dispute with Russia. Russia and Serbia had to back down.

Russia had lost face and was annoyed. Tension rose in Europe.

The Balkans

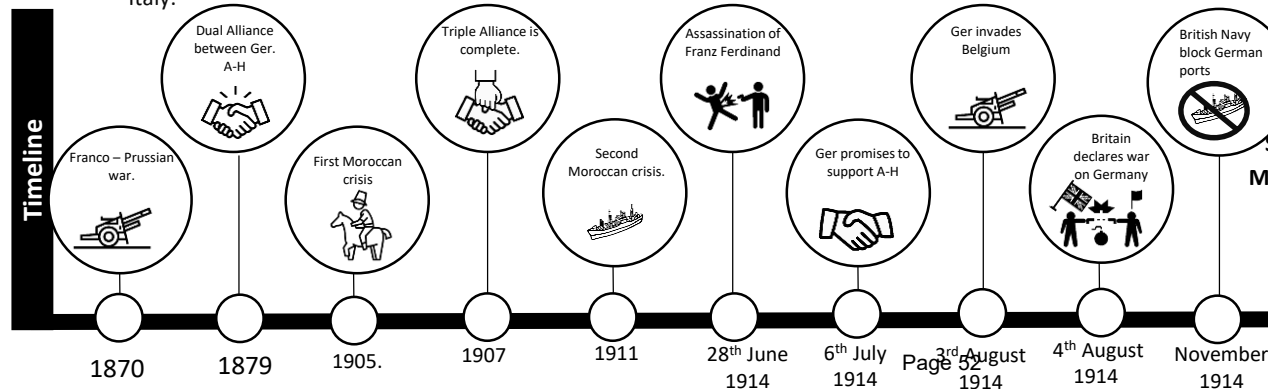
In 1911 a rebellion against the ruling Sultan broke out in Morocco. The Sultan appealed to France for help.

The French went to Morocco to help put down the rebellion.

Germany opposed the French actions, and sent a gunboat the *Panther* to Agadir to protect German interests in Morocco.

The use of a gunboat alarmed other countries, especially Britain who saw it as a warlike action. Britain declared it's support for France.

Germany were forced to back down and had to accept French control of Morocco. Germany felt humiliated.



Second Morocco Crisis

The July Crisis

Year 9 History

Half term 3: The First World War – Life in the Trenches

Source skills

- Content** | What can be seen in the source.
- Provenance** | Who created the source and why?

Key people

Central Powers

Kaiser Wilhelm II (1859-1941)
Grandson of Queen Victoria, Kaiser Wilhelm was emperor of Germany. His foreign policy of *Weltpolitik* brought him into conflict with other European powers. He abdicated at the end of the war, fleeing to the Netherlands.

General Hindenburg (1837-1934)
Commander of the German forces in WWI. He eventually becomes President of German and is replaced by Hitler when he dies.

Gen. Douglas Haig (1861-1928)
British soldier who commanded the allied forces at the Somme. Very controversial to this day with disputes over his tactics and understanding of the war.

Lord Kitchener (1850-1916)
British war hero who served in the Boer War. His image was used in recruitment campaigns across Britain to encourage men to join the war.

'Tommys' and 'Huns'

Tommy – Slang name for British soldiers.
Huns– Pejorative nickname given to German soldiers.

Key terms

Tank | Mechanical weapon, first used on the Somme.

No Mans Land | Area between the trenches, disputed terrain.

Poison Gas | Weapon designed to irritate the skin and blind victims..

Somme | The most 'famous' battle of WWI, with over 1 million deaths.

Blockade | Stopping food and supplies getting to an area or country.

Stalemate | A standstill where neither army can advance.

Attrition warfare | Wearing an enemy down through prolonged and continued attack.

Conscription | Every man of fighting age is required to fight in the army.

Armistice | An agreement to stop fighting; a ceasefire. This was signed on Nov 11th 1918.

Key events

New Weapons used in WWI
Tanks: First used by the British at the Battle of the Somme. They were clumsy and unreliable at first, they improved rapidly as the war progressed.
Poison Gas: First used by the Germans in 1915. Chlorine gas irritated the lungs and people died of suffocation. The gas used 'evolved' over time to become Mustard Gas. This had no smell and caused blindness and death.
Machine Gun: Gun capable of firing up to 8 bullets a second, however heavy and immobile at first.

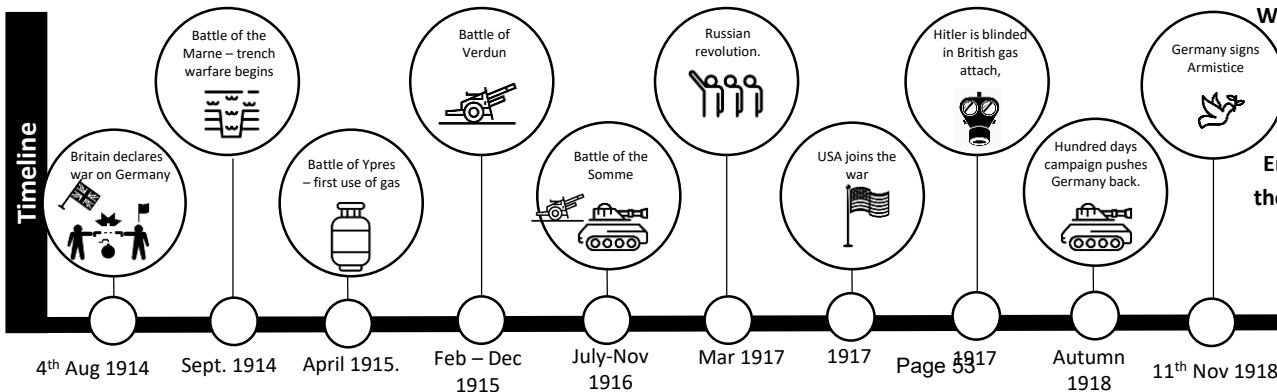
The Battle of the Somme
The most infamous battle of WWI and has been used as an example to demonstrate the horrors of the war. Lunched to relieve the French forces who were involved in heavy fighting at Verdun. The first day of the battle, July 1st 1916, was a calamitous day for the British forces, with over 50,000 casualties. This was after a 10 day bombardment of the German lines. The same tactics were repeated for many weeks and months thereafter.
146,000 Allied deaths, 164,000 German deaths. A shocking battle for the people back home in Britain.
Two views of Haig: 'Lions led by donkeys' which sees Haig as an uncaring general who tried the same failed tactics over and over again. Others take a more sympathetic view.

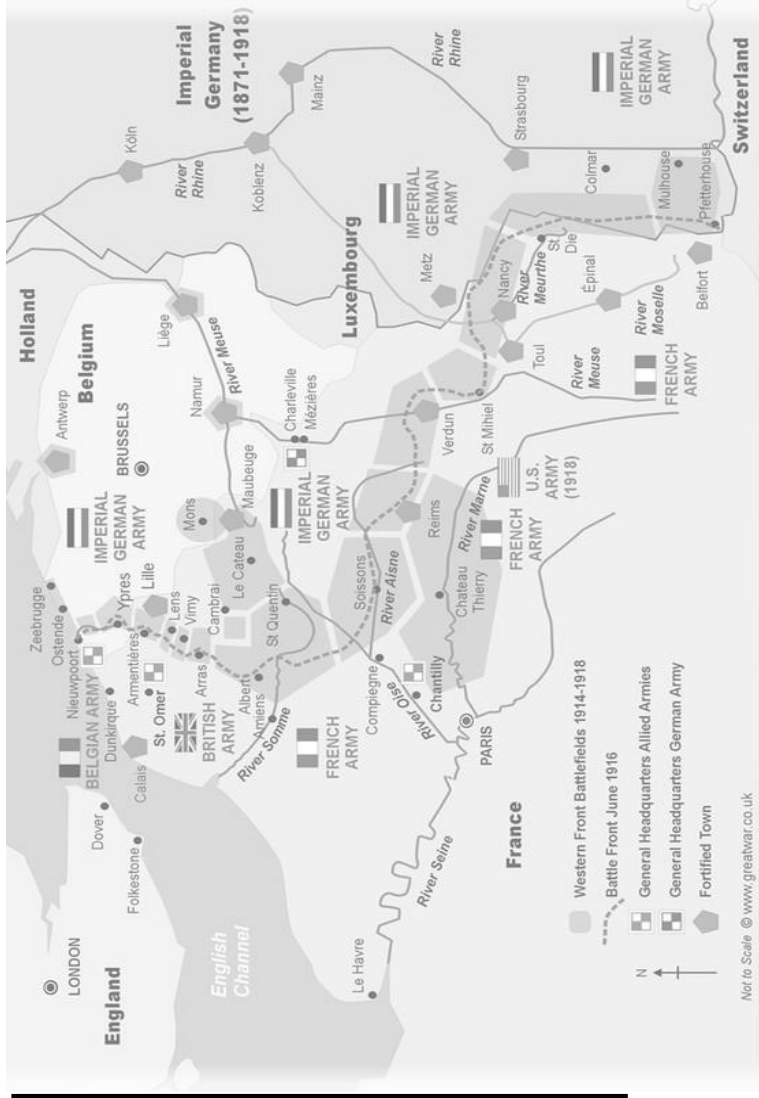
The Western Front

Life on the Western Front was difficult for soldiers, with poor hygiene, cold and damp living arrangements and boredom being prominent aspects of soldiers lives.

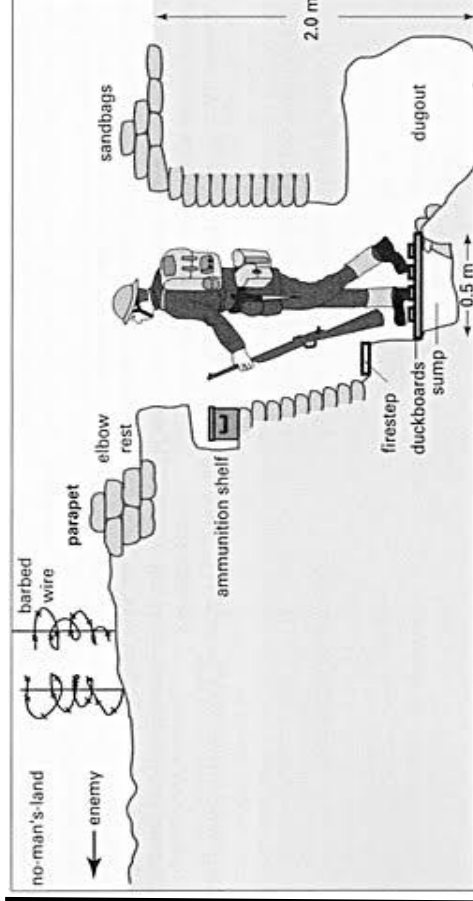
Ending the war

Fighting during the war went on for 4 years (1914-18). In 1916, David Lloyd George became Prime Minister and announced a 'total war' effort, which included mass production of weapons in Britain. In 1917, America joined the war for the Allies. They brought new weapons and soldiers. By 1918, Germany was close to running out of resources and its soldiers began mutinies. On 11th November 1918 Germany surrendered, signing the Armistice.





After the Germans failed to capture Paris and were held back after the Battle of the Marne in 1914, both sides 'dug in' a long line of trenches; the Western Front.



Hygiene – soldiers often went weeks without washing

Food – the repetitive nature of the bland food added to the sense of boredom. Stale biscuits, tinned beef and tea were common food rations for soldiers. They received chocolate and cigarettes from home.

Shell shock – the constant fear of bombardment and snipers bullets brought on crippling paranoia as soldiers struggle to cope mentally with their surroundings.

Boredom – life in trenches was repetitive and boring with little stimulation. There were long periods of waiting around.

Trench foot – exposure to wet and muddy conditions meant that soldiers' feet became cracked and raw. The British realised early on how important feet were and enforced strict care of socks and feet amongst British soldiers.

Letters – writing home was one of the few releases from the boredom

Year 9 History

Half term 3: Nazi Germany

Source skills

Content What can be seen in the source.

Provenance Who created the source and why?

Key people

Leading Nazis

Adolf Hitler (1889-1945)
Leader of Nazi Party and the fascist dictator of Germany from 1934 until 1945. During his dictatorship, he initiated WWII with his invasion of Poland.

Joseph Goebbels (1897-1945)
Minister for Propaganda in Nazi Germany. One of Hitler's closest advisors and was known for his public speaking and antisemitism.

Hermann Goering (1893-1946)
Leading Nazi official and head of the German air force during WWII.

Heinrich Himmler (1900-1945)
Leading member of the Nazi party and responsible for the Gestapo. He was one of the main architects of the Holocaust.

Nazi resisters

Hans and Sophie Scholl
Students and members of the White Rose Group who left anti Nazi leaflets in public places. They were executed for their crimes.

Claus von Stauffenberg
Senior officer at the War Office in Berlin famous for the 1944 July bomb plot in which Hitler was injured.

Key terms

Anti-Semitism Hatred and mistreatment of Jewish people.

Concentration Camp A prison camp used to hold political prisoners.

Dictator Ruler of a country with absolute control.

The Fuhrer Hitler's title; meaning all powerful leader.

Gestapo The secret police in Nazi Germany.

Great Depression A period of severe worldwide economic depression triggered by the Wall Street Crash of 1929.

Hitler Youth A programme aimed at young people in Nazi Germany in preparation for the military.

Indoctrination The process of teaching a person or group to accept a set of beliefs.

Kinder, Kirche, Kuche (3Ks) Children, Kitchen, Church –3 areas of focus for women in Nazi Germany

Mein Kampf "My Struggle" – Hitler's book, written whilst in prison in 1925.

Police State Govt exercising power through police.

SS (Schutzstaffel) Hitler's private protection squad who became elite soldiers..

Treaty of Versailles Agreement at the end of WW1 that blamed Germany for war.

Key events

Voting for Hitler At the end of WW1, many Germans were angry with the Treaty of Versailles. It made Germany take the blame for WW1. Hitler used this upset and hatred to encourage people to vote for his policies that were centred around revenge. Hitler promised to;

- Destroy the Treaty of Versailles
- Destroy Communism
- Reunite German speakers
- Create living space in the East (Lebensraum)

He also blamed the Jews and Communists for all of the hardship Germany was suffering.

Women

Before Hitler was elected, women in Germany had many rights and freedoms. When Hitler came to power this changed he believed they should perform a more 'traditional' role. He believed the role of women was 'kinder, kuche, kirche'. Propaganda was used to indoctrinate women. The mother cross was awarded to women who were successful in producing children.

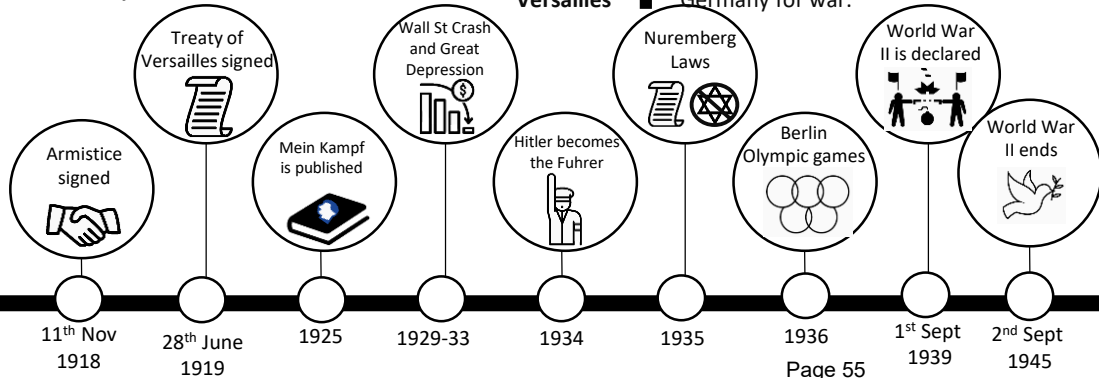
Children

The next generation of Nazis had to be indoctrinated from an early age, so education was about racial purity and ensuring the Thousand Year Reich. The Nazis used the school curriculum and after school groups like the Hitler Youth to control the young people of Germany.

Control

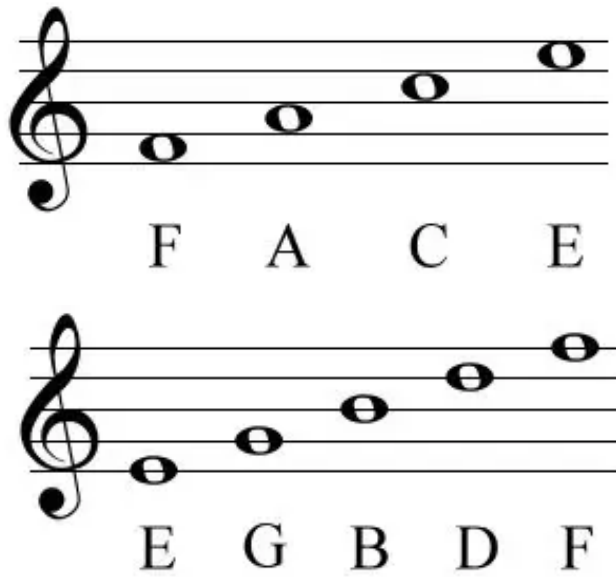
Hitler used propaganda, censorship and the police state to make sure he remained in total control of Nazi Germany. Organisations such as the Gestapo and the SS created an atmosphere of fear which led to German's following orders. Those who did speak out found themselves executed or put in concentration camps. This use of fear was supported by changes in the law, for example in 1933 there were 3 crimes punishable by death. By 1943, the number had risen to 46.

Timeline

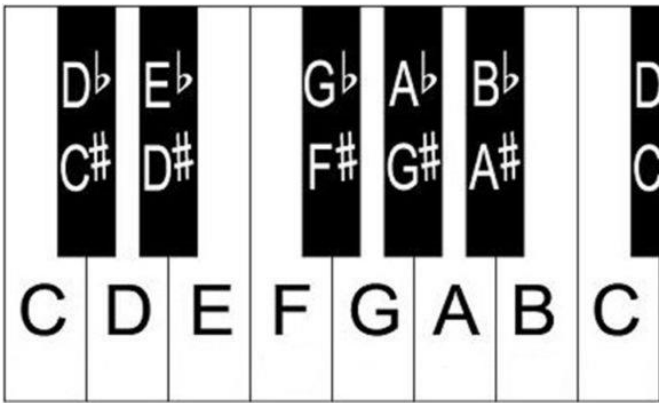


Terminology	
12 bar blues	A chord sequence, used as a foundation within blues music, that is repeated.
Blues scale	A collection of notes that are used to create specific genres of music.
Melody	The tune within a piece of music.
Improvise	Creating music on the spot. Unprepared performance.
Expression	To add emotion and sensitivity to music. To lift music from the page.
Raga	A collection of notes mainly used within classical Indian music.
Tala	A cycle of beats that repeats, mainly used in classical Indian music.

Stave Notation - Treble Clef



Musical elements: Dynamics, Rhythm, Pitch, Structure, Melody, Instrumentation, Tempo, Texture, Tonality, Harmony.



- Famous musicians you will study**
- Bessie Smith
 - Sonny Terry & Brownie McGhee
 - Howlin' Wolf
 - Billie Holiday
 - Anoushka Shankar
 - A.R. Rahman

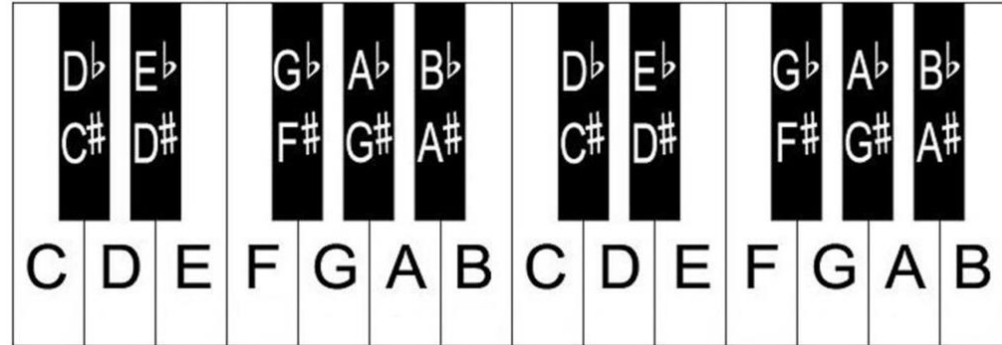
- Blues instruments**
- Banjo, harmonica, vocals, guitar, piano, trumpet, saxophone.

- Indian instruments**
- Sitar, bansuri, sarangi, harmonium, tabla, tambura.

Terminology

DAW	Digital Audio Workstation. We are using a program called Mixcraft.
Programming	A form of music production using electronic devices and software.
MIDI	Musical Instrument Digital Interface. A way to connect musical devices to control and create sound.
Synthesiser	An electronic musical instrument that generates audio signals.
Velocity	The force something is played with, which links to the volume of sound. This can be edited through Mixcraft.
Metronome or click track	A continuous click or sound at equal measures. To aid playing in time.
Piano roll	A graphical display of MIDI notes. Showing pitch, length and velocity, which can be edited and controlled.

Keyboard Diagram



How to build a basic chord

1) Use the 1st, 3rd and 5th notes of the scale to build a basic chord.

Example: **A B C D E F G**
= A minor chord = A C E

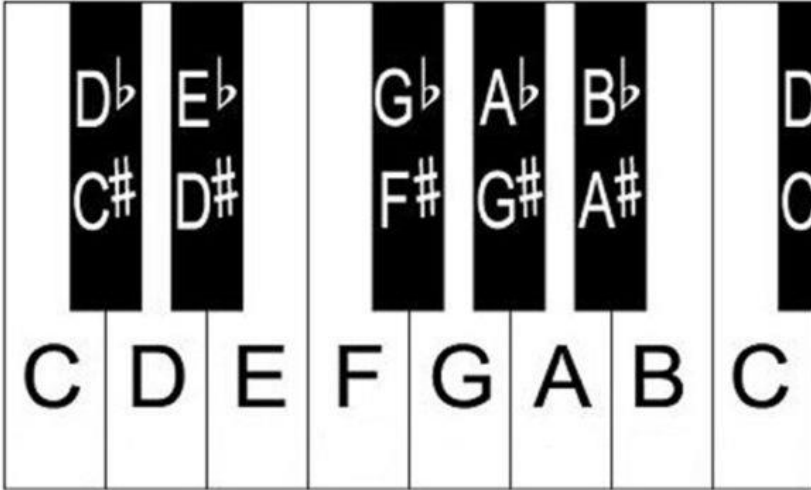
2) Major Chord

5+4 semitones = Example: C E G

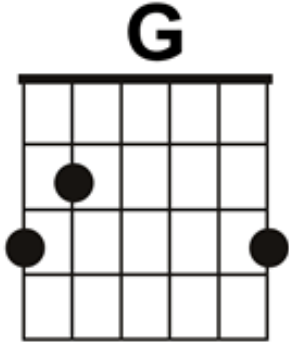
3) Minor Chord

4+5 semitones = Example: A C E

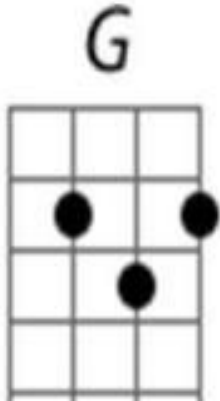
Keyboard Diagram



Guitar chord diagram



Ukulele chord diagram



Terminology

- Notation
- Accuracy
- Fluency
- Tempo
- Beat
- Time signature
- Rhythm
- Melody
- Phrasing
- Sequence
- Pitch
- Instrumentation
- Structure
- Harmony
- Chords
- Style
- Genre
- Ensemble

How to build a chord
 Use the 1st, 3rd and 5th notes of the scale to build a basic chord.
 Example: **A B C D E F G**
 A minor chord = **A C E**

Rules

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

Officials

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

Scoring

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

Bounce Pass

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

Stage one

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

Stage two

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

Chest Pass

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

Stage one

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

Stage two

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

Stage three

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

Jump shot

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

Stage one

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

Stage two

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

Lay-up

A lay-up provides a player with the opportunity to drive at the opponent's basket, jump close to the target and release the ball safely at the backboard.

Stage one

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

Stage two

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

Stage three

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

Key terms

Backhand

Doubles

Forehand

Grip

Rally

Ready position Serve

Singles Shuttle

Rules and regulations

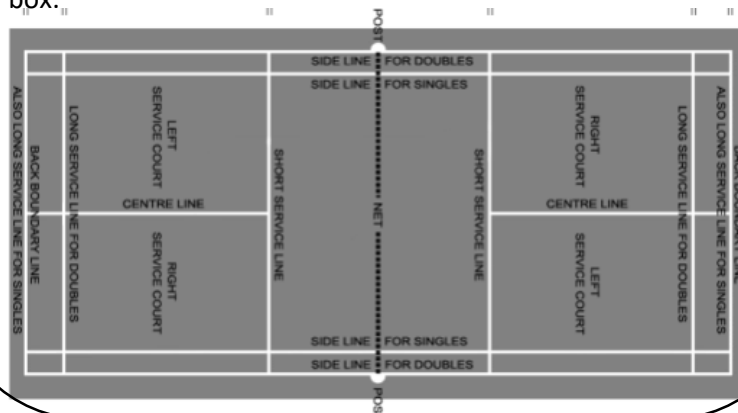
- A game always starts at love all (0-0).
- A game is played up to 21 points; the game must be won by two clear points.
- A game always starts with a serve from the right hand box (Even).
- The serve must land beyond your opponents service line.
- All serves must be hit into the diagonal service box.
- Whoever wins the point serves next.
- You cannot hit the net with your racket or body.

Serving/ court area

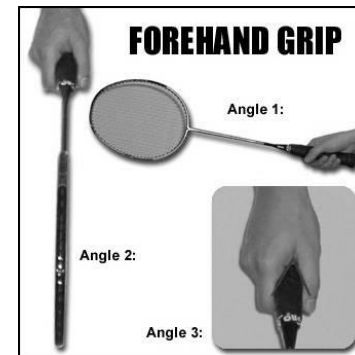
There are three types of serve: Short/backhand, long, flick.

Court area: *long and thin* for singles, *short and wide* for doubles.

Determining where to serve from: If the score is even you serve in the right box, if the score is odd you serve in the left box.



Types of grip



Attacking shots

- Smash shot
- Drop shot
- Net shot

Defensive shots

- **Overhead clear** (played to the back of your opponents court)

Exit routes:

Todmorden Badminton Club
 Todmorden
 Leisure Centre
 Ewood Lane
 OL14 7DF

Brunlea Badminton Club
 St Peter's Centre
 Burnley
 BB11 1NG

Year 9 PE

Football

Short pass

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

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

Long pass

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

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

Control

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

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

Block tackle

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

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

Throw-in

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

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

Heading

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

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

Year 9 PE

Health, Fitness and Exercise

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

Consequences of a sedentary lifestyle

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

Lifestyle choices

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

Health related exercise

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

Rules

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

Officials

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

Scoring

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

1. In open play, if a shot is successfully scored from inside the goal circle, the team gains one point.
2. If the team is awarded a technical foul then they will receive a free shot at the net. A successful shot will be awarded with one point.

Bounce Pass

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

Stage one

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

Stage two

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

Chest Pass

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

Stage one

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

Stage two

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

Stage three

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

Shoulder Pass

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

Stage one

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

Stage two

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

Pivoting

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

Stage one

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

Stage two

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

Stage three

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

Year 9 Spanish Units 11 Talking about a past holiday –where we went & where we stayed

Fui [I went]	Fuimos [we went]	de vacaciones [on holiday]	el año pasado [last year]	el verano pasado [last summer]	hace dos semanas [two weeks ago] hace un mes [a/one month ago]	
Fui a	Fuimos a	Alemania [Germany] Escocia [Scotland]	China [China]	los Estados Unidos [USA]	España [Spain] Francia [France] Irlanda [Ireland] Italia [Italy] Japón [Japan]	
Viajé [I travelled]	en [by]	autocar [coach]	avión [plane]	y el viaje [and the trip]	fue cómodo [was comfy]	fue divertido [was fun]
Viajamos [We travelled]		coche [car]	tren [train]		barco [boat]	fue largo [was long]
				duró [took/lasted]	1 hora 2 horas	
*Me alojé en [I stayed in]		Nos alojamos en [We stayed in]		un albergue juvenil [a youth hostel] un piso un camping	una granja [a farm] un hostel [a hostel] un hotel barato [a cheap hotel] un hotel de lujo [a luxury hotel]	
Me quedé en [I stayed in]		la casa de mis abuelos [my grandparents' house]				
Nos quedamos en [We stayed in]						
Me gustó porque [I liked it because]		el hotel era genial [the hotel was great]		había mucho que hacer [there was a lot to do]		
Lo pasé bomba porque [I had a great time because]		la gente era simpática [the people were nice]		había playas magníficas [there were superb beaches]		
En el hotel	había [there was/were]	un gimnasio [a gym] un parque acuático [an aqua park] un restaurante [a restaurant]	una cancha de tenis [a tennis court] una sala de juegos para niños [a playroom for kids] una zona de spa para mis padres [a spa area for my parents]			

REMEMBER : alojarse and quedarse both mean “to stay”. Use alojarse only for paid accommodation such as hotels. Quedarse is much more versatile and can be used both for staying in most places (including cities), with family and also paid accommodation.

Year 9 Spanish Units 12 - Talking about a past holiday – what we did and our opinion of it

Durante las vacaciones [During the holidays]		hice muchas cosas [I did many things]		no hice casi nada [I did hardly anything]	
El primer día [On the first day]		pasé mucho tiempo con mi familia [I spent a lot of time with my family]			
		pasé bastante tiempo solo/a [I spent quite a bit of time alone]			
El primer día [On the first day]	alquilé una bici [I rented a bike]				
	comí comida deliciosa [I ate delicious food]		compré recuerdos [I bought souvenirs]		
El segundo día [On the second day]	conocí a un chico simpático / una chica simpática [I met a nice boy/girl]		descansé en la playa [I rested on the beach]		
	di un paseo [I went for a walk]		jugué con mis primos [I played with my cousins]		nadé en el mar [I swam in the sea]
Por la mañana	probé platos típicos [I tasted typical dishes]		saqué fotos [I took photos]		tomé el sol [I sunbathed]
	visité lugares históricos [I visited historic places]				
Por la tarde	me acosté tarde [I went to bed late]		me desperté tarde [I got up late]		
Por la noche	fui [I went]	al parque a la playa a la montaña al centro de la ciudad	para [to]	nadar en el mar [swim in the sea]	
	fuimos [we went]	al centro comercial		comprar cosas [buy things]	
		de excursión [on a trip]	de marcha [clubbing]		
	*hice [I did]	hicimos [we did]	buceo [diving]	senderismo [hiking]	
			natación [swimming]	turismo [sightseeing]	
Lo mejor fue cuando [The best thing was when]	cené en un restaurante [I had dinner in a restaurant]				
	vi un partido de fútbol [I saw a football match]				
	pasé tiempo con mis abuelos [I spent time with my grandparents]				
En mi opinión [In my opinion]	fueron unas vacaciones [they were ... holidays]		inolvidables [unforgettable]		buenísimas/malísimas [really really good/bad]
y [and]	pero [but]	(no) me gustaría [I would -not- like]	volver [to go back]		el año próximo [next year]

REMEMBER – In Spanish “**hacer**” means “**to do**” and is often used in combination with actions and activities. However, watch out, because sentences such as “**HICE natación**” are translated back into natural English as “**I swam**” or “**I WENT swimming**”.

Year 9 Spanish Units 13 - Talking about a day trip to Cádiz & Seville

Hace dos días [Two days ago]		fui	fuimos	a Cádiz	Viajé [I travelled] Viajamos [we travelled]	en autocar [by coach] en coche [by car]	
El viaje a Cádiz [The trip to Cadiz]		duró tres horas [took 3 hours]		y me gustó porque fue [and I liked it because it was]		apasionante [exciting] divertido [fun]	
En Cádiz	me alojé [I stayed] nos alojamos [we stayed]		en un hotel	Era barato/caro [It was cheap/expensive]	pero y	el personal era [the staff was]	acogedor [welcoming] simpático antipático
				Estaba limpio [It was clean]			
El hotel	estaba	cerca	lejos	del centro del puerto de Santa María [from the port of Santa María]	de la catedral de la playa de la Caleta [from the Caleta beach]		
Lo que más me gustó [What I liked the most]		de Cádiz [about Cádiz]		fue cuando [was when]	comí marisco en el puerto de Santa María [I ate seafood in the port of Santa María] visité el castillo de Santa Catalina [I visited the Santa Catalina castle] fui al teatro romano [I went to the Roman theatre]		
Me encantó [I loved]		Nos encantó [We loved]		el viaje a Cádiz	y me gustaría [and I would like] y nos gustaría [and we would like]	volver el año próximo [to go back next year]	
Hoy [Today]	Mañana [Tomorrow]	voy a ir [I am going to go] vamos a ir [we are going to go]		a Sevilla	en tren [by train] en autocar [by coach]	El viaje dura [the trip takes]	dos horas [2 hours]
En Sevilla	voy a alojarme [I am going to stay] vamos a alojarnos [we are going to stay]		en	un albergue juvenil [a youth hostel] un hotel	cerca de [near] al lado de [beside]	la catedral de la Giralda la plaza de España	
El primer día [On the first day]		por la mañana [in the morning] por la tarde [in the afternoon]		voy a	vamos a	dar un paseo por [go for a walk around] visitar [visit]	el Museo de Bellas Artes [the museum of fine arts] el parque de María Luisa el barrio de Triana
El segundo día [On the second day]		voy a	vamos a	dar un paseo por el casco antiguo [to go for a walk in the old town] ver los jardines del Real Alcázar [to see the gardens at the Real Alcázar]			
Finalmente [Finally]		voy a	vamos a	volver a casa [go back home]	en autocar	en avión	en coche en tren
Creo que el viaje a Sevilla será [I believe the trip to Sevilla will be]				genial	Page 66	inolvidable [unforgettable]	